THE BUILDERS' JOURNAL

OCTOBER

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THE BUILDERS' JOURNAL

A stimulating influence in the construction industry for
Good Design Enduring Construction Craftsmanship Business Capacity

VOLUME ONE NUMBER SIX

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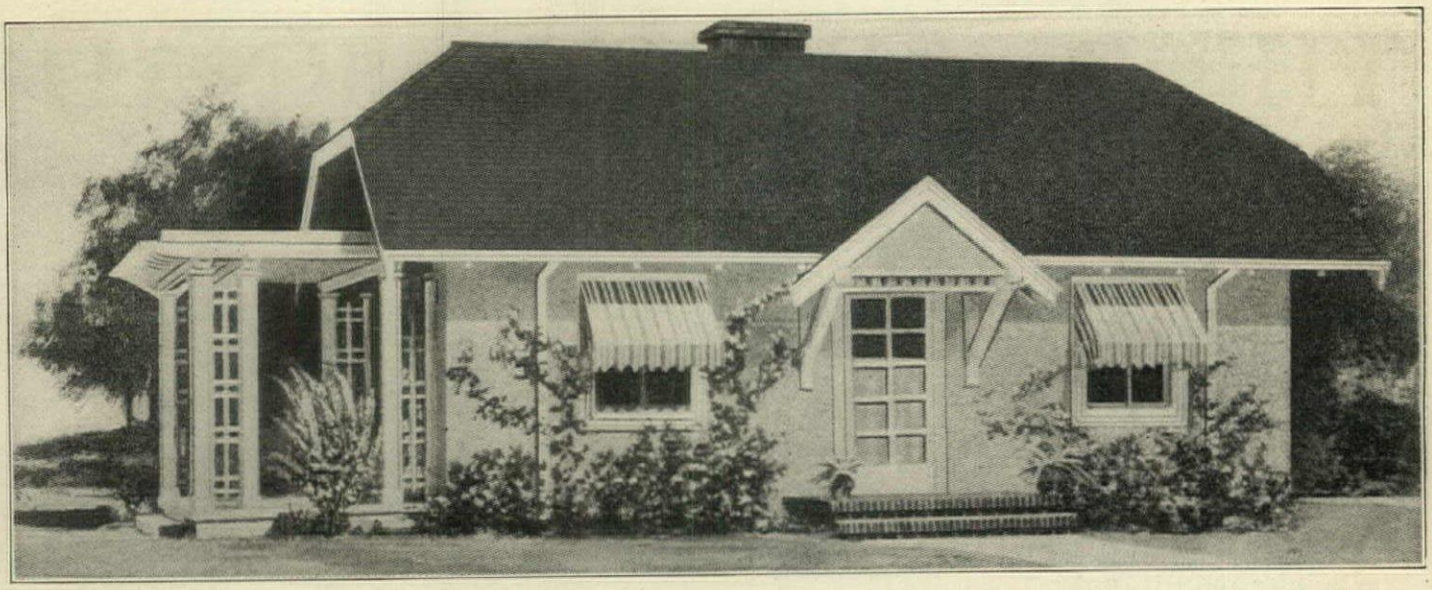

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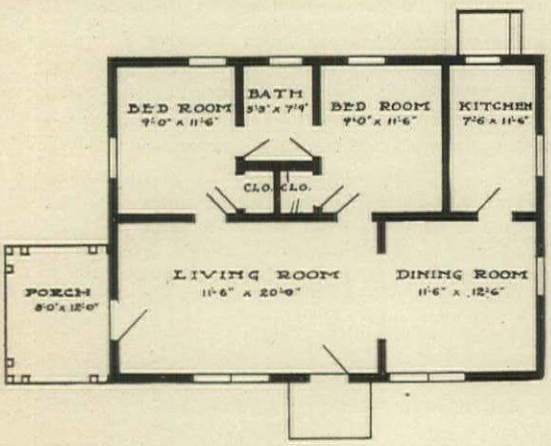

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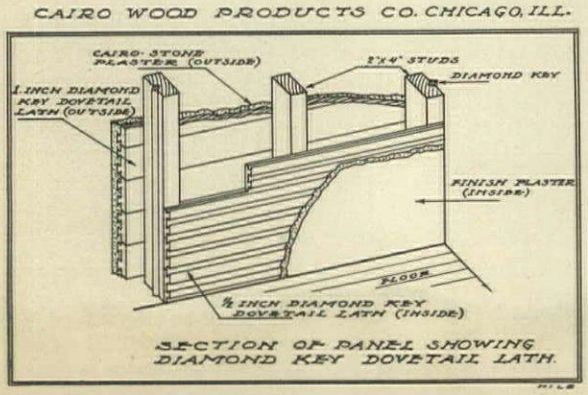

SECTION OF PANEL SHOWING DIAMOND KEY DOVETAIL LATH.

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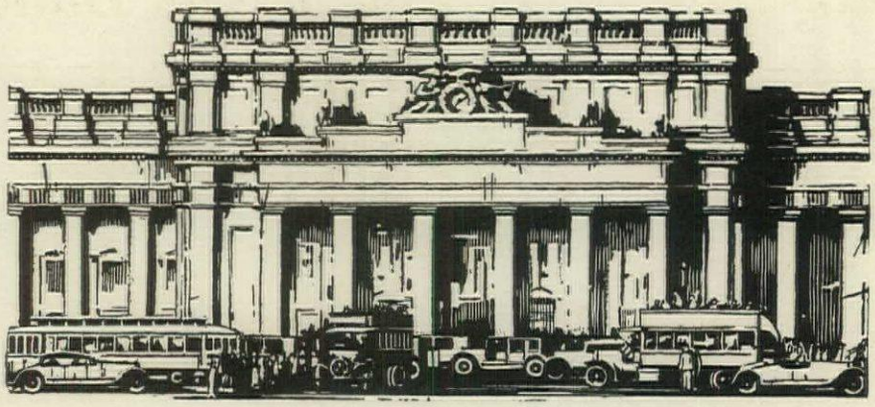

ACTIVITY—buildings and streets busily thronged with people—pleasure and business bent. Some walk—some ride in machine, on trolley or bus. On every conveyance, in every building, doors mark the surge of human travel—quietly. For hinges make activity silent.

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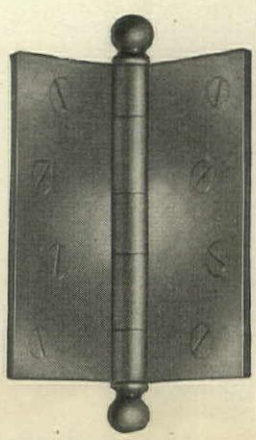

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THE BUILDERS' JOURNAL

The Magazine of Better Building

VOL. I, NO. 6 OCTOBER, 1920

"From My Own Viewpoint"

A Representative of a great metropolitan newspaper recently asked Judge Gary's opinion as to future business conditions. In replying he is quoted as beginning his statement with the significant words, "From my own viewpoint." These are the words that are in the mind if not in the mouth of every builder who is interested in future business conditions. His interest has been primarily in their effect on his own business. Judge Gary's viewpoint, however, is of necessity so broad that it may include the viewpoint of builders, and for this reason his recent statement is significant.

In the interview referred to there were made two particularly significant statements, one to the effect that the unit production of labor is increasing, and another, that business conditions today look more hopeful than at any time during the past six years.

These points, coupled with the fact that excellent reports as to crop conditions are being received from all sections of the country, would seem to apply directly to the business of every builder. If the unit production of labor is increasing production itself will increase. If large business enterprises are in general noting better conditions to come, this fact will be reflected among smaller business enterprises. Finally, if crops are better we may expect more money to be available for investment in building construction, particularly in farm buildings and in moderate cost homes.

"From my own viewpoint," therefore, let every builder inject his share of optimism into a situation which may ultimately react to his benefit. These are times for intelligent application and hard work. Day by day more men are being released for the building industry, not only for actual construction work, but for employment by building material manufacturers.

As plant conditions improve and transportation conditions become better stabilized there will be at least a more certain supply of building material and labor, and this condition, together with increasing availability of building loan funds, will tend to bring about an active wave of construction of the smaller types of building. The great demand for buildings of this character is forcing issue after issue, and new ideas and new methods of financing and construction are being developed with great rapidity.

It is evident, therefore, that every wise builder will follow closely the developments of the times, in order that his service may be efficient and comprehensive enough to develop a definite, good reputation as more work becomes available. Optimism and hard work are what the country needs now.

Current Notes and Comments

The General Tone of Business Is Optimistic with Confidence in Immediate Future

SO much of our difficulty in getting back to normal business is the result of indecision, waiting to see what the next man is going to do before we take a step, that a recent analysis of country-wide business conditions made by the Fidelity and Deposit Company of Maryland should be of general interest in giving a clear picture of the present status of affairs. The information on which the report is based was gathered by 900 representatives of the bank located throughout the country and is considered by Franklin K. Lane, former Secretary of the Interior, "the first comprehensive, carefully made and approximately accurate picture of industrial, agricultural, financial and political conditions throughout the United States."

The question of first concern to builders, the status of building, is surprisingly satisfactory in view of adverse circumstances surrounding it. Out of the 9 sections into which the country was divided, 5 report building as increasing. These districts comprise New England, South Atlantic States, East and West South Central and Pacific Coast States. The rest of the country, which takes in the large Central and Middle Atlantic States, reports building as decreasing. In practically every center the greatest building activity is in factories and warehouses with low priced dwellings in great demand; only in the West North Central district is activity reported in high grade dwellings and apartments.

From a general business viewpoint it is reassuring to learn that there is no shortage of raw material sufficient to curtail production. Industries generally report a satisfactory volume of orders. Transportation conditions are improving and a substantial reduction in the freight car shortage is noted in every district except in the Rocky Mountain States, in the Southwest and in the district including Kentucky, Tennessee, Alabama and Mississippi.

The only unfavorable conditions are a shortage of coal and failure of labor to increase individual productivity in spite of the fact that wage increases in 1920 are reported as from 10 to 50%.

Financially the country is in a strong position. In only one of the 9 divisions is there a decrease in bank deposits; individual savings accounts show marked improvement everywhere, indicating that the orgy of spending and extravagance is over. Money for loans is nevertheless tight and high interest rates prevail which is generally accounted for by the lower purchasing power of the dollar which requires higher money charges as it does higher prices for all other commodities. The building industry is justified in taking an optimistic view of the future because with general business conditions good, and the demand for buildings so great, activity in building cannot be long deferred.

Make Efforts to Extend Length of Construction Season

WITH the period normally considered the construction season rapidly drawing to a close it is realized that only a portion of the housing and other building we need is under way. Before the war it was generally considered that with winter weather active construction should stop, but during last winter the demand for expansion of industrial plants was so great that under the force of circumstances building in many sections of the country was carried on without interruption.

It should be evident that a building brought to earlier completion through winter work is of advantage to the owner in giving him earlier occupancy and reducing the non-revenue-producing period. From the contractor's viewpoint it simplifies his problem of keeping an organization together. The annual charge for equipment is greatly reduced because of its more extended use, labor responds to the advantage of steady employment, and transportation difficulties are lessened because of spreading the shipment of materials over a longer period.

When the problem of the day is the discovery of means to increase production, it would seem that the building industry could make a large contribution toward that end by extending its working season. This year, particularly, there will undoubtedly be many opportunities to get buildings under way before spring; with the successful results that are already recorded builders should have no hesitancy in recommending winter construction.

Are You Doing Your Bit? Exemption from Taxes on Mortgages Needed

ONE situation with reference to housing shows no signs of improvement. Returns from building departments while indicating a gain in the month of August in the total amount of building show practically a stop in residential building. In Boston, as an example, out of a total of 43 permits issued in a week, but one was for a dwelling house. In the face of the general shortage of houses this is a serious condition. The difficulty in getting mortgage money is probably the chief obstacle and an important factor in making mortgage loans unattractive to investors is the Federal Income Tax on mortgage income which reduces the net return and places mortgages at a distinct disadvantage when compared with tax exempt municipal bonds.

The Associated Metal Lath Manufacturers in a recent bulletin urge all connected with the building industry to take an active part in getting national legislation passed that will exempt mortgages on new homes from taxation.

The bulletin states that banks were obliged to stop construction loans, not because of prices of materials, but because they could not dispose of real estate mortgages to their customers. This was largely due to the Federal Income Tax which, with its heavy Surtax on the larger incomes, makes mortgage buying at 6% absolutely impossible. No one can blame the man with an annual income of $50,000 for refusing to make investments that will yield but $412 on $10,000 when he can easily get $600. In the case of an income of $30,000 invested in mortgages there are Federal Normal and Surtax charges levied making a total of 21% which must be deducted before the net income to the investor is found.

Investors are therefore putting their funds into municipal bonds which are tax exempt. To compete with these 6% bonds the banks would have to offer 7.6% interest on a taxable mortgage to an investor with a $30,000 income, or 8.7% to the $50,000 investor if he were to come out even. With mortgages tax exempt, however, they could readily be sold on a 5% and 6% basis.

The Builder and His Dealer

Difficulties in building make full co-operation necessary

By E. C. Roberts

A WIDELY popular automobile is advertised as being "standardized,"—that is, the parts are brought together and assembled into a finished car. It seemed to be a new idea in the automobile field, yet it is what builders have been doing from time immemorial,—assembling materials into completed structures. Yet builders do not sell the completed structures to owners, nor do dealers sell the materials to the builders. Each is selling a service,—the builder his services in erecting a building and the dealer his services in furnishing the materials. And in the final analysis the materials are not bought or sold,—only the service they render in the completed building is sold.

Thus the furnishing and use of the proper materials to perform certain service in the building becomes as important as any other function. And part of the dealer's task is to know the proper material and how it should be used to secure the desired result; while to the builder is assigned the task of using that material so as to secure the desired result.

Perhaps one of the most serious drawbacks under which the small contractor and building supply dealer labor is a lack of understanding of each other's problems. It is up to the dealer to buy, not from the lowest bidder, but from the producers from whom he is assured of getting delivery. It is his problem to aid in getting the material into his yard, to unload it promptly and economically, to reload it to his delivery equipment and get it to the job, and all on a margin that requires the utmost skill to prevent showing a red ink balance on his ledger.

However, the troubles that delay and aggravate the dealer in turn are reflected on the contractor,—but the average small contractor is not familiar with conditions beyond the dealer's control and vents his ire upon the luckless chap who is furnishing materials.

For instance, nearly every contractor has suffered through inability to secure labor,—yet he fails to realize that the dealer has to have labor, that the producer must have labor. Contractors have experienced delay in railroad travel, yet they fail to co-ordinate this with the much worse delay in freight. It seems that the small contractor is so busy with his own immediate troubles that he cannot or does not see that his worries are the same as the dealer's and producer's, and their difficulties are only the same as those from which the whole nation is suffering. The remedy would seem to lie in a better understanding of the conditions that affect the whole building industry.

IN order to secure the proper distribution of materials contractors should familiarize themselves with what constitutes a standard load and order accordingly. For instance, if 1500 common brick constitute a wagon load, and 2500 a truck load, as far as possible the contractor should order those quantities. When the end of the job is in sight he should estimate carefully what he needs to complete his job, for it costs money to pick up material and haul it away. Not only that, but the team or truck that is picking up over-ordered material should rightfully be delivering, for undoubtedly some other builder is waiting.

Often a dealer is called upon to deliver material over almost impassable roads, where, if the builder had notified the dealer when the road or street was in such condition that it would bear traffic, delivery could have been made with much less expense.

A contractor should assure himself that the owner for whom he builds is able and willing to pay. Too often, the prospective owner is lax in meeting his obligations and an additional burden is thrown on the small contractor. "Shoe string" owners should also be avoided. It is true that the commercial fabric of the world is woven of golden threads of credit, yet more than a casual glance is given to the strength of these threads by the successful industries.

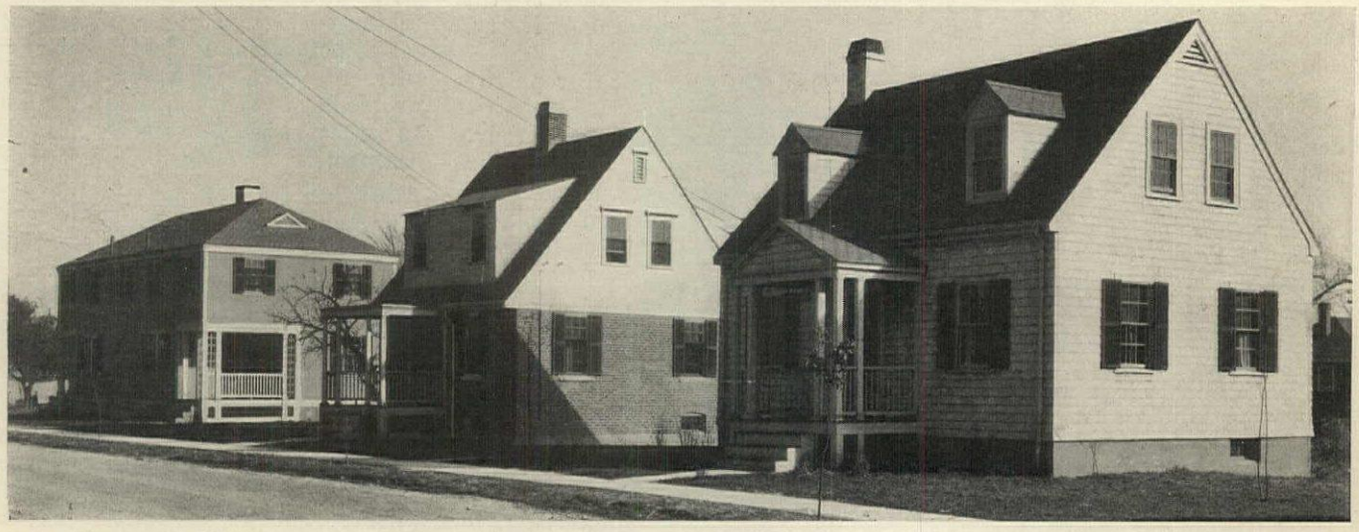
Money makes the mare go just as well today as it ever did, and credit men in many firms are now insisting that a man should have, besides a clean record and a willingness to pay, *the ability and means* to meet his obligations. Therefore a contractor should be alive to every means to foster his credit reputation. Not only should he see his way clear to pay his bills, but he should make certain that his clients will pay him promptly. Many a small builder has done himself damage by waiting until it was too late before taking the dealer into his confidence.

If a contractor would talk over with a dealer the advisability of taking on certain work and arrange terms before going ahead, much unpleasant controversy would be avoided. The dealer isn't anxious to collect his bills merely for the satisfaction of handling the money. He, too, has obligations to meet, and he must meet them promptly, else his sources of supply will be cut off.

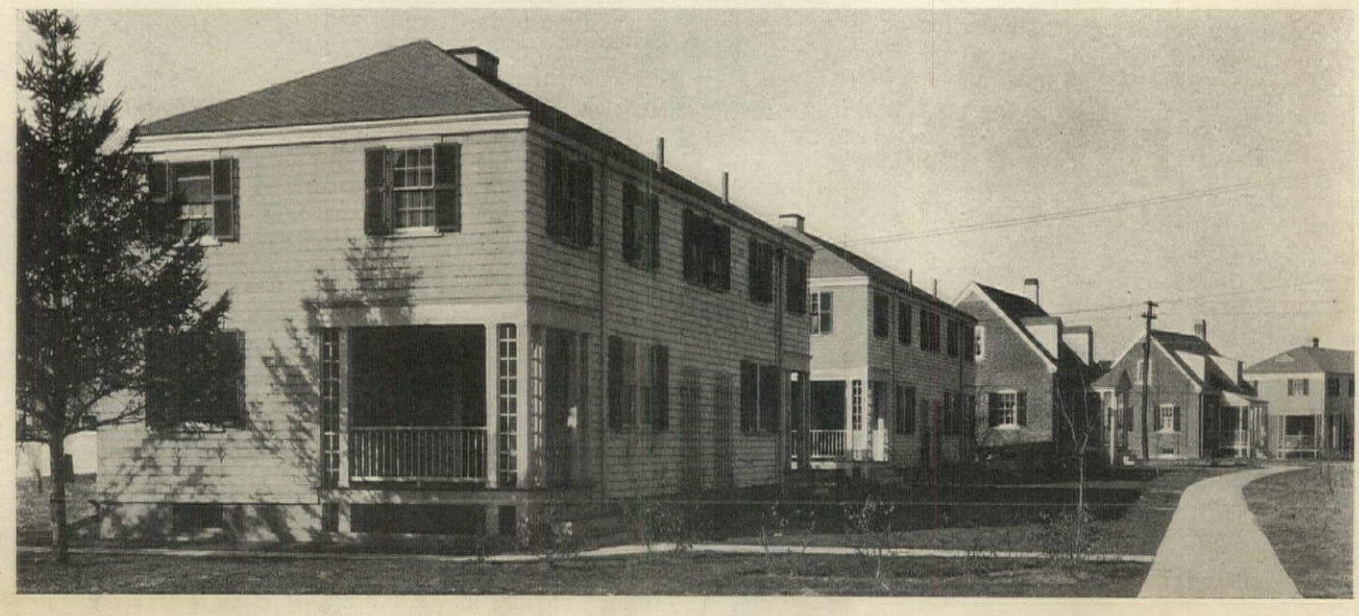
LASTLY, a spirit of confidence should obtain between dealer and builder. The old ideas of skinning corners and "getting by" are over, for business men know that success is not built on a single operation, but upon a continued series of tasks well and honestly accomplished. The standardization of materials is largely responsible for the elimination of trickery, and inherently most men are honest. Poor construction has largely been eliminated, and the building industry stands on a high plane of efficiency and worth. Perhaps no other industry is so affected by conditions not under its control. Certainly no other industry, unless it be iron and steel, employs so many men, or consumes so much material, or is so dependent upon railroads. Nor is any other industry so hard hit in times of panic or so overworked in times of prosperity. Building is the first industry hit in hard times and the last to recover. It goes hand in glove with financial conditions and when money is "tight" building suffers. Building is tremendously dependent upon labor.

Thus, with producer, dealer and builder so linked, a mutual understanding of each others' problems should cause a more equitable use and distribution of materials and labor.

This street view shows the grouping of two-flat and two-family semi-detached houses. Note the balanced arrangement of houses each side of center house which is the 4 room semi-detached plan on page 11



A view in the Arnold Street tract showing the groupings of single houses. Note the variety that is had in these houses by using different roofs and dormers although plans are similar



This Government housing development at Quincy, Mass., was built by Casper Ranger Construction Co. The houses were designed by James E. McLaughlin, architect; the town plan by Herbert J. Kellaway, landscape architect, and the engineering work by Ernest W. Branch, engineer. Walter P. Moulton, general superintendent

An Industrial Housing Project

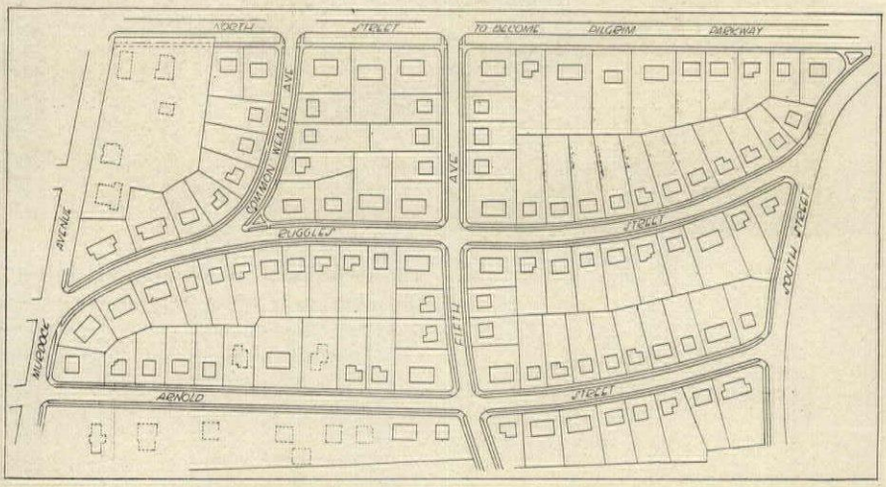
These houses at Quincy, Mass., offer valuable ideas for inexpensive small houses. Types to suit all needs

James E. McLaughlin, Architect

THE question of housing is much to the fore, particularly that involving large operations; there is, therefore, special interest for builders in industrial housing of a simple character that has been successfully carried out for it holds many suggestions of immediate value.

One of the developments financed by the government during the war is illustrated here. It has the distinction, in addition to its special attractiveness, of being one of the few examples where the cost was held within the estimate.

These houses were built in Quincy, Mass., for the employes of an important shipyard, a subsidiary of the Bethlehem Steel Co. Three sites were chosen for development containing in all 50 acres and on which were erected 90 single houses of 5 to 7 rooms each, 57 semi-detached houses and 109 two-flat houses. The work was done during 1918 and the average cost, per family, was $4722.68 for the houses, and $5583.55 per family for the complete development including cost of land and road and sidewalk construction.

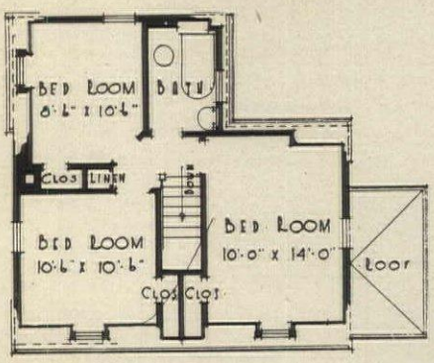


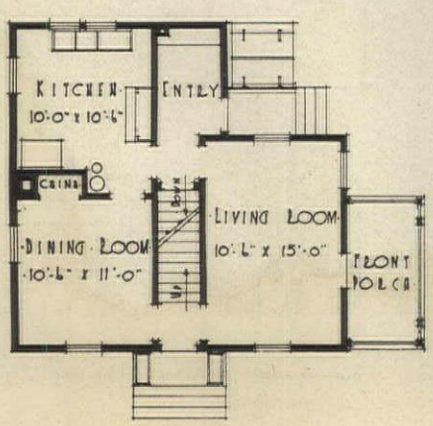
Street layout of the Arnold tract showing positions of houses
Herbert J. Kellaway, landscape architect

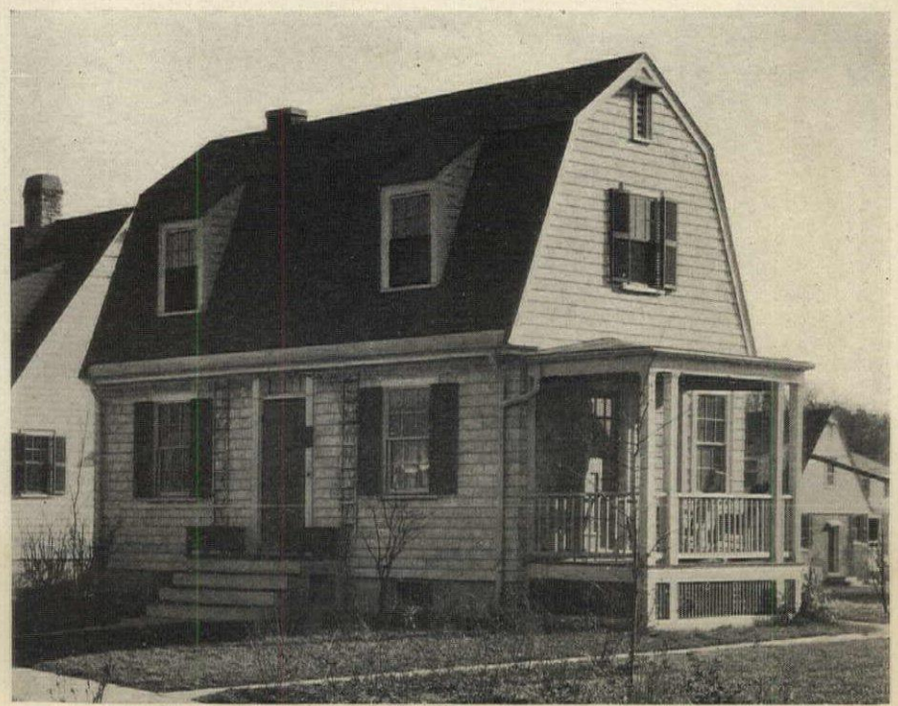
The plot plan on page 9 shows the arrangement of the houses on the site known as the Arnold tract and is selected for illustration because of its approach to the average suburban type of development. It contains 18.3 acres and has accommodations for 127 families, 77 of which are in single houses and the rest in double houses.

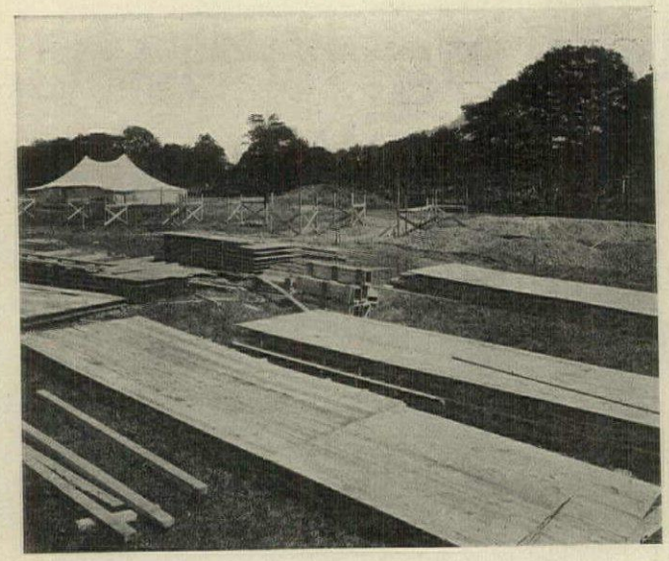
The houses are designed along simple colonial lines; this style permits straightforward, easy construction and a certain variety which may be had in the exterior appearance by placing porches in different positions and by having the ridges in some cases parallel to the street and in others at right angles,—all

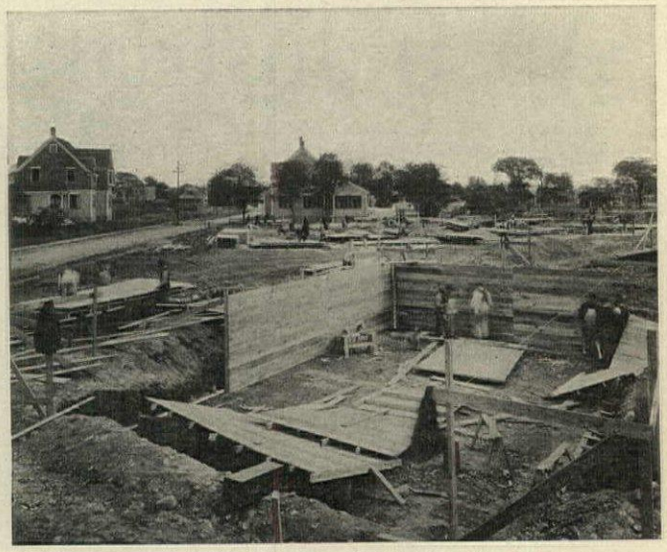
Below are the plans and exterior view of a 6 room single house with gambrel roof. A good type of design











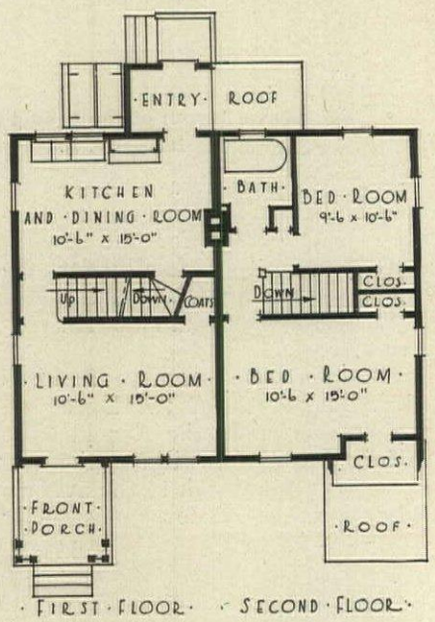
The pictures across the top of this and the next page show the stages of assembling the standard wood forms and distributing the concrete

without any great difference in the plan.

All of the various main types of houses are shown in these pages from photographs and plans. Some were built of frame with exterior walls of siding or shingles while others were wholly of brick or the first story of brick; further variety was had in the roofs, some having simple pitched roofs and others gambrel roofs. The roof covering was chiefly asphalt shingles though slate was used somewhat. The pleasing effect which this variety of treatment gives may be noted in the middle picture on page 8. It removes wholly any suggestion of the "institution" or "model town" which is naturally objected to by purchasers.

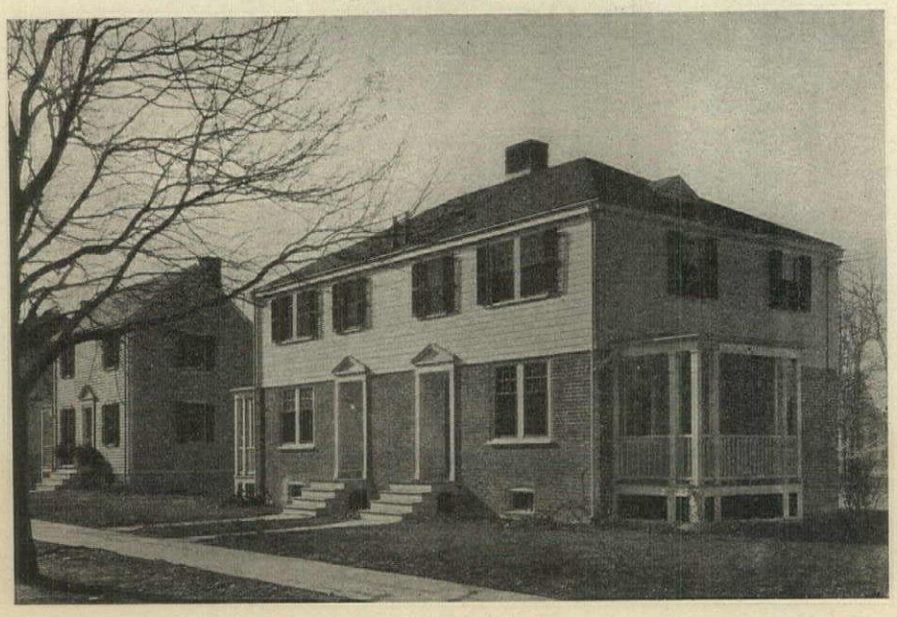
The semi-detached or double houses were built in two sizes, one type having 4 rooms and the other 6 rooms. The larger house shown on page 10 was very successful and was valuable in giving an appearance of solidity and permanence to the development, which is seldom achieved with the smaller single family houses.

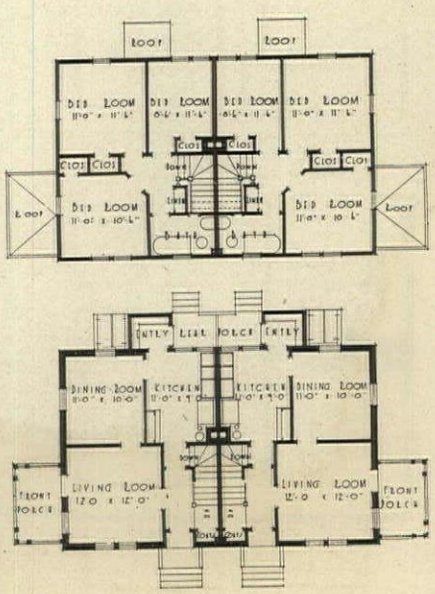
The 2-flat house, of which a large number were built, is a type that enjoys great popularity in New England. This popularity is due to the combined advantages of an apartment and suburban house which the 2-flat house offers. One family is provided for on each floor, with separate front and rear entrances for each family, also separate compartments in the cellar provided with separate heating systems which are operated by the tenants. They are attractive to purchasers because the return from the

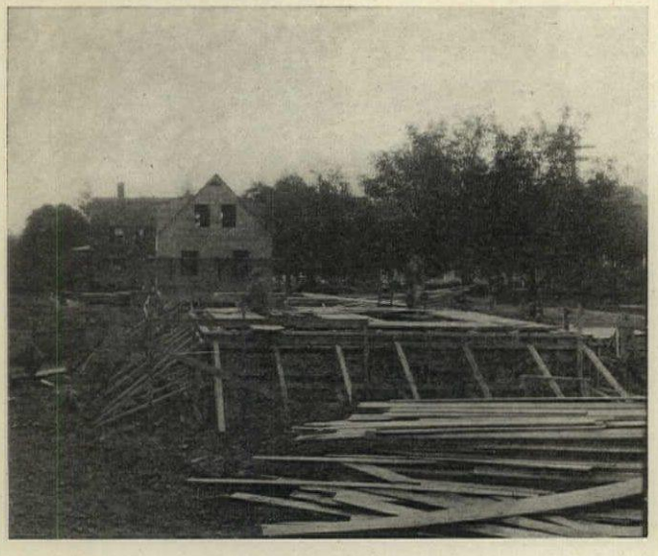


At right is floor plan of 4 room semi-detached house. Kitchen and dining room can be combined

Plans and exterior of 6 room semi-detached house. Shown below Open vestibule floors laid in lead





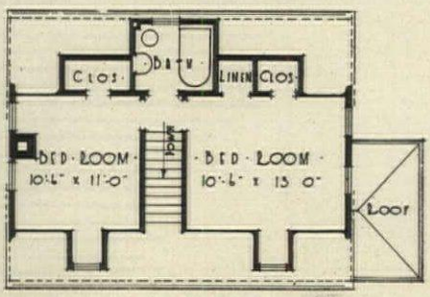


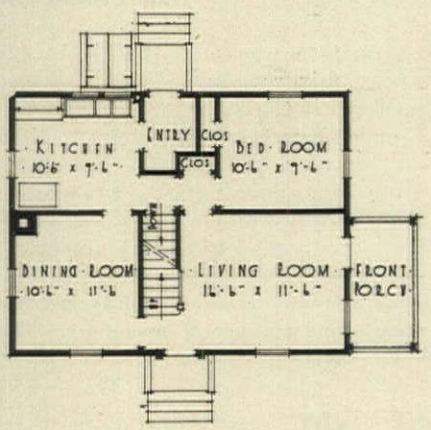
rented floor will largely meet the carrying charges on the entire house.

Some notes regarding the organization required to carry out the work are of interest. The government maintained one force consisting of general superintendent with an assistant, a field force of 18 inspectors, a chief clerk in charge of correspondence, order and bills, an auditor with material and time checkers, and a cost engineer, all reports being made to the U. S. Housing Corporation in Washington.

The contractor's organization comprised a general manager and three assistants, one in charge of each tract with foremen and sub-foremen. A 2-story building was used for offices, the first floor by the contractors and the second by the government force. Near the office was located the woodworking mill and also a general storehouse for plumbers' supplies, steam fitting and electrical supplies, finished hardware, electrical fixtures, wall paper, etc. On each of the three tracts there was a separate storehouse and timekeeper's office. These stores kept cement, rough hardware, and similar materials required in construction.

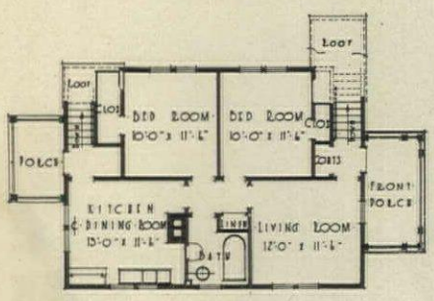
The mill was fully equipped with saws and planers and all machinery was operated by electricity. All framing for the houses was produced in this mill, often as many as 10 frames being turned out in a day. The material was distributed to the house locations as fast as it was finished. In this way it was possible to assemble it rapidly because no cutting was necessary at the site of the house.

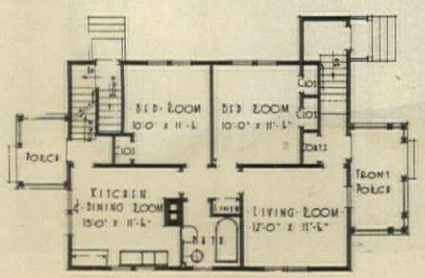




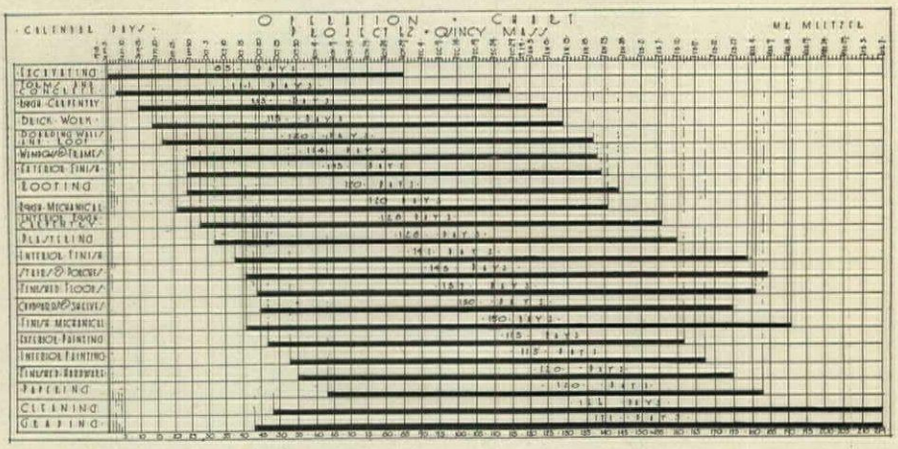
A second type of plan for 6 room single house. Note everything is contained in rectangle, insuring economy

Below are plans and exterior of 4 room 2-flat house. Note simple framing about center partition





Construction was carried on through winter as shown above and in the chart at right which gives total days required for each operation. Note absence of waste in scrap pile above



Foundations were made of concrete, the sand and gravel for which were secured from the excavations. Part of the excavating was done by hand, but where the houses were regularly spaced and reasonably close together a steam shovel was successfully used. This cut a trench as wide as the houses were deep; after the foundations were completed the steam shovel filled in between them. Standard wood forms for foundation walls were built in sections for each type of house with openings left for sewer, gas and water connections. Window and door frames were set in them and the concrete poured around them. These forms and the method of assembling them are shown in the pictures at the tops of pages 10 and 11.

Concrete was mixed with 1 and 2-bag mixers which were placed level with the tops of the walls so four cellars could be poured without moving the mixer. The concrete was distributed by buggies, and runways wide enough for wheel barrows to pass were built connecting the foundations to speed up the pouring.

The work was begun in September, 1918, and continued without interruption through the winter. The various operations of building were carried along almost at one time as will be noted from the chart on this page which shows the total time required for each operation and the months during which the work was in progress.

Note attractiveness of slightly curving streets and absence of monotony. The average set-back is 15 ft.

Ramps vs. Elevators for Garages

Conditions that determine choice. Typical plans of small garages showing various kinds of ramps. Best plans for different lots

By H. F. Blanchard

WHETHER to use a ramp or an elevator for a public garage is a problem that comes up every time the contractor is called upon to construct such a building. It is more of a builder's problem in the case of small and medium sized garages (and the majority of garages are in this class), because in most cases the design of these buildings is left to the builder, no architect being employed. In the larger garage buildings, covering sizable plots of ground and several stories high, architects are invariably called upon to do the designing. Consequently this type of building will be left out of the discussion, inasmuch as the selection of ramps or elevators is made by the architect and is therefore not a problem for the builder.

The average garage building is usually not over two stories or perhaps three, and may cover a plot of ground 50 to 100 ft. in frontage and perhaps 100 or 200 ft. deep. Discussion will be confined to garages on plots within these limits.

Ever since the ramp sprang into the limelight a few years ago it has been growing in popularity. Much of this gain is justified because the ramp offers a quicker and more convenient means of getting cars in and out of a building. It takes up more space than the elevator but it costs less to build and its upkeep is less. It is a fact, however, that popular sentiment has been to some extent stampeded in favor of the ramp and today there are many garage buildings in which ramps are used where elevators would be more suitable. The purpose of this article, therefore, is to help the builder to determine whether the ramp or the elevator is more desirable.

Generally speaking, ramps should not be used for buildings of less than 50-ft. frontage. If, for example, a ramp is used in a 45-ft. building the space alongside of the ramp is really too narrow to be used economically, particularly for the storage of cars. Assuming that the gross width of the ramp is 10 ft. the net width of the garage storage space beside the ramp is less than 35 ft. This is not enough for the storage of two rows of cars and therefore is not an economical arrangement.

Likewise, in a building 50 ft. wide the space alongside of the ramp is too narrow except for the storage of very short cars such as Fords. This condition is illustrated in Fig. 1. This plan shows a building 50 ft. wide located on an inside lot. Whether a ramp is objectionable for such a building depends on the personal views of the garage operator. The 40-ft. space may be used for the storage of Fords unless there is some objection to this restriction.

Another disadvantage of the ramp in this case is that the turn from the ramp into the second floor aisle is quite sharp. In fact, a car must turn in a circle of 37-ft. diameter. This is sufficient for small cars and a few cars of small to medium size but is not enough for the larger cars, unless the car is backed at the turn or unless a turntable is installed at the aisle opposite the turn.

Fig. 1 is a second floor plan and for the sake of economy of printed space two elevators are shown in addition to the ramp. Elevator A has the advantage that entrance to it from the street is direct. At the same time the amount of space required to reach the aisle from the elevator on the second floor is not prohibitively large.

Elevator B is not quite so convenient to reach but it is so located that no approaching space is required. Since the elevator opens directly on to the aisle it uses the aisle as an approach. The objection to this location is that if a full sized elevator, say one 20 ft. long, is used in a building 50 ft. wide it encroaches on the aisle to such an extent that there is hardly room left to drive on or off the elevator. Such a location, however, is all right for a wider building as will be pointed out presently.

The grade of the ramp shown in Fig. 1 is 20%. This is a reasonably conservative figure. To make the grade any less would be to increase the length and consequently the space occupied. On the other hand to increase the steepness of the

Fig. 1. 50 ft. garage, 2 stories high, showing ramp and 2 possible positions for elevators. Fig. 2. 60 ft. garage suited to 3 rows of cars

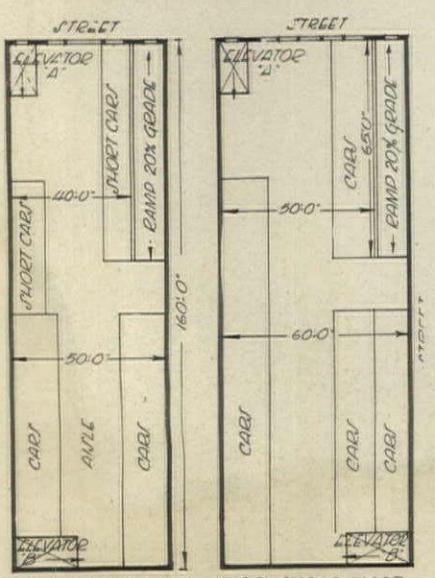


FIG 1 SECOND FLOOR FIG 2 SECOND FLOOR

Fig. 3. 50 ft. garage on corner lot with ground level half way between floors with short ramps to each floor. Fig. 4. 65 ft. garage with similar plan

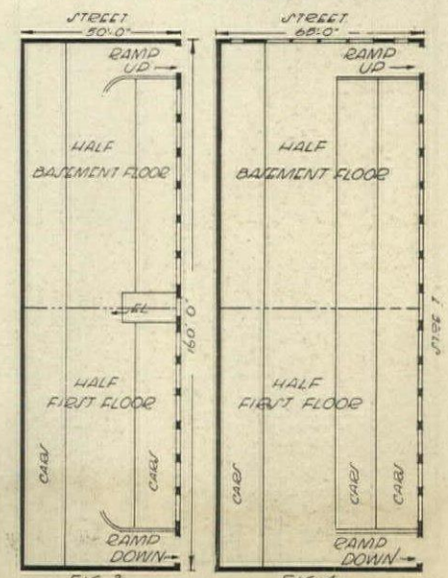


FIG 3 FIG 4

grade very much would be undesirable.

Fig. 2 shows a building which is somewhat similar to that in Fig. 1 but it is 60 ft. wide instead of 50 ft. This is also a second floor plan and it is supposed that the building is located on an inside lot as in the previous case.

In general a plot 60 ft. wide, or perhaps 65 ft., is more suitable for using a ramp of the type shown, principally because the space alongside of the ramp is wide enough to adequately care for two rows of cars as illustrated. The remainder of the space on this floor is wide enough to carry three rows of cars unless the cars happen to be larger than usual. The three-row arrangement is more satisfactory where the garage frontage is 65 ft. instead of 60 ft. The sharp turn at the head of the ramp is an objection in this case as well as in the instance just mentioned.

The advantages and disadvantages of elevator A are here the same as in the previous instance. Elevator B, however is in a better location. It no longer sticks out into the aisle. It is not in the way and there is room enough to drive on or off with ease. It is not quite as easily reached from the street but if this is an important consideration in many cases it would be

Ramp leading up to second floor. Grade in this case about 20%

possible to place the elevator inside the building, close to the street.

If the building is to be located on a corner lot and it is not to be more than two stories high, it is advisable to sink the first floor sufficiently so that the ground level at the driveway entrance comes half way between the first and second floors, thus permitting the first floor, or the basement, to be reached from the street by a short ramp and the second floor to be reached likewise by a short ramp. This construction is not usually desirable on an inside lot as in Fig. 1 or Fig. 2. In either of these cases the long ramps shown are better, but in the case of a corner lot the arrangement illustrated in Fig. 3 is simpler, and more economical.

Assuming that the floors are about 13 ft. apart a ramp grade of about 25% is necessary. This is a little steeper than is usual for a long ramp but is not too steep for a short ramp of this type.

An elevator is shown in this building simply to illustrate the proper location for an elevator in case one is wanted, in place of ramps, for any reason. If a show room and accessory store, offices, etc., are desired at the front end of this building it is advisable to make this portion one story high with its floor at ground level.

Fig. 4 shows a building similar to that in Fig. 3 except that it is located on a corner plot 65 ft. wide. Since there are two rows of cars on one side of the main aisle the length of the ramps may be longer than in the previous case and this is a slight advantage.

Buildings up to 75 or 80 ft. wide are usually laid out according to one of the plans illustrated in Figs. 1, 2, 3 or 4. Buildings on plots of larger frontage are more likely to be designed according to Figs. 5 or 6. Fig. 5 illustrates an inside plot with 100 ft. frontage.

One ramp and three elevator locations are shown. The space alongside the ramp is not restricted to the same extent it was in Fig. 1

Fig. 5. 100 ft. building on inside lot, with ramp and 3 possible elevator positions, "C" being the best

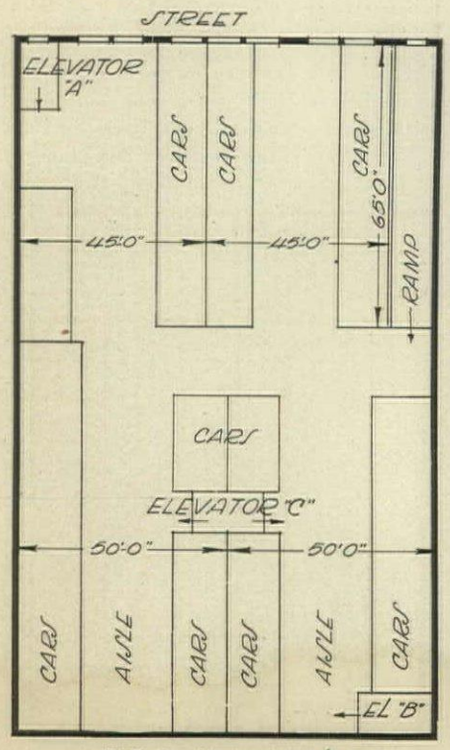
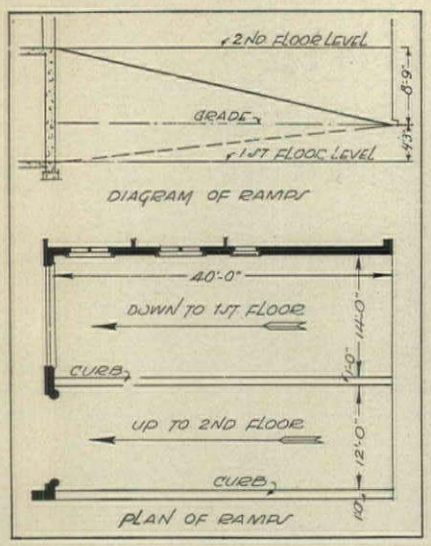


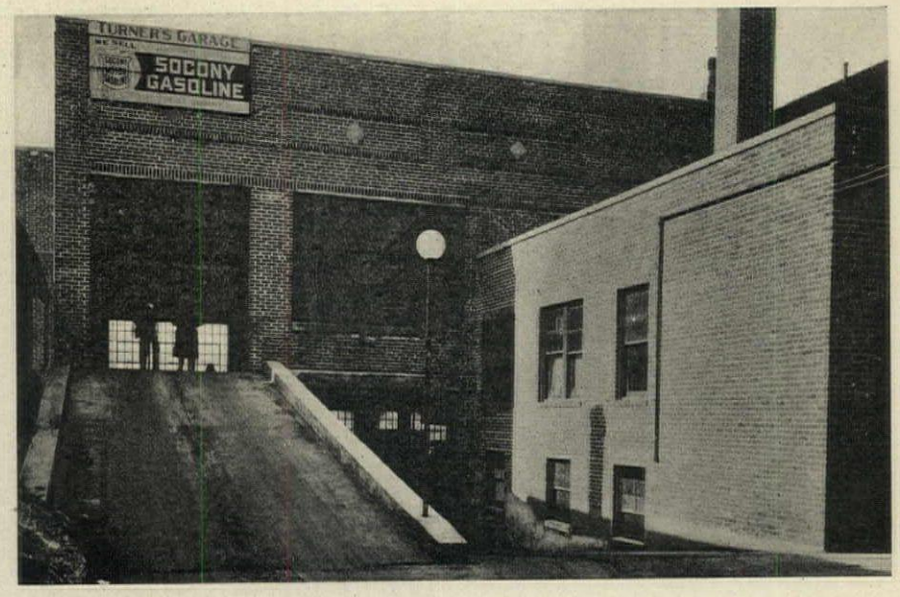
FIG 5-SECOND FLOOR

Ramp to upper floor of garage with ground level between floors. Note the lattice truss roof



where the space was reduced to 40 ft. because in this case the encroachment of the ramp is divided between two garage sections each of which is 45 ft. wide. Medium sized cars may be stored in these two sections.

The elevator A has the same advantage and disadvantage of elevator A in Fig. 1. This also applies to elevator B. The best location for an elevator, in this plan, is indicated by elevator C. This elevator is equally accessible to both main aisles on either floor. An additional connecting aisle between the main aisles on either floor is not necessary



Garage on inside lot with narrow frontage to street with up and down ramps together. Note detail at left. George N. Meserve, architect

with this elevator location. Consequently it is plain that this elevator arrangement is very economical of space.

From this layout it should be clear that buildings 80 ft. to 100 or 120 ft. in frontage must resemble two buildings of half this frontage. This plan is really nothing more than the plan in Fig. 1 doubled except, of course, for the location of elevator C. Therefore in the case of a plot 120 or 130 ft. in frontage the plan shown in Fig. 2 might be doubled.

Fig. 6 shows the second floor of a corner garage 100 ft. square. It is seen that if an elevator is used the connecting aisle between the two main aisles is directly in front of the elevator. If this plan is turned to the left, through 90°, it is seen that it is suitable for a lot which is 100 ft. deep and of any frontage at all, inasmuch as the amount of frontage then does not influence the car layout.

Now let us assume that this plan illustrates the upper floor of a corner garage in which the lower floor or basement is 6 or 7 ft. below the ground. In this case the short ramp is used to reach the upper floor and the connecting aisle between the two main aisles is then in line with the ramp. Only one connecting aisle is required in such a building and not two as shown. Two aisles are illustrated simply to show their respective relation to elevator and ramp.

Looking down ramp to lower floor from street. This is 35 ft. long but it appears larger than that

Fig. 6. Plan of garage 100 ft. square equally suited for corner or inside lot. Ground level between floors

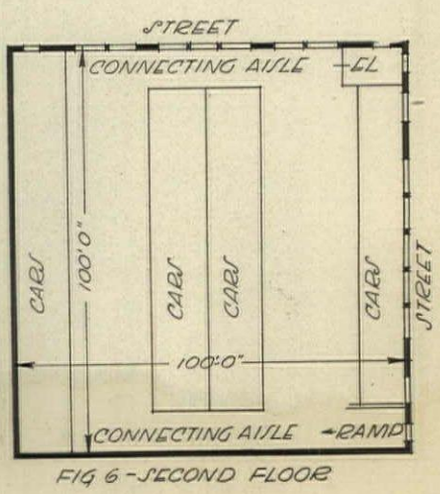


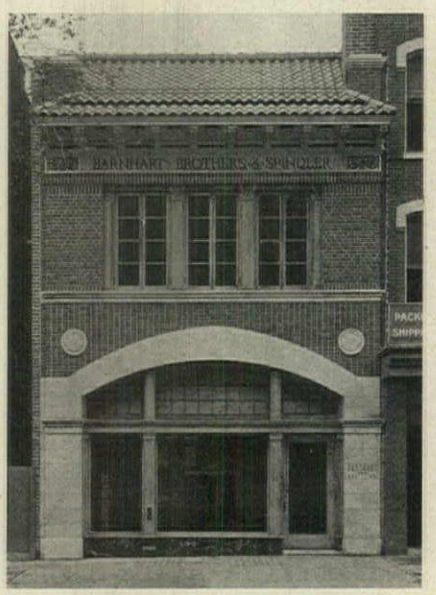
FIG 6 - SECOND FLOOR

Retail Store Buildings

Attractive store fronts for twenty-five foot lots that offer ideas for remodeling. Brickwork a feature of all

A FIELD of active building at the present time is remodeling for retail stores. In many cities the older residential streets are being taken over by business and some very attractive store fronts are being made from the old houses. The floor and roof construction is generally found adequate and it requires only a new front with the necessary rearrangement and new finish inside to make a modern store building.

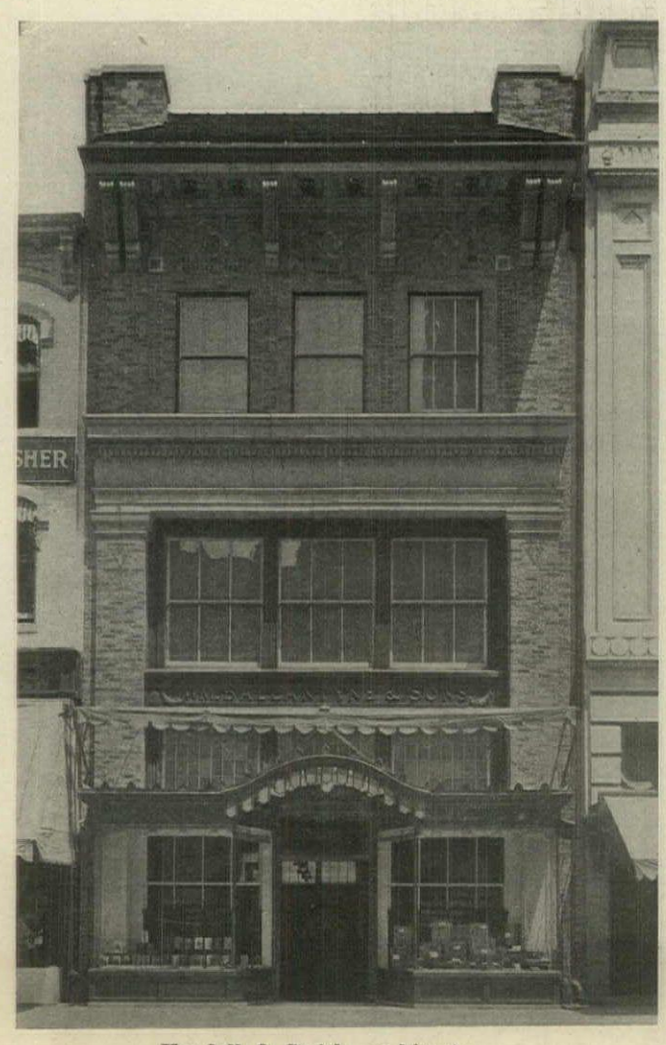
The three buildings illustrated are in Washington, D. C., a city that is particularly noted for its attractive small store buildings. Each front shows a simple and pleasing handling of face brick for the upper walls and for trimmings. The cornices are painted in colors and the show window frames are of metal.



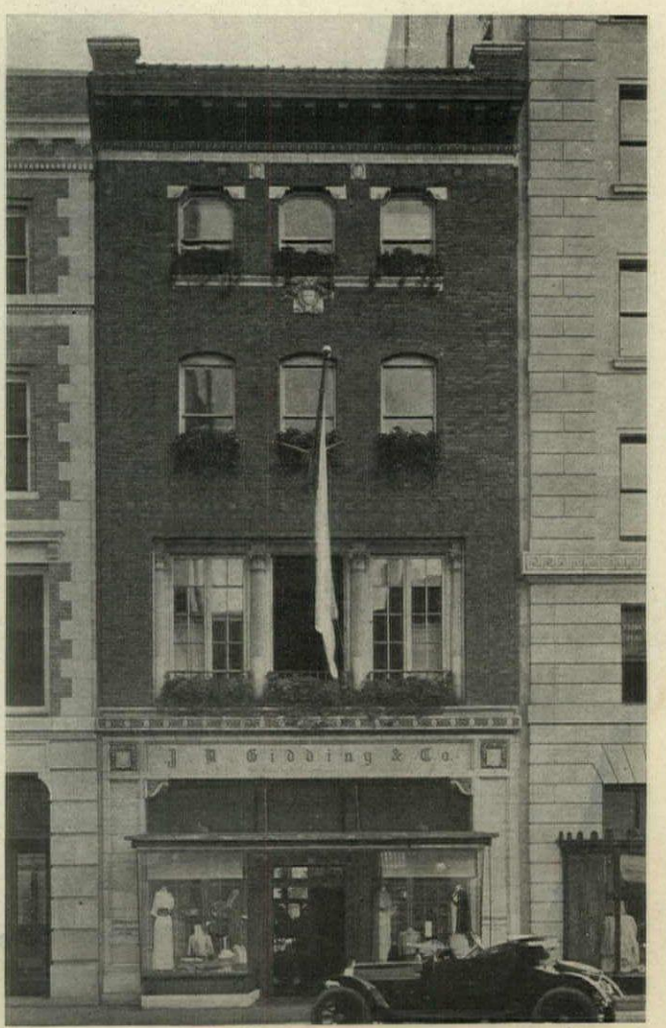
Arthur B. Heaton, architect

Note that in two of the examples the show windows project beyond the building line. In localities where this is permitted a special feature can be made of the first floor front with the windows splayed in toward the entrance to attract the attention of those passing along the street. In the store buildings shown below and to the right the projecting show window space has been extended to cover the pier at each end, thereby giving the full frontage over to display purposes.

Each of these buildings has a frontage of 25 ft. and is occupied by an individual firm, so there is no necessity of a direct entrance from the street to the upper floors. Where this is required the front of the first floor store must be reduced to provide room for it.



Kendall & Smith, architects



Arthur B. Heaton, architect

A Well Planned Small House

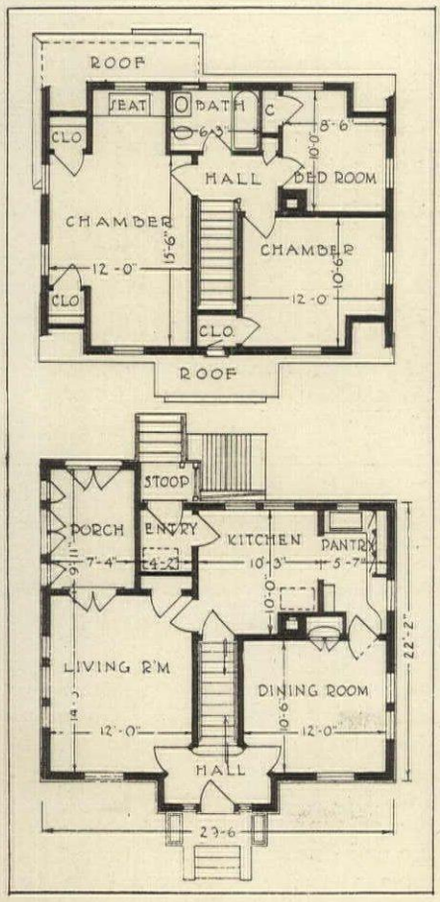
Group recently built shows design and economical plan

Curtis W. Bixby, Architect

A GROUP of houses built recently for skilled employes of the Saxony Worsted Mills at Newton, Mass., offers builders a number of suggestions for attractive suburban homes. Architects are giving close attention to the subject of industrial housing and as a result the standard of attractiveness and livable qualities of the small house are rapidly being raised. It requires ingenuity to provide all of the conveniences and rooms that are demanded today in the skilled worker's home in the space that can be built for a cost proportionate with his earnings and in this the architect performs a valuable service.

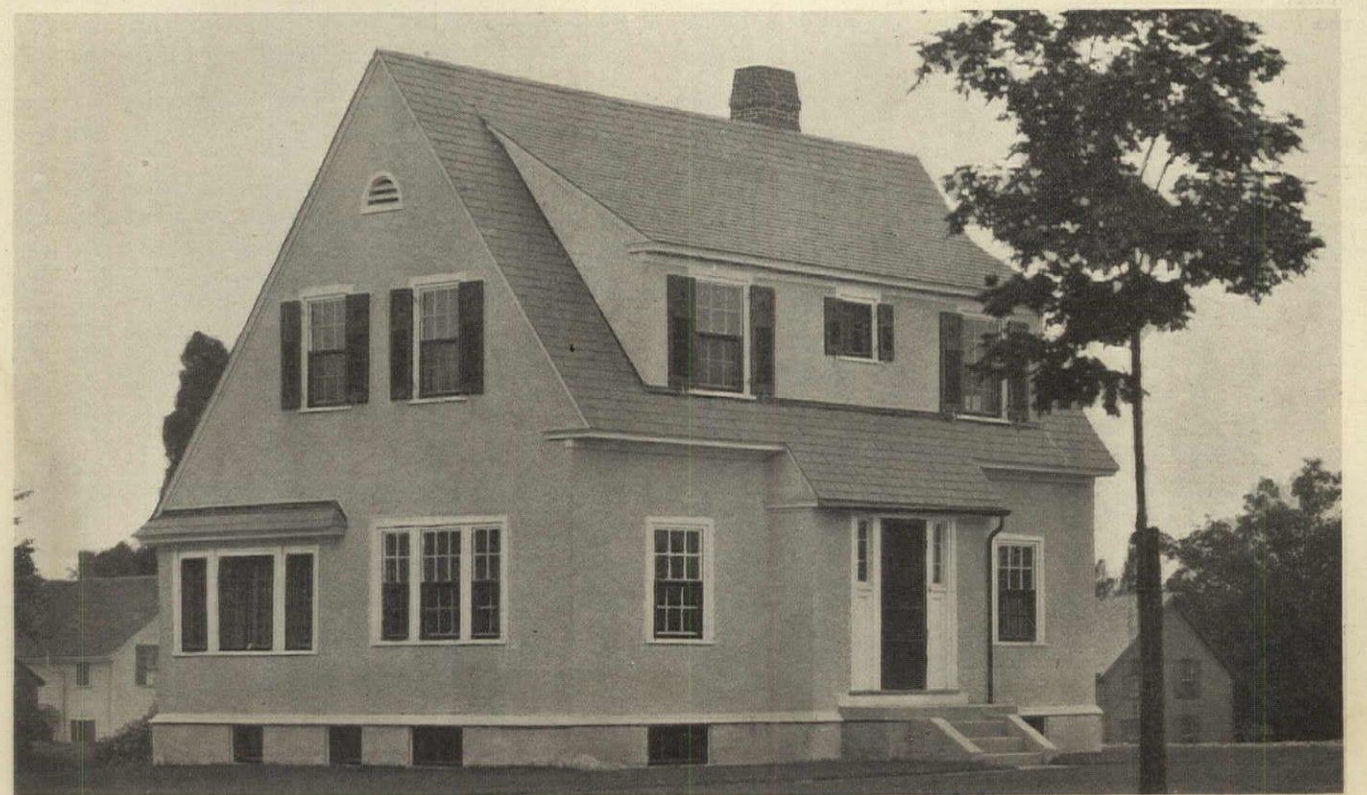
These houses are particularly successful in their plan. A good sized living room, dining room and kitchen with such additional features as a large pantry, kitchen entry and sun porch are contained in a house 29 ft. long and 21 ft. deep. This is accomplished because the stairs have been so placed as to take up minimum space and land on the second floor so that each of the bedrooms is reached from a very small hall.

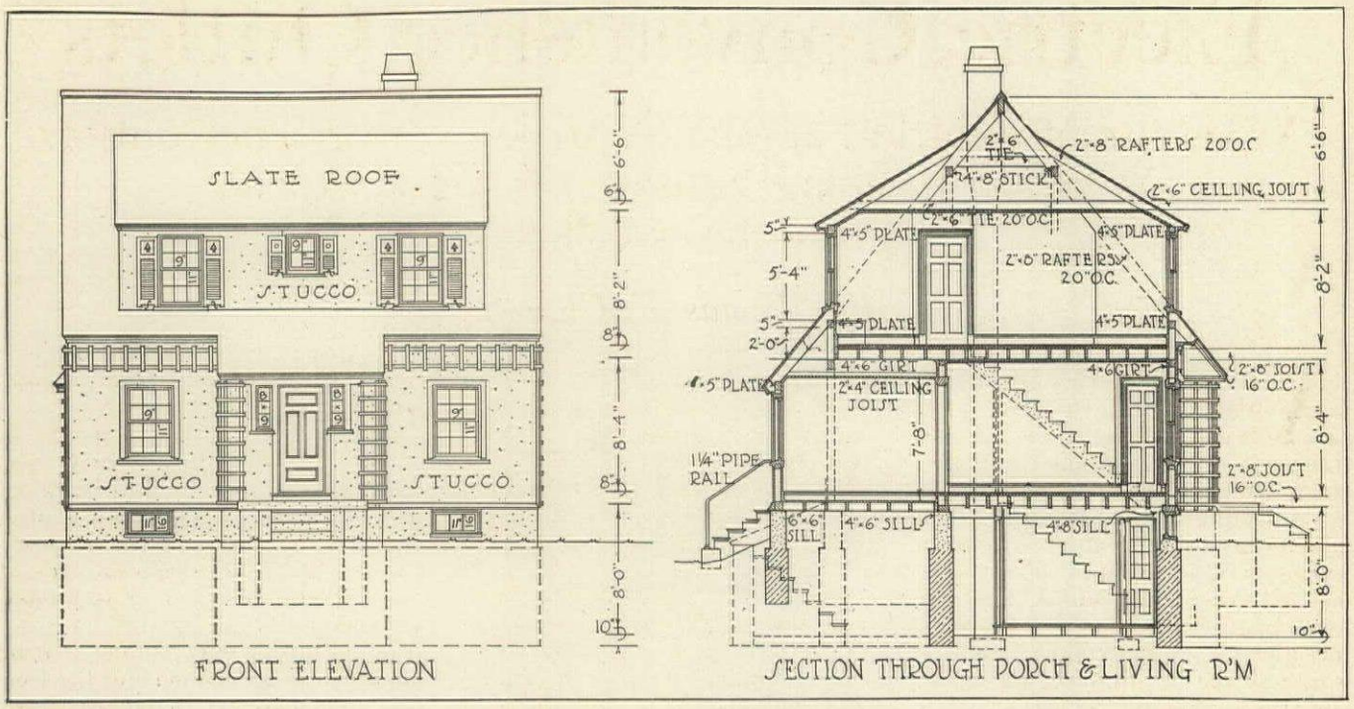
The pantry is large enough to contain the sink which brings it conveniently near the cupboards for the storage of dishes. The pantry is connected with the kitchen by a wide opening without any door so that it is virtually a part of the kitchen. This arrangement leaves the kitchen free to be used for dining purposes if desired in which case the dining room could be used as an additional bedroom. On the second floor are three bedrooms and a bathroom, each of the bedrooms being well supplied with closets.



The houses are of frame construction with concrete foundations. The roofs are of slate and of the ordinary pitch type with long shed dormers both front and back which give good headroom in the second story. The plate is placed sufficiently high so the roof slope continues down to cover the projecting front vestibule and the portion of the porch extending beyond the main house wall. This scheme affords simple construction and also gives a pleasing exterior effect. The construction of the roof, height of the plate and detail of the dormers are shown on the cross section drawing on page 18.

The exterior walls are of cement stucco with a moderately rough surface. The wood trim has been reduced to the minimum which gives





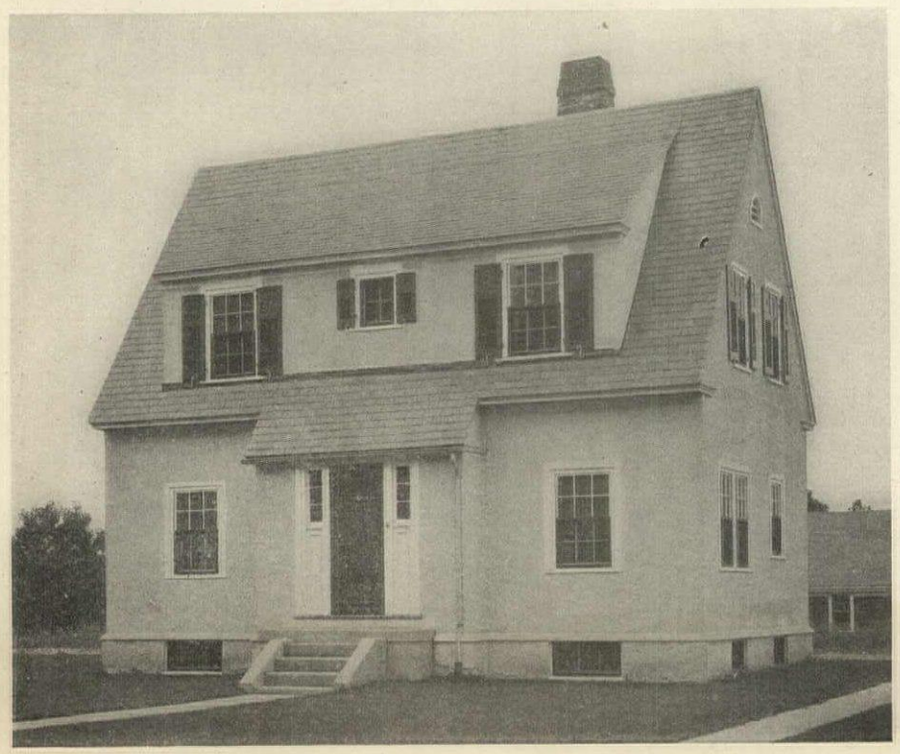
a smart appearance to the exterior and at the same time reduces the cost.

On page 18 is shown a front elevation with an exterior covering of stucco and also suggestions for slight ornamentation through the use of simple lattice work. When a number of houses are built it is desirable to have variety in their appearance and a change of materials accomplishes this with the least trouble. Another simple means is to vary the position on the lot; this particular design would appear equally well if the gable end with the porch were turned toward the street. On a plot with a frontage of 200 ft. four of these houses could be grouped to present an attractive appearance. The two center houses could have the entrances face the street, and the end houses, of different material from the others, would have the porch gable ends face the street.

These houses were built in 1918 but the plans and specifications have recently been refigured and the detailed items of their estimated cost are given in the table below:

Section above at right shows construction of roof and long dormers

Elevation shows treatment for stucco with lattice ornamentation



Seven Room Stucco House

COST OF HOUSE ONLY

Estimate September, 1920

Excavation and foundation	$1186.00
Concrete forms	250.00
Brick work	250.00
Frame	455.00
Gas service	45.00
Plumbing	700.00
Heating	300.00
Electric work	170.00
Boarding	202.00
Under floors	98.00
Roofing	195.00
Exterior stucco	529.00
Exterior finish	258.00
Piazza work	157.00
Lathing and plaster	508.00
Sash and frames	450.00
Inside finish	520.00
Upper floors	300.00
Hardware	145.00
Painting	555.00
Labor	1330.00
Screens	95.00
Wall paper	65.00
Window shades	48.00
Combination range	89.00
Teaming	45.00
	$8845.00
10% gross profit	884.00
Sale price without lot	$9729.00

Electric Convenience Outlets

Wide use of electrical appliances makes convenience outlets a factor in selling houses. A slight expense promotes satisfaction

By Thomas F. Chantler

ANY builder who is on the alert when showing prospects through his houses cannot well help noting the importance they attach to having satisfactory facilities for connecting and operating electrical appliances, upon there being an adequate number of convenience outlets. The day has long since passed when the practice of unscrewing a lamp in order to make room to plug in an electric appliance was acceptable to even the most unprogressive and old fashioned household. Nowadays convenience outlets, and plenty of them, are expected as a matter of course and they are a factor of prime importance in selling and renting houses.

For the builder to make a point of the small economy made possible by skimping on the number of outlets installed, or by leaving them out altogether, comes very close to being "penny wisdom and pound foolishness." The many electrical devices that their provision makes it possible to use count for much more than the trifling saving in the price of the house that results through not installing such outlets. Moreover, a great number of families have become so accustomed to the use of their electrical appliances that sometimes they will not even consider a house that is not equipped with outlets for their use.

The builder who erects houses to sell that are not suitably equipped with outlets narrows his market and reduces his chances of effecting a sale, while the builder who makes a point of installing an adequate supply of outlets, and locates them intelligently, is improving his chances of effecting a quick and satisfactory sale.

The builder who has not carefully looked into the matter of outlets and who is not posted regarding the growing use of electrical appliances by American households may feel inclined to contend that the importance of the whole matter is being exaggerated. These figures, therefore, should prove enlightening. As an indication of the need for wiring houses more completely and installing plenty of outlets they speak for themselves.

Over ½ million vacuum cleaners and more than 1½ millions electric irons were sold in the United States in 1919.

During the same period more than $50,000,000 was invested in electric clothes washers and other electric appliances, with the supply far from equal to the demand. More than 15,000,000 electrical appliances have been distributed in this country.

Aside from the importance of the service that such appliances supply, another argument in their favor is the small expense attaching to their use. This table shows the cost per month of operating some of these appliances on the basis of 10 cents per kilowatt-hour:

Appliance	Kw.-Hrs.	Cents
Percolators	3½	35 per month
Irons	5½	55 per month
Toasters	3 1/10	31 per month
Washing machines	1 2/3	16 2/3 per month
Vacuum cleaners (portable)	2 1/10	21 per month
Curling iron heaters	negligible	2/3 an hour
Heating pads	negligible	1/2 an hour
Small fans	negligible	$3 a year's use

When these details are considered in the light of the fact that about 85% of American housewives do their own work, employ no servants, it is plain that the use of electric appliances and the need for outlets must continue to increase, and some suggestions regarding wiring and locating outlets should, therefore, prove of interest to builders.

About the Wiring

Opinion is agreed that the best practice in building is to conceal the wires between walls and floors in rigid or flexible conduits. Flexible armored cable is often the most convenient to install in houses already completed.

One of the first steps should be to get in touch with a reliable electrical contractor. He will be familiar both with the local ordinances regarding wiring, and the latest requirements of the electrical code of the National Board of Fire Underwriters.

The laying out of the wiring plans can then be done and the location and character of outlets determined. In planning for the wiring the aim should be to provide not only for the probable needs, but also for future requirements. Lighting circuits should be independent of those used for cooking, heating and power appliances and in many instances they should be provided with meters of their own. Many central stations grant a lower rate for current used for ranges and heating appliances if connected to separate meters.

A word might be said here about the electric building code. It prescribes the conditions of safe wiring, but it should always be remembered, in using it, that it prescribes merely the *minimum* requirements allowable to secure insurance and generally to insure the job being passed by the city inspector. So for greater safety and convenience a wider margin should be provided. Convenience outlets can be installed, when building, at a trifling cost. If added after the building has been completed they will cost much more in time and money. What comprises complete electric service for the home is shown by this list. Few homes, of course, have all these appliances, but the use of accessories of these kinds is constantly growing.

Dining Room

Toaster	Hot water heater
Chafing dish	Radiant grill
Coffee percolator	Luminous radiator
Tea kettle	Electric cleaner
Cigar lighter	Samovar
Fan motor	

Bedroom
Luminous radiator
Electric cleaner
Curling iron
Water heater
Bed pad
Fan motor
Reading lamp
Ozonator
Hair dryer
Massage vibrator
Baby milk warmer
Turn-down lamp

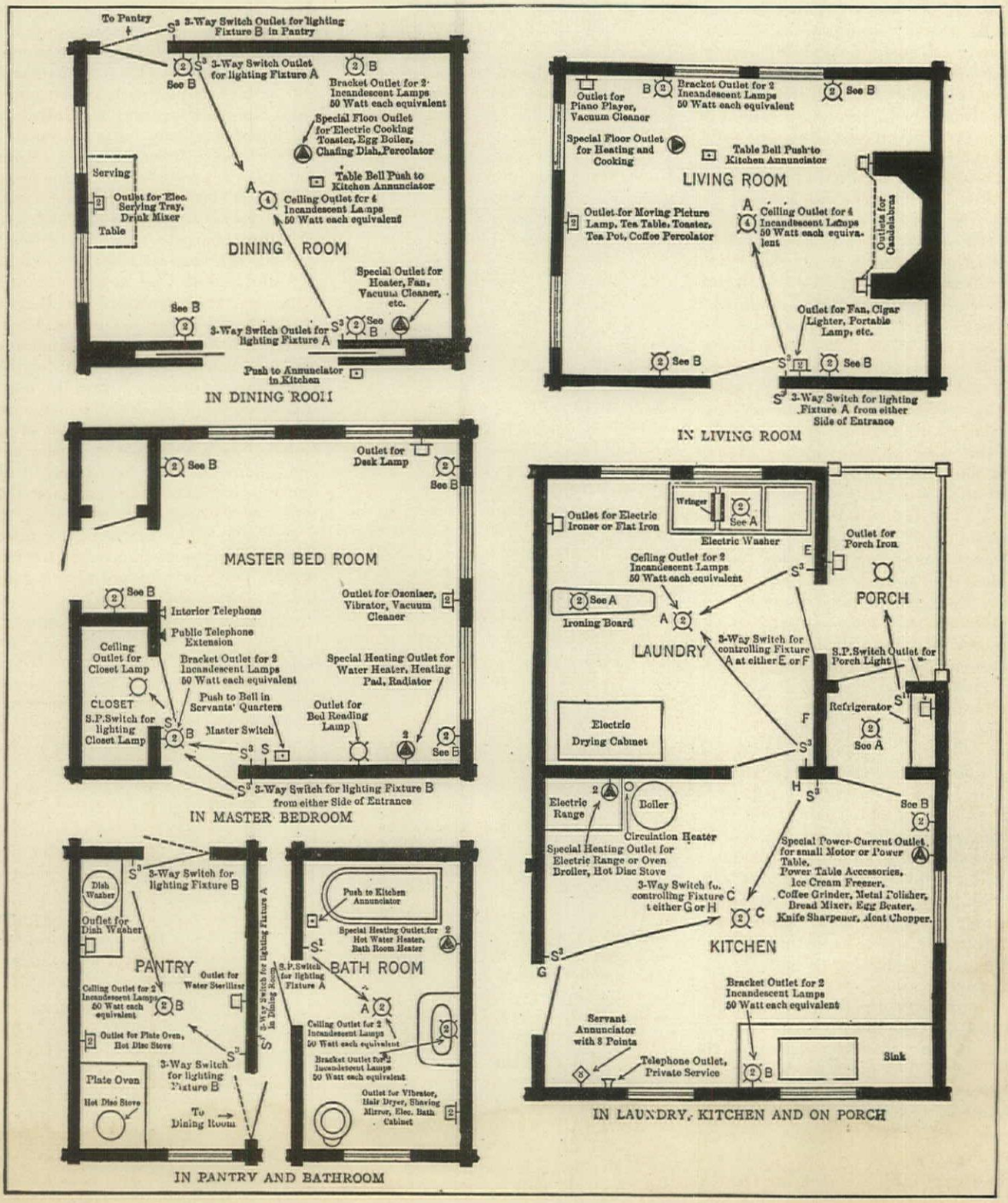
Kitchen
Electric irons
Washing machine
Electric stoves
Electric tea kettle
Disc stoves
Frying pans
Glue pot
Soldering iron
Radiant grill
Toaster
Electric cleaner
Fan motor
Coffee grinder
Meat chopper
Bread mixer
Egg beater
Silver polisher
Knife grinder

Living Room
Electric cleaner
Fan motor
Electric piano
Table lamp
Sewing machine
Turn-down lamp

Laundry
Electric washer
Irons
Laundry machine

Bath Room
Luminous radiator
Electric cleaner
Shaving mug
Curling iron
Water heater
Hair dryer
Massage vibrator
Turn-down lamp

Garage
Breast drill
Several outlets for portable lamps
Luminous radiator, if not heater
Glue pot
Soldering iron
Fire pumps
Small motor for tools
Portable drill
Grinding machine
Charging batteries
Electric cleaner
Buffing machine



The Builders' Journal Plans

No. 6. A house for twenty-five foot lot with quantity survey of all materials

By Gordon Robb, Architect for The Builders' Journal

IN suburban sections of our larger cities land values are generally high and many people who want to own a single house are compelled because of circumstances to economize on the amount of land they purchase. The majority of suburban districts are laid out with lots of narrow frontage ranging from 20 to 30 ft., it undoubtedly being the hope of the promoters that because of the narrow frontage they will sell two lots to the prospective home-builder. When the lots are divided into 20-ft. units this is necessary unless the development is one of solidly built row houses. It is possible however, to build a detached house on a 25-ft. lot and it is frequently done. With the wide use of the automobile there is a demand now for room to get a driveway to a garage which can be easily arranged in the rear of the lot. In many neighborhoods there are likewise restrictions that the house must set at least 3 ft. from the side boundary lines.

We have, therefore, a problem to plan a house that will contain fair sized rooms and at the same time accommodate itself to a 25-ft. lot and leave a 3-ft. space on one side and room for an automobile driveway on the other. It means that we have a maximum of 16 ft. for the width of the house.

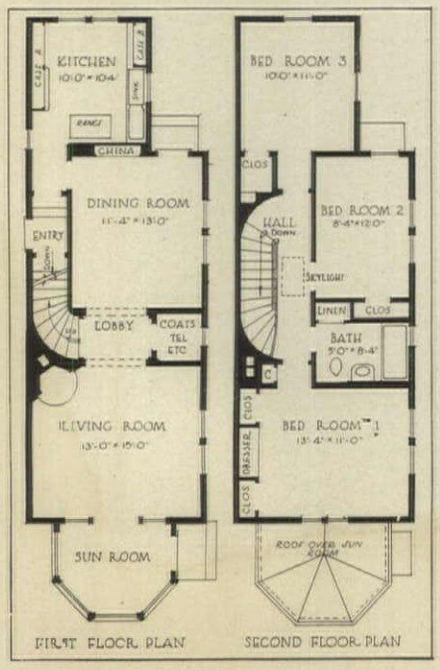
Mr. Robb will give advice without charge on any question that may come up in building this house. Regulation ¼-in. scale blueprints can be furnished at moderate cost, but for all practical purposes the published plans are sufficient. The November issue will contain plans for an "airplane" bungalow the popular Western house, so arranged that construction of the upper part may be delayed

A plan for such a house is presented this month. The main floor is open to give a spacious effect. The stairs are inconspicuously placed and go up between walls; opposite their start is a large coat closet. Entrance from the street is through the sun room which is made in the form of a large bay to afford views in different directions. If desired the end of the living room toward the sun room could be fitted with a series of glazed doors so that in warm weather the living room and sun room could be thrown into one. The kitchen is contained in an extension, narrower than the main house, which gives an opportunity for a glazed door or window in the dining room that will provide cross ventilation through the house. There is no pantry but cupboards are conveniently placed on opposite walls of the kitchen.

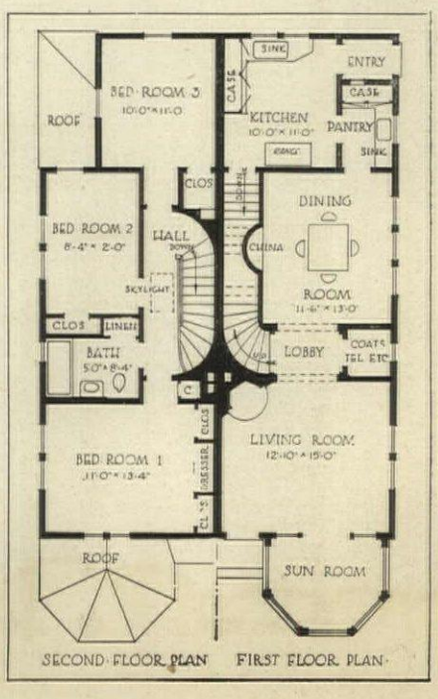
On the second floor there are three good bedrooms, each supplied with a closet. The pair of closets and the built-in dressing table in the main bedroom are an attractive feature and can be bought from stock to fit this space. The upper hall and stairs are lighted by a skylight. Because of the care which has been taken to get light into each of the rooms from either front or rear and side light from the side having the driveway the whole interior will be exceptionally light in comparison with the usual house built on a narrow lot. It will be noted that the side of the house with the 3-ft. setback from the lot line has no windows or openings that are necessary with the exception of the entrance to the kitchen and cellar grade. This fact makes this plan suitable for a semi-detached house by using this side as the party wall and reversing the rooms either side of it. If two houses were built in this way a rear entrance and cellar entrance could be arranged in the angle formed by the main house and the kitchen wing.

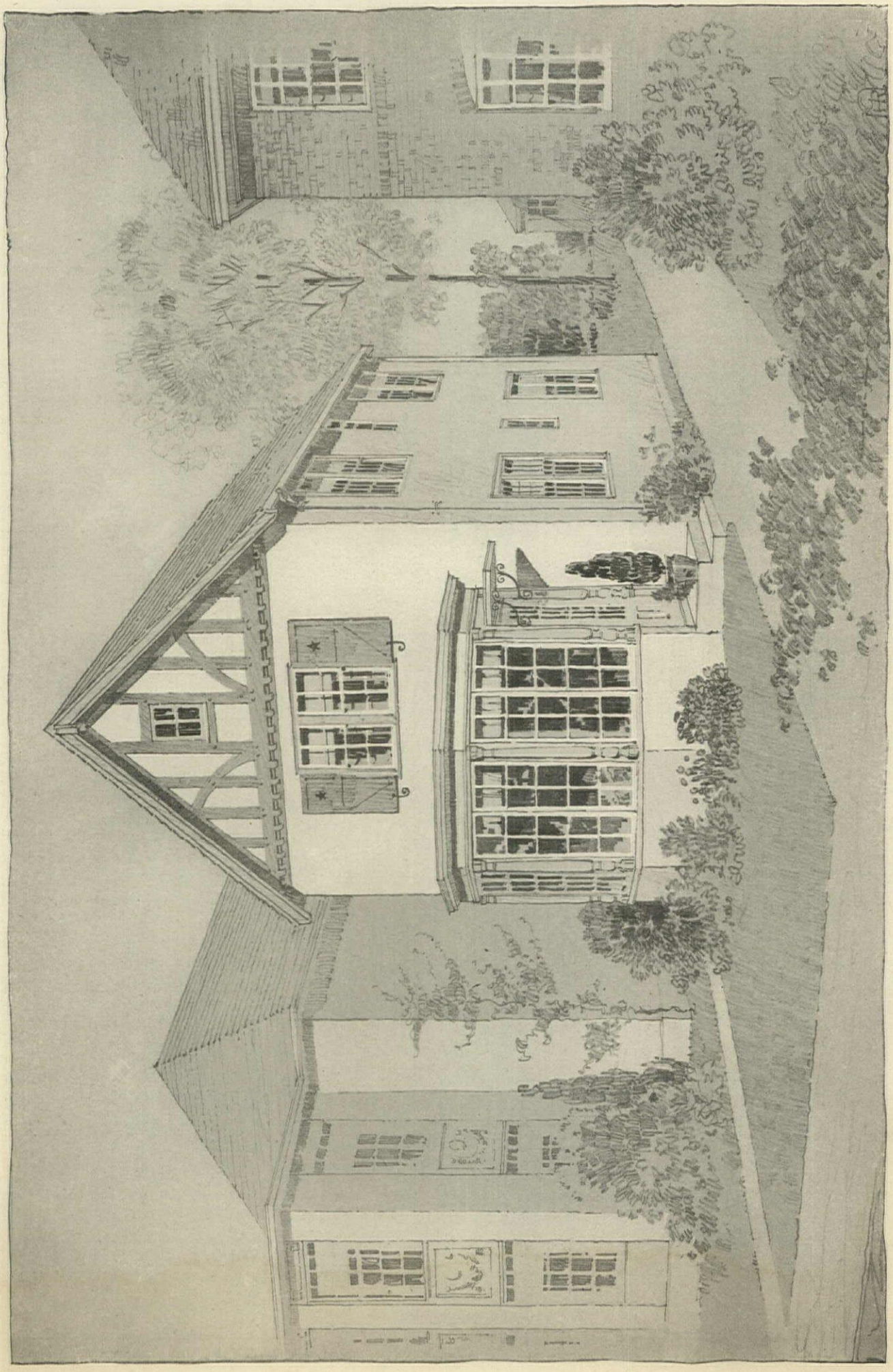
The exterior is designed along simple English lines and intended to stand out from its neighbors because of the plain plaster wall surfaces relieved by the interesting half-timber work in the gable and the 5-sided glazed sun porch. There are interesting possibilities for color schemes in painting or staining the wood finish. Should the house be built as semi-detached the front could be roofed with a double gable or the ridge could be run parallel with the front and the half-timber gables used on the sides centered over the double windows in the living room and bedroom above.

Plans of the single house



Plans of the semi-detached house





No. 6. A House for Twenty-five Foot Lot
By Gordon Robb, Architect for The Builders' Journal

The Builders' Journal Plans

No. 6. A house for twenty-five foot lot
Quantity Survey

By Frederick H. Hunter

THE quantities listed here are for estimate purposes. All measurements are NET unless otherwise noted. Quantities such as sheathing, flooring, roofing, etc., are given by area with no allowance for wastage, matching of lumber, etc. Minor outs are disregarded. No attempt has been made to include all the small items nor such items as clearing the site, drains, supplies, etc., which must be governed by local conditions. Where the word "Item" appears in the quantity column it indicates that the expense of the work in question would probably be set as a lump sum based on data available.

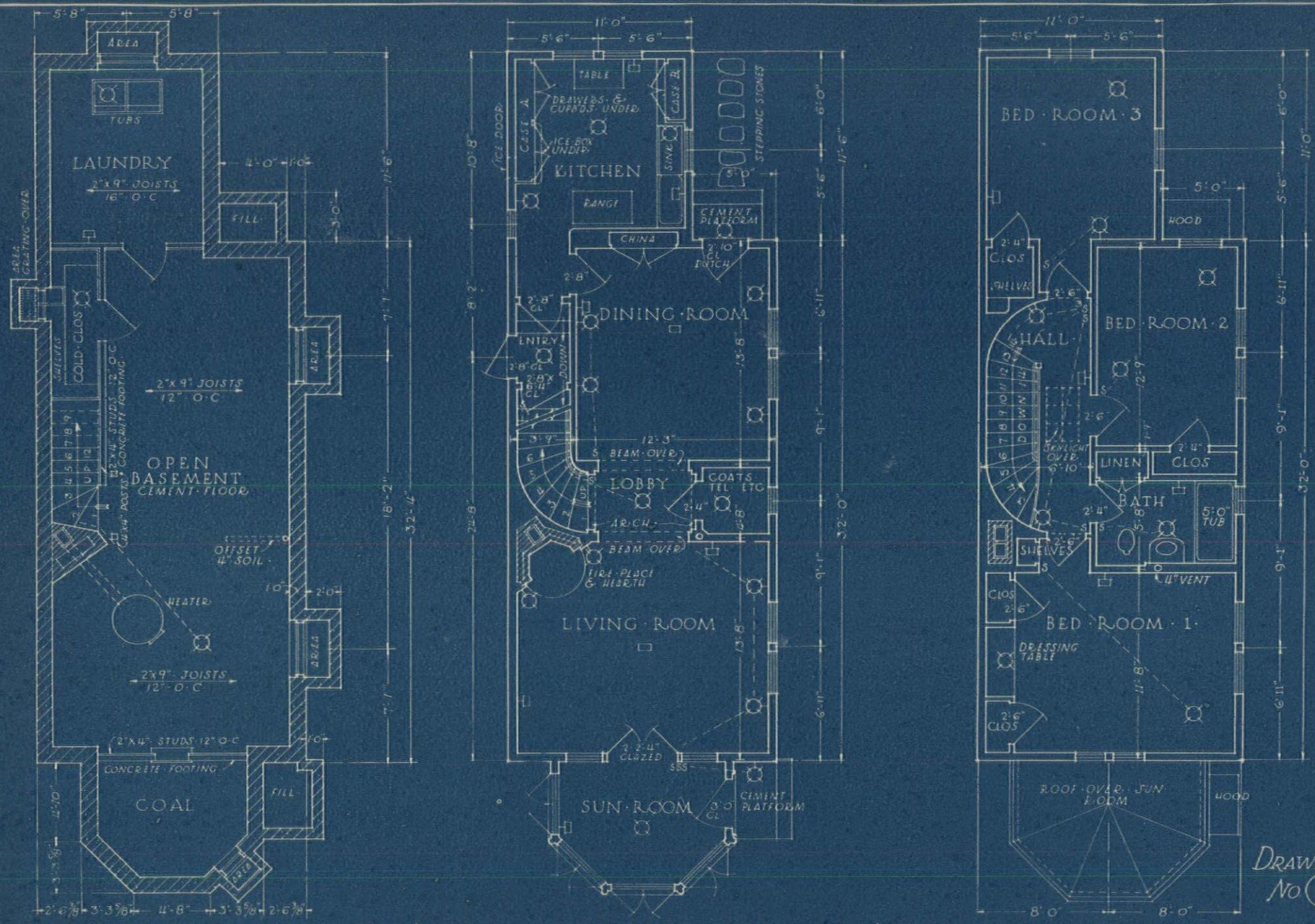
Strip loam: about 10 ft. front and back—assuming loam to average 8 ins. deep ..... 45 cu. yds.
Excavation for cellar ..... 166 cu. yds.
Excavation for footings, areas, piers, etc. ..... 9 cu. yds.
Concrete for foundations ..... 39 cu. yds.
Forms for same (contact area) ..... 2275 sq. ft.
Form trowel wash for basement sills ..... 15 lin.ft.
Concrete basement floor ..... 65 sq. yds.
Common brick for chimney ..... 150 cu. ft.
(At 20 per ft. this is 3M)
8 x 12 flue lining ..... 54 lin. ft.
Thimble piece included in above 1
Metal thimble for smoke pipe 1
Clean out door in chimney 1
Concrete chimney cap, about 2'-0" x 3'-6" ..... Item
Terra cotta chimney pots 2
Earth fill for steps, rammed ..... 1½ cu. yds.
Concrete platforms, 4'-6" long, 2'-4" wide include granolithic finish 2
Concrete steps: include finish ..... 9 lin.ft.
Firestopping: it would require about 1½M brick to firestop according to the best requirements ..... Item
3" round tile flue for venting gas range ..... 20 lin. ft.
Finished fireplace (rough fireplace and trimmer arch included in previous item for chimney)
Damper for 36" opening 1
Mantel bar (unless patent damper which forms lintel is used) 1
Brick for facing, lining and under fire 180
4 x 4 tile for hearths 30
Cement border for hearth, smoothed and pointed ..... 6 lin. ft.

Framing lumber
There are no especially long lengths needed—no joist over 16'-0". Lengths are scheduled "to the next whole foot." That is, a piece 14'-4" is counted 15'-0". Length allowed for splices in sills, girts, ridge, etc.
(Framing is scheduled for a girt frame)
4 x 6 sill ..... 280 ft. B. M.
2 x 9 floor joists ..... 1750 ft. B. M.
4 x 6 girt ..... 250 ft. B. M.
4 x 4 H. P. posts ..... 44 ft. B. M.
2 x 4 and 2 x 6 for framing rear entry floor, second floor over lobby and closet, around fireplace, stairs, etc. ..... 70 ft. B. M.
2 x 6 joist for porch roof and attic floor ..... 680 ft. B. M.
2 x 6 rafters and ridge, lengths 12 ft. ..... 700 ft. B. M.
TOTAL CARRIED FORWARD .....

TOTAL BROUGHT FORWARD .....
Wall framing 2 x 4, 16" O. C. Include in price for plate of 2 x 4's doubled, usual posts, bracing, etc. No outs taken for windows or doors on account of doubling and trussing ..... 2360 sq. ft.
Cross bridging of 1 x 2 stock ..... 118 lin. ft.
2 x 4 stud partitions 12" O. C. with 3 x 4 H. P. cap and bridging. Lengths measured to partition cap below, no outs deducted ..... 185 sq. ft.
Non-bearing partitions of 2 x 4 and 2 x 3 studs (include cap, sole and bridging) ..... 900 sq. ft.
Furr out wall faces around curve of stairs, china closet, vent pipe, etc. ..... 220 sq. ft.
2 x 10 and smaller stock for stair stringers and framing ..... 110 ft. B. M.
Block out on front gable for half timber ..... 65 sq. ft.
Roof sheathing ..... 1162 sq. ft.
Block up for roof boarding over sun room (joists are flat) ..... Item
Build cricket for chimney ..... Item
Underfloors, square edged boards ..... 1090 sq. ft.
Attic floor, matched boards ..... 490 sq. ft.
Strap furr ceilings with 1 x 2, 16" O. C. for wood lath (if sized timber is used omit this item) ..... 1130 sq. ft.
Furr for arched ceiling over lobby and for soffit of stairs ..... 60 sq. ft.
Joist hangers
4 x 9 over 4" 3
Asphalt or asbestos shingles for roof ..... 11½ sqs.
Shingle ridge ..... 43 lin. ft.
Shingle hips ..... 12 lin. ft.
Metal or canvas roof over sun room and hoods ..... 1 sq.
Flashing over hoods and sun room ..... 23 lin. ft.
Flashing over windows and doors ..... 45 lin. ft.
Cap and under-flashing around chimney and for L roof ..... 23 lin. ft.
Flashing around skylight ..... 15 lin. ft.
5" metal gutter ..... 90 lin. ft.
3" metal leaders ..... 85 lin. ft.
Goosenecks and bends ..... 5 each
Iron or Akron pipe for leader ends ..... 5 pcs.
Iron grating 1-3 x 2-0 over area ..... Item
Exterior windows (include sash and frame)
Basement windows, casement sash, 4 lt. 9 x 13 2
Similar basement windows, 2 lt. 2
Similar basement window, 8 lt. 1
12 lt. D. H. 9 x 12 3
12 lt. D. H. 9 x 13 pr. in mullion frame ..... 2 units
TOTAL CARRIED FORWARD .....

TOTAL BROUGHT FORWARD
12 lt. D. H. 9 x 12 pr. in mullion frame — 2 units
8 lt. D. H. 9 x 11 pr. in mullion frame — 1 unit
6 lt. D. H. 9 x 13 special — 1
6 lt. D. H. 9 x 12 special — 1
2 lt. D. H. 18 x 18 — 1
2 lt. D. H. 27 x 18 — 1
2 lt. D. H. 27 x 18 pr. in mullion frame — 1 unit
10 lt. casements 9 x 13 pr. sash in one frame, no mullion — 4 units
4 lt. casement 8 x 12 — 1
4 lt. casement 8 x 10 — 1
Wood skylight, 4 lt. 3'-8" x 3'-4" — 1
Shutters, special, for pr. window, front elev. — 1 pr.
Exterior doors (include frames)
Front door, 3'-0" x 6'-8", glazed 12 lts., 2 panels under — 1
Side door, 2'-10" x 6'-8" glazed 9 lts., 2 panels under — 1
Side door, 2'-8" x 6'-8" glazed 6 lts., 2 panels under — 1
Special small door to ice box — 1
Exterior finish
Gable rake, front end — 25 lin. ft.
Drop post at peak of gable — 1
Rake trim for rear elevation — 32 lin. ft.
Cornice — 90 lin. ft.
Cornice for sun room — 25 lin. ft.
Belt with blocks at bottom of half timber gable — 16 lin. ft.
Half timber strips, 5¾" x 7/8" straight — 30 lin. ft.
Half timber strips, curved — 8 lin. ft.
Pin ends for same — 40
Corner boards with engaged spindle for sun porch — 6
Hoods over doorways, about 2'-4" x 4'-0" — 2
Wrought iron brackets for same — 3
Lattice strips of 7/8" x 1¼" — 225 lin. ft.
Apron piece under thresholds — 2
Interior doors
2'-8" x 6'-8" — 1
2'-8" x 6'-8" glazed — 1
2'-8" x 6'-4" glazed — 1
2'-6" x 6'-8" — 5
2'-4" x 6'-8" — 4
2'-4" x 6'-8" glazed — 2
Frames for single doors — 12
Frame for pair doors with sidelights — 1
Sidelights with panel under — 2
Flap doors to linen closet, include frame — 1
Interior finish
Trim with mitered angles for doors and windows — 540 lin. ft.
Wide casings for window mullions — 40 lin. ft.
Narrow casings for corners in sun room — 18 lin. ft.
Window stools and aprons — 78 lin. ft.
Stop beads for jambs — 160 lin. ft.
Wide stop beads for heads — 48 lin. ft.
Base — 330 lin. ft.
Chair rail — 54 lin. ft.
Mantel in living room — 1 unit
Casing for beams at lobby — 13 lin. ft.
Arched casing (lobby to stairs) — 1 unit
Return casing over door to coat closet — Item
Wood pilasters and casings for lobby — 4
Shelf and hook strip for coat closet — 1
Shelf and hook strips for bedroom closets — 3
TOTAL CARRIED FORWARD

TOTAL BROUGHT FORWARD
Shelf in linen closet — 1 set
Small shelves in closet of bedroom No. 3 — 1 set
Dressing table, bedroom No. 1 — 1 unit
Dress drawers in closet in bedroom No. 1 — 1 set
Shelves in alcove recess, bedroom No. 1 — 1 set
China closet — 1 unit
Case "A" in kitchen — 1 unit
Case "B" — 1 unit
Sink frame and drain board in kitchen — 1 unit
Ceiling light over hall, 6 lts., about 2'-0" x 3'-6" with trim — 1
Picture moulding — 260 lin. ft.
Stairs to 2nd floor and kitchen entry
Treads, about 3'-3" long — 4
Special treads for curve — 10
Risers — 16
Nosing for top steps — 2
Well fascia with nosing strip — 10 lin. ft.
Skirt board, straight — 17 lin. ft.
Skirt board, curved — 12 lin. ft.
Special curved piece near foot of stairs — 4 lin. ft.
Wall rail — 10 lin. ft.
Returns at end — 2
Curve with sharp drop — 1
Post — 1
Well rail — 10 lin. ft.
Finish floors (include sheathing paper) — 1060 sq. ft.
Cellar stairs
Treads 3'-0" long — 7
Treads for winders — 3
Risers — 10
Batten doors in basement (include frames) — 2
Sheathing on laundry and closet partitions — 78 sq. ft.
Sheathing on coal bin partitions — 35 sq. ft.
Studding for coal bin partitions — 63 sq. ft.
Build shovel hole and slide — 1 unit
Frame for 2 laundry trays — 1 unit
Shelving in cold closet — 80 lin. ft.
Vent box in cold closet — Item
Plastering—interior
Ceilings in general — 126 yds.
Basement ceiling (if plastered) — 62 yds.
Arched ceiling over lobby — 3 yds.
Walls — NET 314 yds.
(Or half outs, 368 yds.)
Dado (4'-0") in kitchen and bathroom, Keene's cement on metal lath — 29 yds.
Corner beads — 32 lin. ft.
Exterior stucco on patent heavy weight sheathing and patent wood lath — NET. 198 yds.
(Or half outs, 215 yds.)
Stucco between half timber in front gable — 3 yds.
Allow for work not listed in the survey:
General or overhead costs — Item
Grading,—walks, planting, sodding, etc. — Item
Connections for water, sewer, gas, etc. (including trenches) — Item
Insert sub-bids for other trades
Hardware
Allow for setting hardware — Item
Painting
Plumbing
Heating
Electric work
Fixtures
TOTAL AMOUNT



PLAN OF BASEMENT SCALE 1/8"=1'-0" · PLAN OF FIRST FLOOR SCALE 1/8"=1'-0" · PLAN OF SECOND FLOOR

DRAWING NO. 1

A HOUSE FOR A 25 FOOT LOT

The BUILDERS' JOURNAL WORKING DRAWINGS

NO 6
OCTOBER 1920

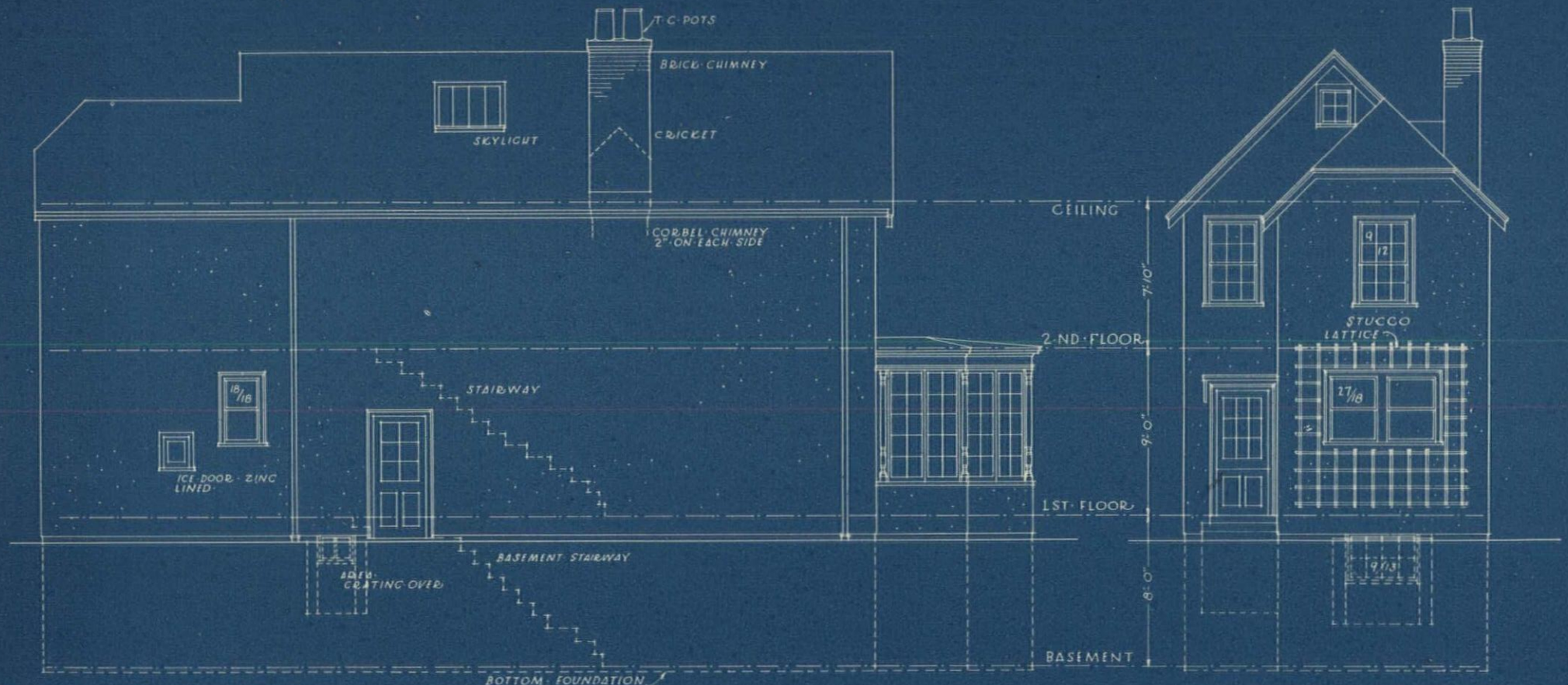
ELEVATION OF FRONT SCALE ⅛" = 1'-0" ELEVATION OF SIDE (RIGHT)

DRAWING NO. 2

A HOUSE FOR A 25-FOOT LOT

The BUILDERS' JOURNAL WORKING DRAWINGS

NO. 6
OCTOBER 1920



ELEVATION · OF · SIDE · (LEFT)

SCALE · 1/8" = 1'·0"

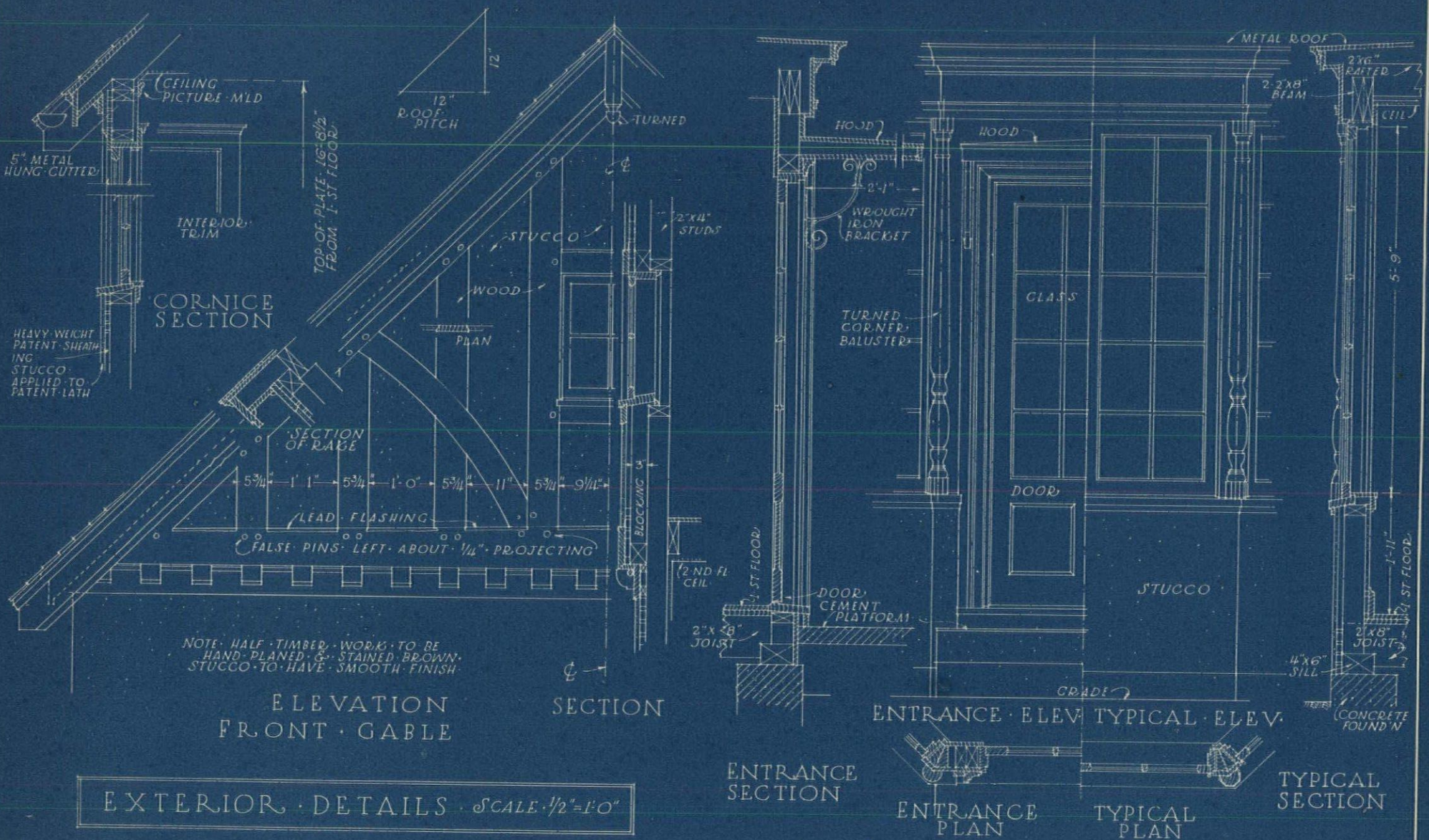
ELEVATION · OF · REAR

DRAWING NO. (3)

A·HOUSE·FOR·A 25·FOOT·LOT·

The BUILDERS' JOURNAL WORKING DRAWINGS

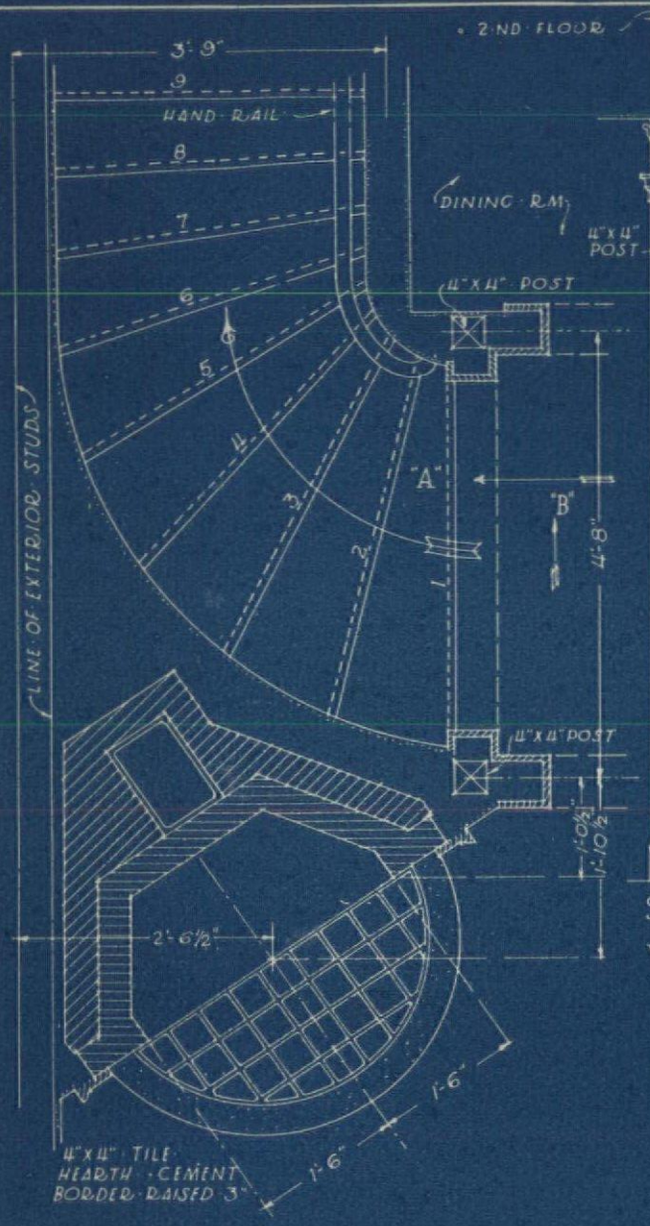
NO 6
OCTOBER·1920



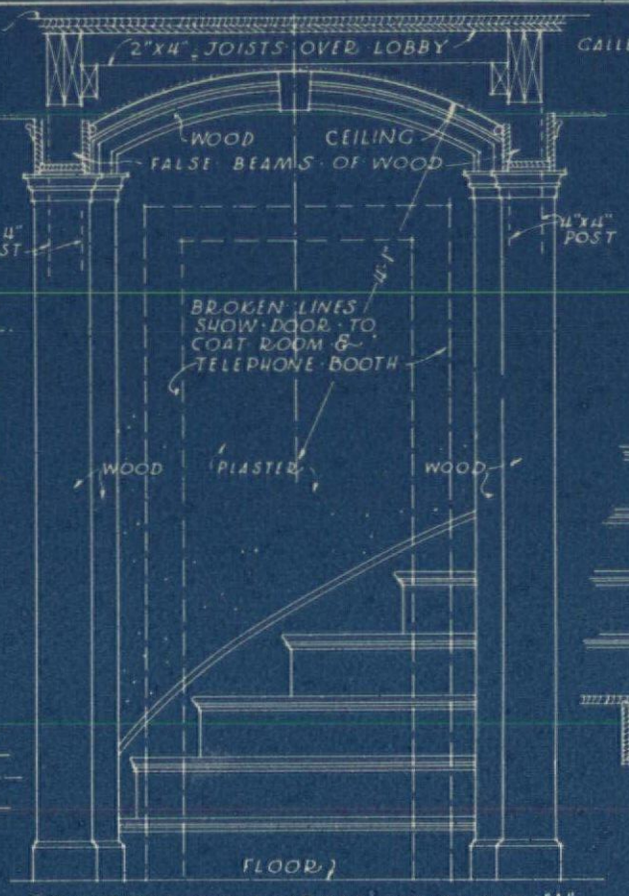
EXTERIOR · DETAILS · SCALE · ½"=1'-0"

SUN·ROOM · & · ENTRANCE · DETAILS

DRAWING NO. (4)

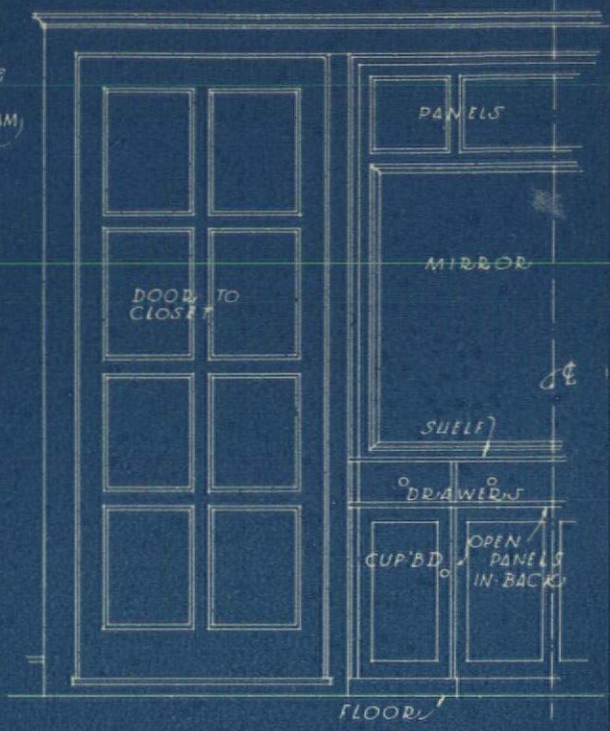


PLAN · OF · FIRE PLACE & PORTION · OF · STAIRS



SECTION · OF · LOBBY · TOWARD · "A"

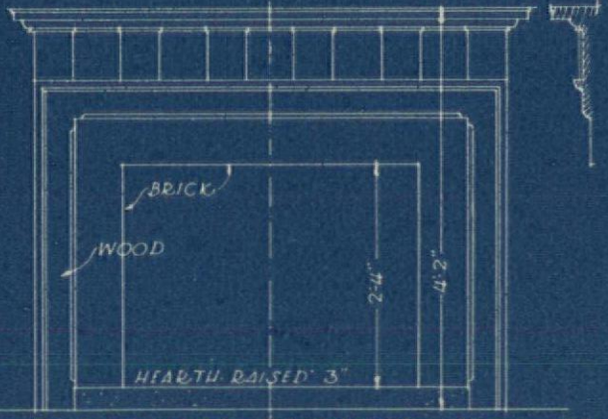
SECTION · OF · STAIRS · TOWARD · "B"



ELEVATION

PLAN
DRESSING · TABLE · & · CLOS · IN · BED-ROOM · # · 1 ·

HAND · RAIL & · BALUSTER
SCALE · 3" = 1'-0"



ELEVATION · OF · FIREPLACE · SECTION

INTERIOR · DETAILS
SCALE · ½" = 1'-0"

DRAWING NO. (5)

MASONRY

Practical Information on Materials and Latest Construction Methods

Popular Brick Bonds

American or Common Bond

By William Carver

BESIDES the color of the mortar and the texture, width, and cross section of the joints, another factor of even more importance to good brickwork is the *bond* in which the work is laid. Each of the foregoing factors is extremely important in producing the desired appearance, and good bonding is necessary to give the wall the proper strength, as well as to contribute another important factor to its effect.

The word bond means "to bind," and this describes exactly what is accomplished when the brick are properly arranged. The bond helps to bind the brickwork together, in which it is assisted by the mortar. The very best and strongest mortar cannot produce strong brickwork unless the bond is right, but a wall in which the brick is well bonded will still have considerable strength even if the mortar is inclined to be weak. Hence, important as they both are, good bonding may be said to be even more vital than good mortar.

These definitions of bonding are so excellent and complete that they are here quoted. Dr. G. C. Mars says in "Bonds and Mortars in the Wall of Brick": "Bond may be defined as the method by which each brick in the wall is so placed that the entire wall, by the overlapping of the individual bricks upon each other, forms one solid mass throughout its length and breadth. The bricks laid with the length of the wall, or the stretchers as they are called, secure by their overlap longitudinal bonding strength, while those laid across the width of the wall, or the headers, bond the wall transversely." Fred T. Hodgson says in his "Cyclopedia of Bricklaying": "Bond is the method of arranging each brick so that it laps over the bricks with which it is in contact above and below a distance equal to one-quarter of the length of the brick."

Two considerations will probably affect the selection of the bond,—cost and appearance. There is also another factor, that of strength, which is here briefly considered.

There is some difference of opinion among engineers as to which bond makes the strongest wall. Up to recently it was almost universally considered that the more headers the wall contained the stronger it was. According to this theory, English bond was the strongest, Flemish bond next, and common bond — containing mostly stretchers—coming last. Some prominent constructors have begun to ask whether a wall mostly of stretchers with just enough headers to properly tie the wall together is not really stronger than a wall with an excess of headers for ordinary purposes. Every type of solid brick wall is enormously strong and will carry great loads when properly built, and if a crack is ever found in such a wall it will almost invariably be due to a soft spot in the foundation soil. While no scientific tests have as yet been made, there is likelihood that such tests may show a wall in common bond to have the greatest lateral strength under ordinary conditions. This question is, however, for the usual builder, somewhat academic; every type of bond possesses much more than ample strength for ordinary needs. Only in heavy construction or under special conditions need the

A factory near Philadelphia in which common bond has been used as decoration. The strong horizontal lines are header courses laid in different colored brick. Stearns & Castor, architects

The pictures at right and left show operations in laying header and stretcher. Note that it is easier to lay a stretcher

strength of the bond be taken into account.

This table gives some idea as to the relative costs of various types of bond, expressed in labor hours. These figures are taken from "Brick —How to Build and Estimate."

Bricklayers' time laying 200 sq. ft. of 8-in. wall with ½-in. joints (containing about 2500 brick).

	Lime Mortar	*Cement Mortar*
Common Bond	17 hrs.	19 hrs.
Flemish, English or English Cross Bond	21 hrs.	22 hrs.

The above figures relate to straight wall work, without pilasters or special features. These figures may vary slightly in various parts of the country, and according to the management of the individual job, but will serve to indicate the general ratio. The bond is assumed to be a structural bond,—with headers running through and not broken off.

Taking a definite example, a small two-story house 25 feet square, would have about 2500 sq. ft. of brickwork, including porches. This would mean about 50 hours extra bricklayers' time (provided the brick were set in lime or cement lime mortar) for one of the more elaborate bonds. To this should be added some extra laborers' time,—not more than five or six hours, however, if several bricklayers are employed; and if a special face brick is used a greater number will be required than for a wall in running bond. This table shows the percentage of extra face brick required for the bonds named over and above the number required for straight "running bond." The figures are taken from "A Manual of Face Brick Construction."

Common Bond
(full header course every 5th course) 20% (1/5)

Common Bond
(full header course every 6th course) 16-2/3% (1/6)

Common Bond
(full header course every 7th course) 14-1/3% (1/7)

English or English Cross Bond
(full header every 6th course) 16-2/3% (1/6)

Flemish Bond
(full header every 6th course) 5-2/3% (1/18)

Double Header Bond
(two headers and a stretcher every 6th course) 8-1/3% (1/12)

Double Header Bond
(two headers and a stretcher every 6th course) 10% (1/10)

Generally speaking, the surface effect should be selected which best carries out the architectural design. As pointed out before, the many factors which determine the appearance of brickwork make it impossible to say that one bond is actually better looking than another bond, without considering the architectural design, the type of brick to be used, and the color, width and cross section of the joint. Therefore it must always be a matter of judgment whether any given piece of work should be laid in common or a more

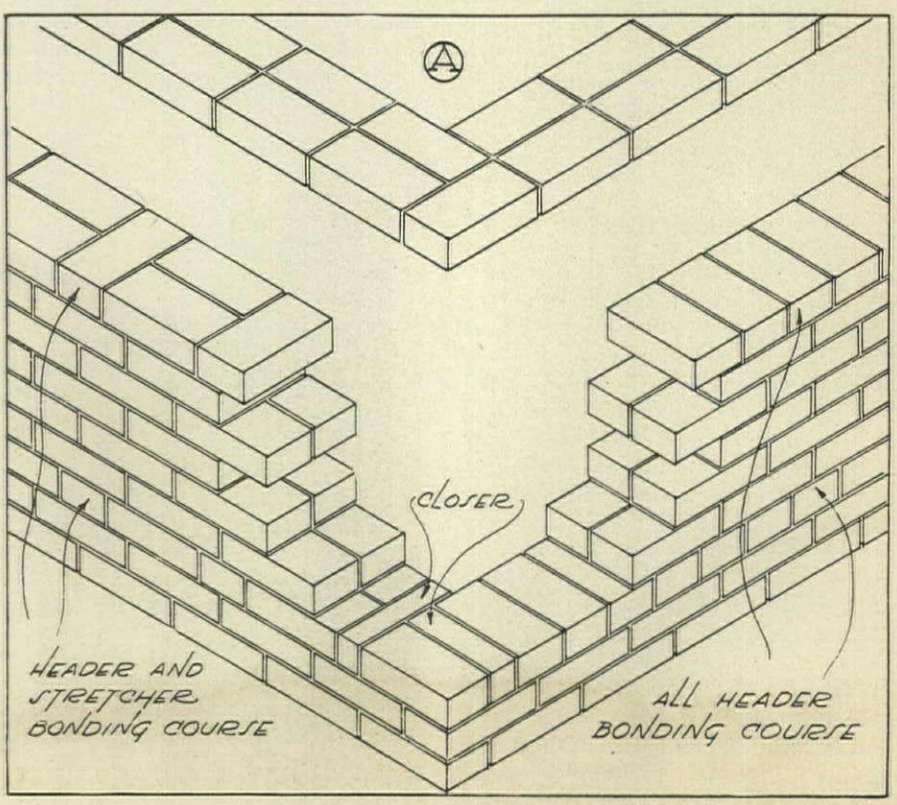


Diagram of brick wall with corner cut away to show bond. Left side shows stretcher and header and right side all header bond course

expensive bond. It is very often found, however, owing to the limited wall area of the average house, that with any average brick the more expensive bonds look by far the best, Flemish bond being a favorite with home builders. Many thousands of beautiful homes are, however, built in common bond every year, and particularly is this true of the cheaper and even moderate priced homes that are built to sell against competition, and especially against the competition of non-permanent construction. In this kind of work it is generally necessary to "count the nickels."

Patterns formed by the geometrical arrangement of various colored bricks are very effective if the designs are appropriate and in scale with the elevation. Much ancient brickwork was built in this manner and successful modern examples are plentiful. But so much extra time is required to lay pattern brickwork that its present day use is confined to more expensive homes and other structures. The slight variations in the color of the bricks caused by the uncertain action of the fire and minute chemical differences in the clay suffice, in most cases, to give a wall of kiln run brick sufficient interest to produce a very artistic and pleasing result.

At first sight there appear to be a bewildering number of types of bond, especially of those used to form patterns on the face of the wall. A little study proves, however, that all bonds fall roughly into three main classifications,—Running or American bond and its modification of common bond forming the first division, and English and Flemish bonds with their many variations forming the second and third.

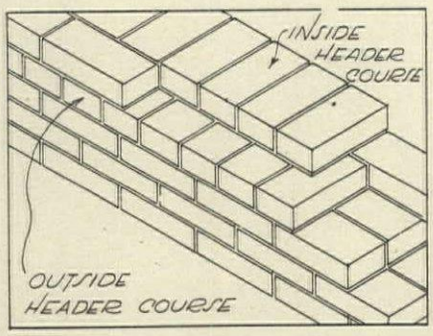
Common Bond

The arrangement of bricks known as common bond is illustrated here. It will be noted that the wall is composed of stretchers for several courses, then follows a course either entirely or partly of headers. The sketch illustrates both arrangements —at the right showing an all-header course, and at the left a course of alternate stretchers and headers, or "Flemish" course. The latter generally makes the best looking wall. Note the "closer" or half brick in each type of bonding course at the corner. Sometimes the closer is placed right on the corner, but does not look well in that position, nor is it good construction. At A is shown the corner for the courses between bonding courses.

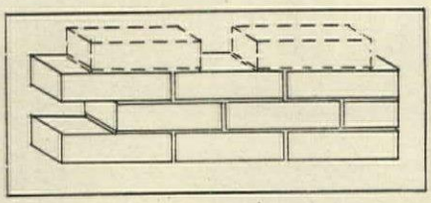
The building codes of almost every locality will determine the number of header courses necessary, in most places averaging one course of headers to five courses of stretchers. Where the wall is over 8 ins. thick one header will not, of course, reach entirely through the wall. In such cases another header course is introduced into the back of the wall to properly bond in the backing. It is necessary to stagger the header courses in a 12-in. wall.

The great majority of bricks are laid in common bond. This is the easiest of all the bonds to lay, and for that reason is the cheapest. Most of the brick are laid as stretchers, and the bricklayer's hand is in a more natural position when placing a stretcher than a header. This makes an appreciable difference in the number of bricks laid in a day's work. Moreover, where the appearance of the wall is not a factor, and it is not entirely essential that the vertical joints of alternate courses should form a perpendicular line, it is easier to place a stretcher so that it will bond well with a stretcher course below. Assuming the brick has the standard length of 8 ins. and a 2-in. lap is necessary to give a good bond, it will be seen that the vertical joint at the end of a stretcher can be placed anywhere within the center 4 ins. of the stretcher below.

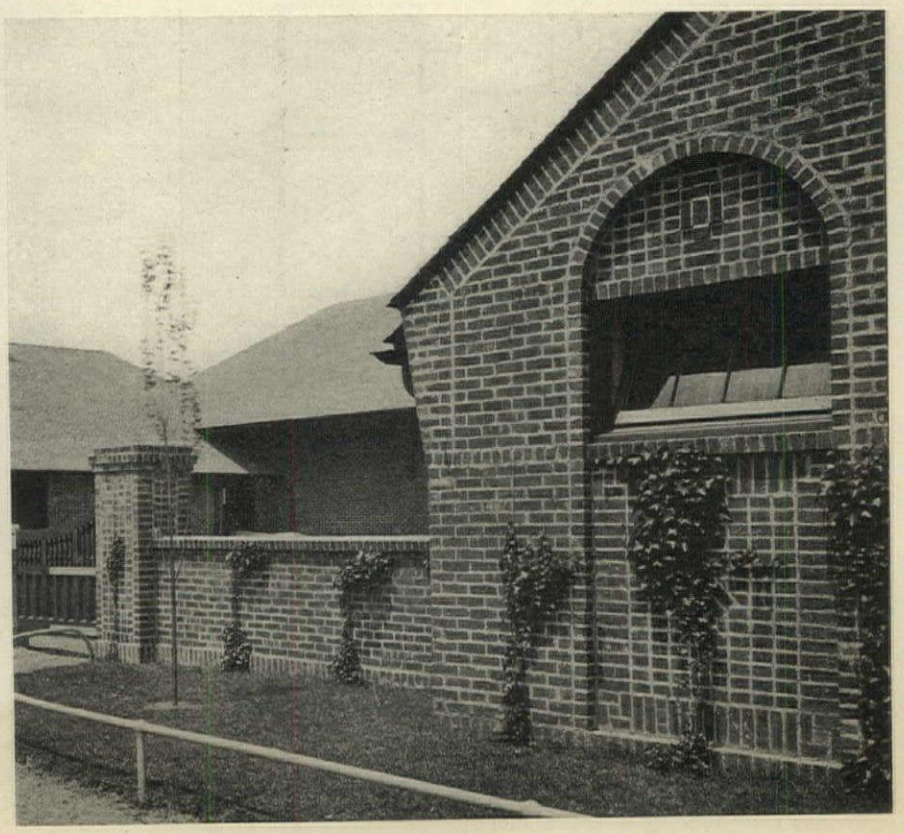
This makes for speed in laying brick in places where appearance does not count. Common bond, properly laid for exposed situations has, however, the perpendicular joints in each alternate course directly over each other.



In 12 in. wall the header course does not extend through wall. Another header course inside is then necessary as shown in diagram



In rough brickwork joint may come anywhere within center 4 in.

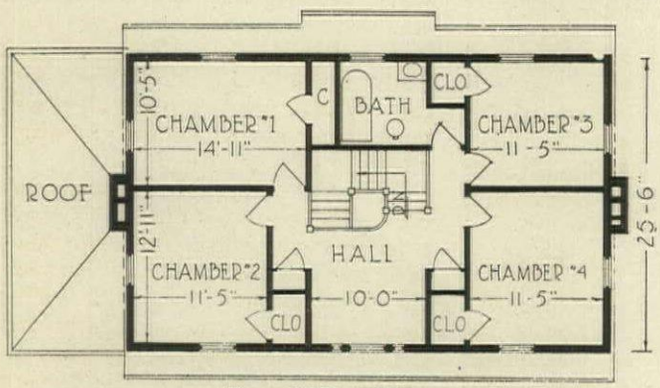


Detail view of brick wall showing running bind for main walls with rowlock and soldier courses, corbel and pattern work for decoration
Alfred Hopkins, architect

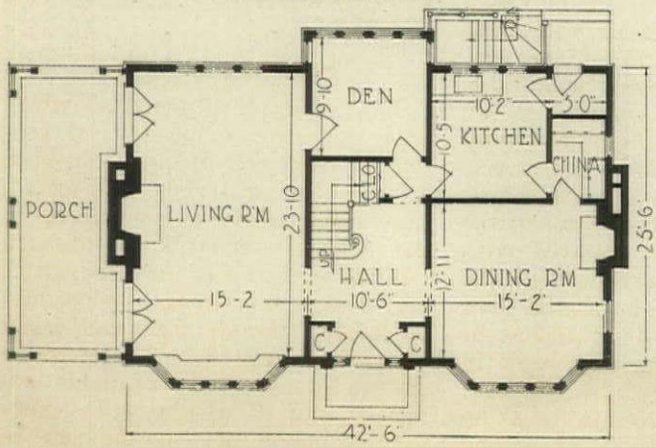
A Brick Suburban House

A gambrel roof with a long dormer gives comfortable bedrooms

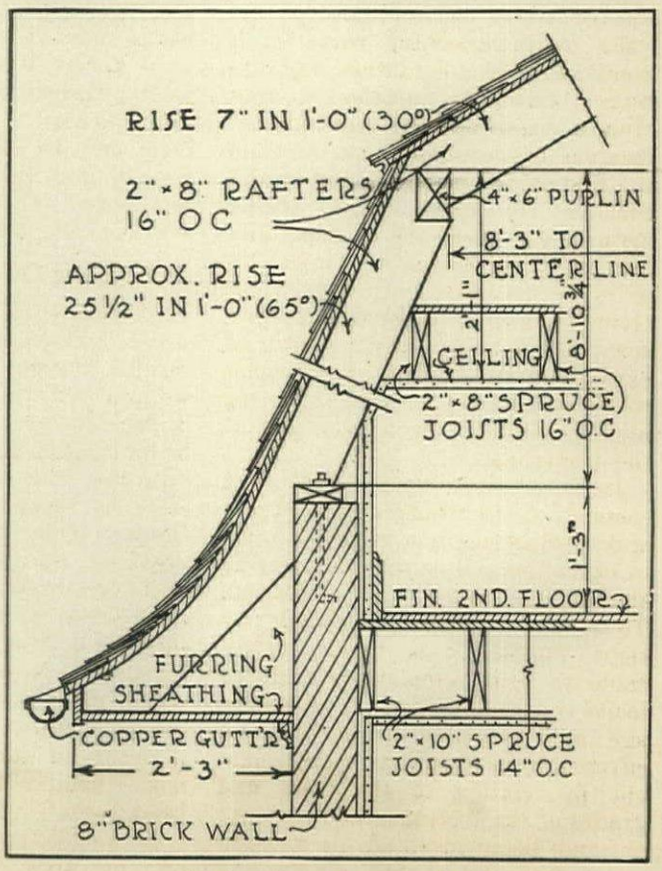
Charles R. Greco, Architect



Second Floor Plan



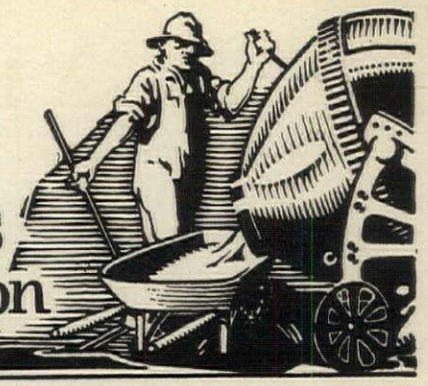
First Floor Plan



Section through gambrel roof

CONCRETE

Form Work-Reinforcing Methods Monolithic and Block Construction



Concrete Foundations

Part I. The most common troubles and how to avoid them

By J. B. Lowell

TO feature in the building of our homes merits more attention and receives less in comparison to its importance than the construction of the foundations. This cannot be said of heavy commercial buildings where extreme loads, involving all manner of difficult conditions of soil and adjoining structures, have developed foundation systems of the greatest scientific accuracy. The loads of the average dwelling or apartment house are generally so light in comparison to the bearing capacity of the soil that often but little consideration is allotted to that stage of the work.

It has been said by a builder of the old school of thoroughness that "the most important parts of a house are the foundation and the roof." Unlimited troubles can arise from a cheaply built foundation,—troubles that develop usually after a building is occupied and which continue to grow until drastic methods are necessary to stop them. But it is then too late to avoid repairs to masonry, carpentry, plastering, painting, papering and possibly plumbing or heating and an expense out of all proportion to that which would have been incurred had greater care been exercised at the beginning.

In foundations water is the most common of the troubles encountered and to overcome it a method simple in operation and capable of meeting suddenly increased flows is desired. To eliminate water completely by tight bulkheads is rarely applicable to light foundations and the usual course is to depend on drainage and pumping. This is best effected by a drainage system laid out in relation to the lines and grades of the footings, the low point or sump being in an offside location apart from later construction. It may be even desirable to lay wooden conduits built of form boards to carry the water under backfill or along the footings while concrete is being poured. Attempts to pump water from a trench during the process of pouring concrete is sure to result in cement being carried away by the pump, and if poured into water standing in the trench a separation of the aggregate takes place. The presence of water is also the direct cause of intermingling of mud with the concrete and undermining of the bank allowing earth clots to fall into the footing. All this tends to make a foundation of which the sustaining power is of uncertain value. In the steps or shaft the difficulties encountered are not so marked but it is necessary to keep forms free from water and joints washed clean while concreting. Access to the bottom of the form may be maintained up to the time of pouring by leaving the bottom board off, allowing the chips, sawdust, etc., to be washed out.

Stopping Off the Day's Work

A feature in the use of concrete which is given close attention by the careful builder is the method of stopping off the day's work. This is done by preparing a joint which in its location and design will maintain the full strength of the concrete as though poured simultaneously. This is accomplished by breaking the joint both vertically and horizontally. The simplest vertical break is made by two boards forming a V set in the center of the form. It is easily removed with slight danger of breaking out the green concrete. The horizontal joint is made in steps of 12 inches or more, similar to racking back in brickwork.

It is good practice, in breaking off the work, to leave projecting from the face of the joint a number of reinforcing rods of sufficient size and bonding length to withstand any tendency to separate that might occur; this is particularly essential in the case of joints to be kept open until after the concrete completes its final set. Here also enters the question of creating the bond between the new and the old work, which must be done carefully if success is to be assured. Where the concrete is still green a stiff broom or a wire brush may be used to scar the surface. If this is not effective the surface must be broken by a chipping hammer. Ultimately a fresh rough face should be obtained which is then washed with clean water or, for very old concrete, a one-to-six solution of muriatic acid, and lastly a paint of cement and water is applied just before pouring. If acid has been used all traces must be removed before painting with the thin grout.

It is often allowable, in mass concrete, to employ pieces of well washed stone to help form the bond at horizontal joints such as between the footing and the shaft. This forms a satisfactory bond provided the stones are selected for size in relation to the width of the footing and are washed free from all dust or mud.

Selecting Materials

The quality of all materials which enter into the composition of concrete is deserving of much consideration. Clean materials, well mixed, practically assure a concrete up to the normal standards of strength but the entrance of foreign matter may reduce the strength below that of safety. Simple tests can easily be made in the field to determine the usefulness of the available materials and if doubt still exists sample blocks of concrete can be made for one-day and seven-day

tests. Reinforced concrete should be made of unquestionably clean materials but some latitude is allowable in mass concrete such as occurs in foundations.

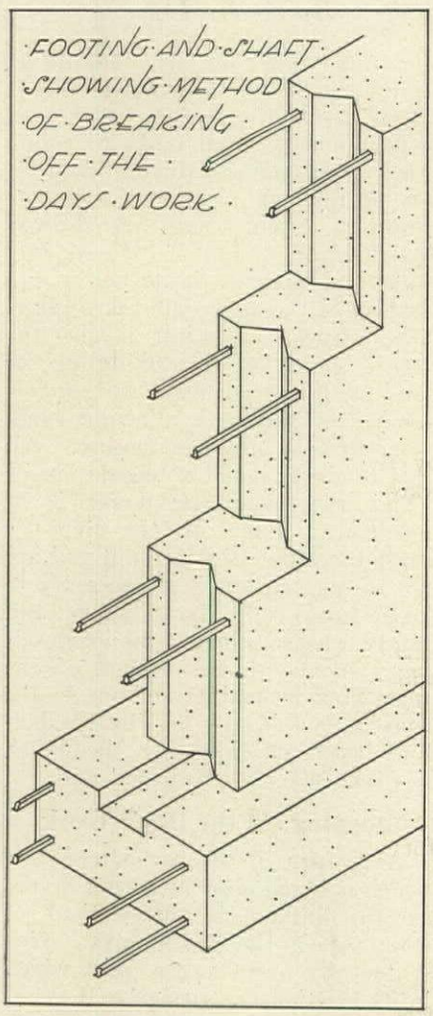
Cement delivered in the ordinary manner in cloth bags is so rarely impure that it hardly need be considered. If it ever is defective, dampness is generally the cause and this is readily evident by cakes or lumps which must be thrown aside. Clear, fresh water is desirable although salt water has been used without apparent injury except to retard the setting of the concrete. Water receiving the discharge from chemical processes is never suitable nor water carrying vegetable matter such as surface water from bogs or swamps. Such water can be used only if drawn through a large settling basin. The common sources of impurities are clay and vegetable matter.

Clay in some forms is not detrimental; it may even be of assistance in promoting the easy working qualities of the mixture and the ultimate water tightness of the concrete. To be of any merit it should occur in a finely divided state clinging to the grains of sand or gravel but of such small particles as to be scarcely visible and only evident as a stain on the hands when rubbed with the material. If it occurs in lumps the material is unsafe to use as these lumps will pass through the mixer in the same form leaving voids in the concrete on drying. Clay lumps in sufficient quantities would cause failure but clay in fine particles up to 20% of the weight of the sand in lean mixtures, such as 1:3:6, has not reduced the strength. In rich mixtures, such as 1:2:4, a loss takes place if as much as 2% of clay is present, the explanation being that the clay fills the void in lean mixtures and in rich mixtures it tends to prevent adhesion of the cement and sand.

Loam, or other vegetable matter, if present in such a small quantity as one half of 1%, may make sand unfit for use. It retards the setting to a marked degree and reduces the ultimate strength of the concrete by separating the particles of cement from the sand and stone.

Both clay and loam can be detected in material by shaking up with water in a glass, the lighter clay and loam settling on the top of the sand. This clay or loam residue can then be caught on a filter paper and ignited, the difference being that the clay will not be reduced, as is the loam, to a smaller volume of ash.

It sometimes happens in the movement of material about construction work that unslaked lime lumps fall into the gravel or stone and are carried into the forms before complete slaking takes place. While this seems a remote possibility it should be guarded against. A lump of lime slaking slowly within a concrete wall develops a tremendous pressure, it is practically certain to break out a large piece of concrete and it has been known to cause complete fracture of a small reinforced beam. Occasional leaves,



shavings, roots and such foreign matter while not interfering seriously with the strength of large masses of concrete do bring about unsightly pockets which require patching and imply carelessness in other parts of the work.

Winter Time Precautions

It often is necessary to place concrete foundations during weather below freezing temperature. This practice was formerly considered unsafe and is still held so by most building departments as a precautionary measure. There is no risk however, if proper equipment and protection is provided in placing concrete at a temperature even as low as zero. The first essential is that frost must be kept out of the soil after the trench is excavated. For this purpose there is nothing better as a protection than old hay spread a foot or more in depth and covered with boards or canvas to prevent it being carried away by the wind. This same hay can be used again on top of the freshly poured concrete. Secondly the concrete must be above a temperature of 40° at the time it is placed. This can be attained by heating the water and sand, and in extreme low temperatures the stone. Steam if available is the most satisfactory heating medium. It can be turned directly into the water, and under piles of sand and stone through perforated pipes. The sand and stone should be kept covered by canvas at all times to prevent loss of heat by radiation, and will also serve to keep out snow. Another satisfactory method is by heating the batch as it turns in the mixer.

Whatever means of obtaining the heat is employed, great care should be used to prevent ice or snow entering the sand or gravel and no time should be wasted in getting the batch into place. When the warm concrete is once protected the chemical process of setting will generate sufficient heat within the mass to maintain a temperature above freezing until after the danger of injury has passed. The footings, however, must remain protected to prevent frost from reaching the earth beneath.

When one considers the value of the superstructure and interior finish of a building as well as the comfort of living in a house which stands true and firm, it would seem that careful workmanship could not be given anywhere to greater advantage than to the foundations. The most perfect hanging of a door is labor lost if, later on, a settlement results. Yet the amount of labor necessary to hang a door, if given at the critical point in the placing of a footing, may represent the difference between a perfect superstructure and one with cracks, destructive of interior decorations and exterior reputations.

CARPENTRY

Good Practice in Frame Construction and Finish

The Framing of Large Barns

With special reference to the Shawver Truss

By J. L. Strahan, Massachusetts Agricultural College

SCARCITY of manual labor on the farm and the introduction of labor saving devices for the handling of hay and grain, combined with a constantly increasing cost of lumber for building purposes, have made necessary a very radical change in the design and construction of modern barns from the types which had been up to within 15 or 20 years ago, the most economical and efficient. Heavy timbers up to 10 x 14 in section have been replaced by 2-in. planks or even lighter lumber; mortise and tenon joints have been superseded by spiked or bolted joints and the interior framing has changed from a veritable forest of heavy posts and cross ties to an open, clear space that resembles, in some extreme cases, the interior of a balloon.

It must not be supposed, however, that such radical changes took place all at once. On the contrary even today some farmers insist on building frames with heavy cross ties and large purlin posts. Others will omit the ties and replace them with adequate braces leaving the bents very distinctly marked off for purposes of hay measurement. This is considered by some very practical farmers as being a decided advantage, even at the cost of a slightly increased lumber bill. There are always localities in which carpenters stick to old methods because of a lack of experience with the new, and perhaps also because of a lack of faith in the newer forms of building. Nor is this surprising for in many cases the newer types have not stood up to their work because of imperfect design or careless construction and consequently these types are held in disrepute.

Thus a general survey of the farm building conditions throughout New York and New England, conducted during a period of somewhat over a year, discloses the interesting fact that these newer types of frames are coming into use only slowly, though none the less surely, and against the prejudice or ignorance of local builders and the somewhat isolated individual farmers. In new construction all gradations and types from the heaviest timber to the lightest plank frames are found, and in remodeling, the cross ties are being very gradually and rather reluctantly eliminated in favor of side braces.

At present it is doubtful whether there are any "standard" forms, though out of the many observed a certain few types seem to predominate and are sufficiently distinct in their fundamental structural details to warrant their being classified and named.

The chart shown in Fig. 1 illustrates a possible classification of modern frames with respect to their principal roof supporting features.

The principal division in this classification is made on the basis of the presence or absence of a purlin plate, or a member which supports the roof rafters and is, in turn, supported by a specially constructed truss which transfers the roof load to the ground wholly or in part through posts. In the case of the Shawver and the cantilever

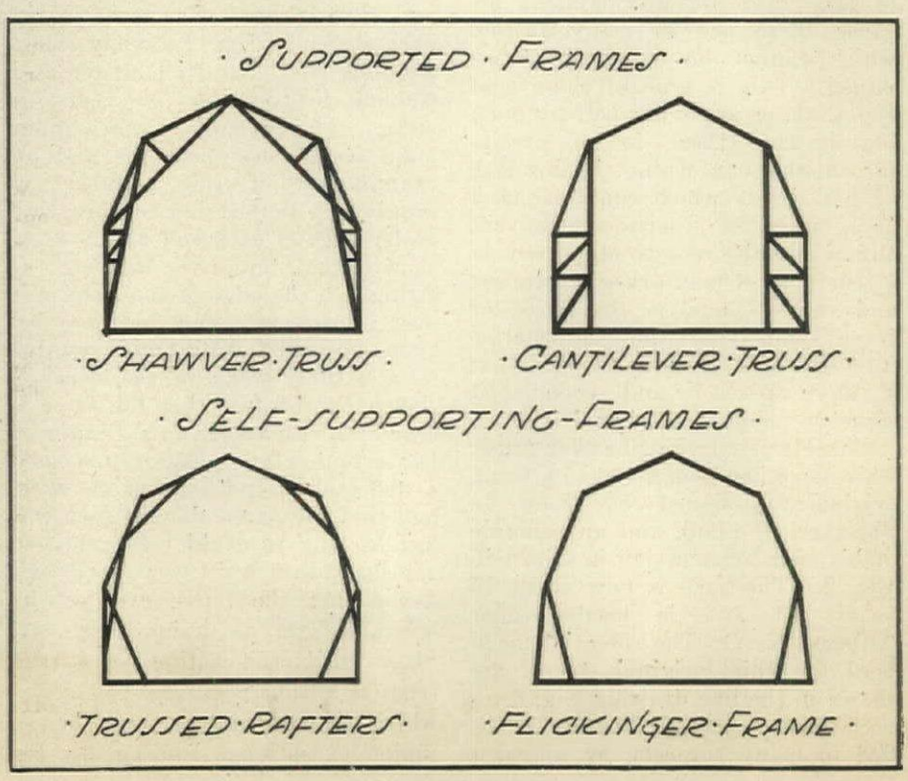


Fig. 1. Diagram showing four principal types of modern barn roof frames

Fig. 2. One of the first Shawver truss barns to be built in the East

types the roof load is carried to the ground through trusses placed at intervals of from 14 to 20 ft. while in the case of the trussed rafter and Flickinger types the load is transferred entirely through the walls to the foundation. The roofs in the first two types are supported at the hip or at the hip and peak by trusses, and in the latter two they are truly self-supporting.

It has been said that refined classifications of wooden structures of this kind are unwarranted because there are so many factors which cannot be definitely determined. This is true of those roof types which are truly self-supporting because there is no precise information concerning the strength of nail joints which could be used as a basis for a critical analysis. But where the roof is supported on a true truss it may prove of interest and value to analyze the action of forces and determine the relative intensity of stresses to the end that a more perfect and economical structure may be designed.

Consider first the Shawver truss. This name has been given to a form, originally designed by John L. Shawver, of plank and an example of his own construction is shown in Fig. 2. The barn is now about 15 years old and is located near Auburn, N. Y. The essential members in this original truss are shown in the line drawing Fig. 6.

Shawver's truss has been modified in many respects, by different builders until, in some cases, it is hardly recognizable. It will be noticed that in the original there is a member running from the purlin plate to the peak. This is quite an essential member if the structure is to be considered as a true truss, yet an example found at Middletown, N. Y., shown in Fig. 3, is without it. Still another modification is shown in Fig. 4. In this case the purlin post has been broken and brought into the wall half way between the main plate and the floor where it is bolted to the post and blocked up with a piece of 2 x 8 plank. This is perfectly legitimate construction because analysis shows that the outward thrust of this member, even under the most severe loading, is not sufficient to cause excessive bending in the post. There is a still further type in which the peak tie is omitted and all that remains of the original truss is the purlin post. This example can hardly be called a Shawver truss at all, but it illustrates well how greatly this type of design has been changed and modified. In this last case it would be better to leave out the post entirely and depend on a wall brace to keep the resulting self-supporting roof in place.

With so many variations and modifications in the design of this truss it would not be surprising to find that some are giving better satisfaction than others after a considerable period of service. Unfortunately, however, the oldest of the Shawver barns, at least in the East, are hardly old enough to offer any real comparisons. The truss in the barn shown in Fig. 2 already shows some signs of distortion under continuous loading for 15 years or more. This occurs in the upper main member or peak tie and an examination of this member by means of a taut string touching the under edge at each end of the stick, showed that the space between the string and the edge of the wood was over 1½ ins. at a joint half way between the ends. That this is not due tc a natural warp in the wood is shown by the fact that the same is true of all the others to a greater or less extent. It is possible that such a deflection is not serious in itself and that the particular member will last as long as could reasonably be expected, but it is very good evidence that the truss, even in its original form as designed by Mr. Shawver, is not acting as a true truss at all but is subject to stresses which cause bending and hence, under exceptional loading, as for instance an unsually high wind, is liable to failure. If it can be modified to some slight degree in such a way as to make it act as a true truss without unduly increasing its cost or difficulty of construction then failure from such a source can be practically eliminated.

Consider how it has been built in the past. In Fig. 5 is shown a line drawing of all the essential members as included in the barn in Fig. 2. It will be observed that the truss is made up of three main members forming a triangle with *a, i* as a base. The left hand side of the triangle is all the construction included between *a* and *e*, and the right hand side between *e* and *i*. If these two sides are rigid in themselves, then the whole structure will be rigid, as a triangle cannot change its shape under load unless one or more of its sides either buckles or changes its length. But an examination of either of the sides of the main triangle shows that it is not rigid if all the joints are considered as pin joints. The left hand side is made up of three elements, two of which, *a b c* and *d e f* are triangles and the third, *b c d f* a four-sided figure. The four-sided figure can change its shape if the joints are flexible, and hence the relative position of *b c* and *d f* is free to change within the limits of deflection of member *b e* at *f* and member *a d* at *c*. Hence the truss

Fig. 3. Shawver truss with Nos. 2 and 3 omitted. Auxiliary hay floor suspended by iron rod so truss is doing double duty

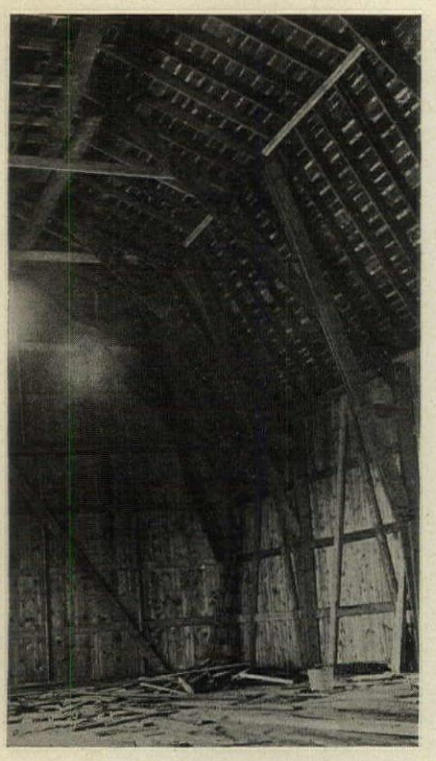


Fig. 4. Another modification of Shawver truss showing purlin post No. 5 brought into wall half way between main plate and floor

is rigid only as *a d* and *b e* are inflexible. Thus, a load applied at the peak and tending to deflect the point *e* downward must be withstood by *a d* acting as a beam at *c* or *b e* acting as a beam at *f*, or both together. An excessive load will therefore cause deflection in members Nos. 4 and 5, which will give a bulging effect at the plate. If the truss were designed with the member *b d* or No. 2 so constructed as to resist a tensional stress such distortion could not occur, because in this case all the elements of the truss are triangular and cannot appreciably change their shapes under the loading for which they are designed.

Furthermore, it is a simple matter to analyze the truss so designed and determine the proper working stresses for each member. Such an analysis brings out several very interesting facts. It is possible to determine the relative amount of stress carried by each member of the truss, and this table gives this relation in terms of per cent with the greatest stress at 100:

Members	% Stress
1 + 6	64.5
2 + 7	100.0
3 + 8	44.5
4 + 9	44.0
5 + 10	62.2
11	9.0

These figures are based on stresses caused by maximum loading, that is to say, a combination of dead load, snow load and wind load.*

When only vertical loads are considered, wind load being omitted, the stresses would be proportioned thus:

Members	% Stress
1+6	28.4
2+7	84.0
3+8	18.7
4+9	52.8
5+10	100.0
11	21.4

It will be noticed that in the case of maximum possible loading, members Nos. 2 and 7, or the lower roof rafter, take the greatest amount of compressive stress and that under the usual loading, or maximum vertical loads, they take second highest, being subjected to a stress of 84% of the greatest which occurs in the purlin post.

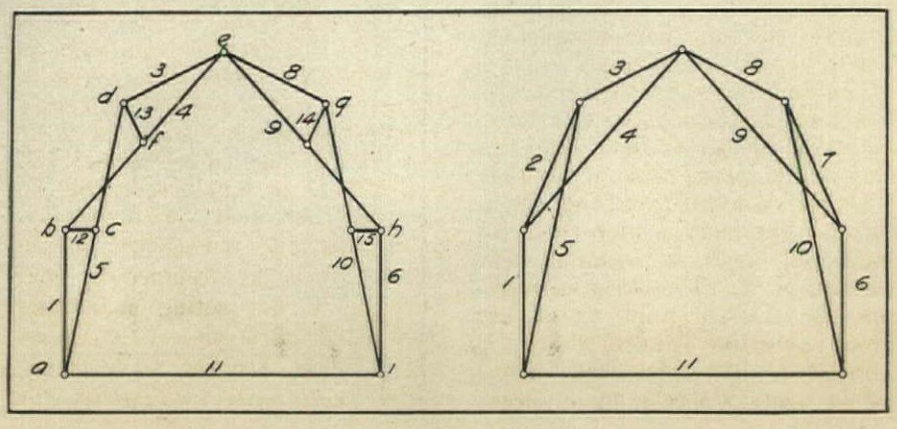
In order to check up these results in some more graphic way, the author designed and built a small wooden model with flexible joints. It contains all the essential elements of the truss and is so constructed that all joints are subject to displacement, in any direction under load, a maximum amount of about ⅛ in. All vertical members are single, ½ in. thick by 1 in. wide, and are pierced at the proper points by 8d nails which have had the heads and points taken off, leaving a pin 1 in. long, of which ¼ in. projects on each side of the member. The two rafters, the ties and the main peak tie are all double members, ¼ in. thick and 1 in. wide, which straddle the single members and are of such length that the steel pins just mentioned come in the precise center of ½ in. diameter holes in their ends when the truss is not subjected to any pressure. The space between the pins and the walls of the ½ in. holes is filled with rubber in the form of a washer whose inside and outside diameters conform to the measurement of the pin and the hole. The double members are held in place by small ⅛ in. stove bolts, inserted at such points that they do not interfere with the deflection of the members when the truss is under load.

In order to make smooth construction, the upper rafter starts at the purlin as a double member straddling the purlin post, and ends at the peak as a single member between the two sections of the peak tie. This is accomplished by merely splicing two pieces of the ¼ in. stock to a piece of the ½ in. stock, making a lap joint 3 ins. long, or long enough to withstand any stress to which it might be subjected. There is no joint connecting the two sections of the truss at the peak. This point, therefore, simulates a true hinge joint when taking vertical loads. The pins which hold the lower rafters, members Nos. 2 and 7, in place have spread farther apart, indicating a tensional strain, and further, the amount of displacement in this case is noticeably greater than that of any of the others. All of the joints show a pin displacement which can be interpreted to check up the computed values precisely in kind and approximately in amount. They indicate tension in all the outside members, even including the wall post, and compression in the inside members.

Real Shawver trusses, as found in actual construction and also in some commercial designs on paper, vary in respect to the design of members Nos. 4 and 5. Some are found with No. 4 single and No. 5 double

*For a detailed discussion of the analysis from which these figures are taken, see "Barn Roof Design" by J. L. Strahan in the Transactions of the American Society of Agricultural Engineers for 1918, pp. 57-74.

Fig. 5 at left shows diagram of Shawver truss as originally used in Fig. 2. At right Fig. 6 shows rigid form with Nos. 2 and 7



while others have No. 5 single and No. 4 double. This difference has an influence on the practical design of all the other members, as is apparent from the fact that the type of construction used (plank framing) requires that members shall interlock, that is, any member joined to a double member must be either single or triple in order to avoid a tortional strain on the truss and a consequent tendency to draw the nails or spikes. Hence with a single purlin post (No. 5), the tie chord (No. 11) must begin as a double member which further requires that the wall post (No. 1) be either single or triple. As ordinarily constructed under these circumstances it is triple, *which requires the use of more lumber than is warranted by any stress to which it may ever be subjected.* On the other hand, the truss with the double purlin post requires only a single tie member, from the standpoint of tensional strain, but probably triple when shear at the foot of the truss is considered. A single tie (No. 11) requires only a double member wall post instead of triple, which is more reasonable in the light of facts brought out by analysis. Furthermore, the results of analysis show that under all types of loadings the post (No. 5) takes more stress than the peak tie (No. 4). This table gives the proportion of stress in No. 4 based on that in No. 5 as 100%:

	Purlin Post	Peak Tie
Load	No. 5%	No. 4%
Dead	100	37.50
Snow	100	54.25
Peak (Concentrated)	100	80.50
Wind left	100	66.80
Wind right	100	82.00
Max. Combined	100	71.50

These figures show conclusively that the post should in all cases be the heavier member as it takes the greater stress and greater in proportion as the load is more uniformly distributed. Thus for a dead load, which is applied uniformly throughout the structure, the post has nearly three times as much internal stress as the tie, while for a load concentrated at the peak the stresses are in proportion of approximately 5 to 4. For maximum stresses, due to a combination of loadings that might occur simultaneously, the proportion of stress is between the two first given or approximately as 4 is to 3. In the light of these results it may be safely concluded that the design which calls for a double member post and a single member tie is the more normal and reasonable of the two types.

In this truss vertically applied loads cause compressive stresses in the inside members and tensional stresses in the outside. An investigation of the action of a wind load on either side shows that the stresses are reversed in all members on the side from which the wind comes. Thus a wind from the left changes the stresses in Nos. 4 and 5 from compression to tension and in Nos. 1, 2 and 3 from tension to compression. The stresses in members Nos. 6, 7, 8, 9 and 10, or those on the side opposite the applied wind load, are intensified rather than reversed. It is conceivable, therefore, that a wind pressure might occur of such intensity as to entirely neutralize all the stresses on the side of application, causing a relaxation of pressure on all joints. Upon an increase or reduction of wind pressure, above or below this point, the joints would again take up their work. Thus a series of strains varying in intensity from zero to that caused by the greatest stress would be constantly occurring at the joints, tending to loosen them unless designed to withstand such action. It is for this reason that bolted joints should always be used instead of spike joints. The spike joints will tend to loosen up more readily and, undoubtedly, a truss so constructed will fail sooner or at least tend to settle out of true shape more quickly. This is especially noticeable in buildings situated in exposed positions.

The Shawver truss comes very near to being standard at the present time for large barn framing. It should make a permanent, long lived structure. Farmers build today, as they did one hundred years ago for life-long service, and not only for themselves but for their children and grandchildren. They are entitled to the best service and advice the builder can give them and for this reason if for no other all guess work should be done away with where large and important farm structures are concerned. Make of the Shawver truss a true truss by including all of its members as properly designed, and join them together in such a way that a good stiff breeze will not make them creak and groan and finally pull apart shortly after the building has paid for itself and has begun to earn dividends.

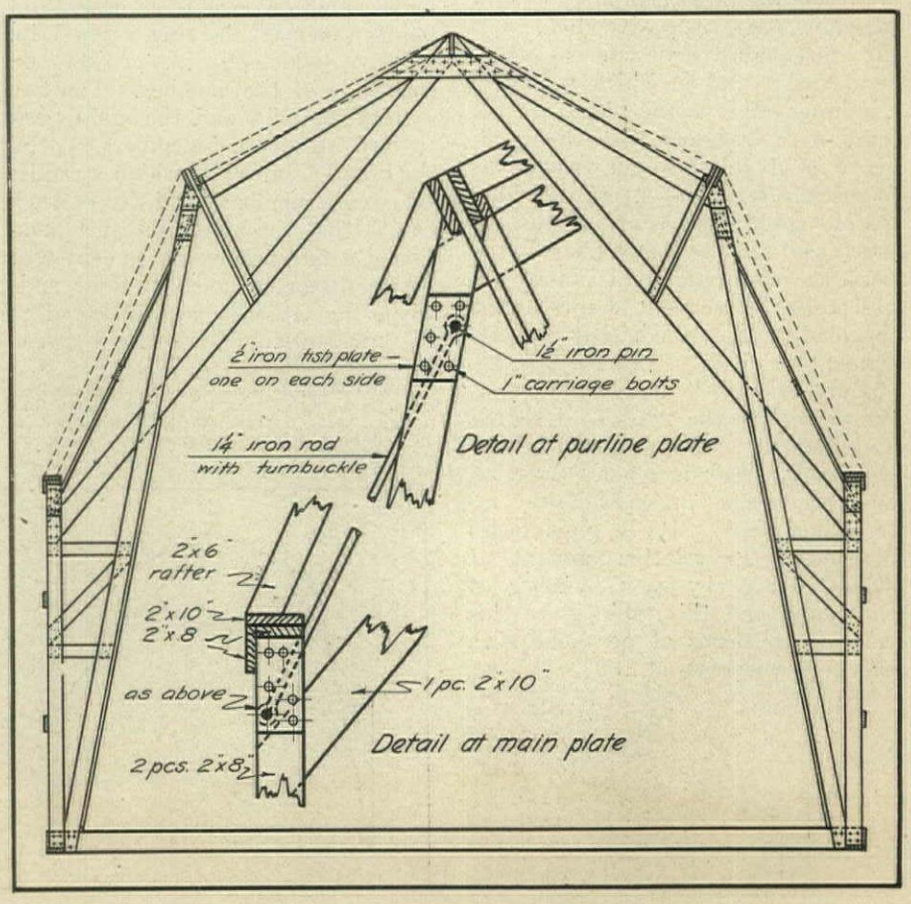
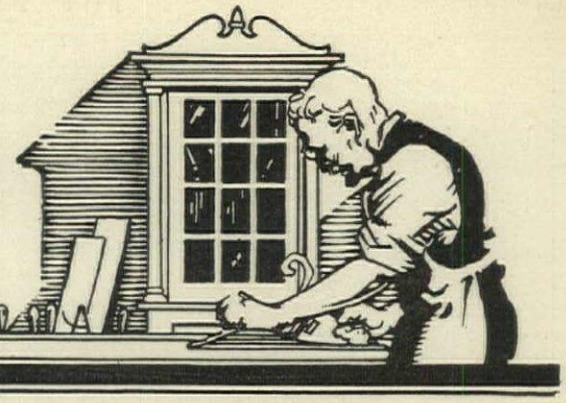


Fig. 6. Design of Shawver truss to conform to correct principles of truss action, showing also a suggested method of construction the connections for the tie rod at the main and purlin posts

SHOPWORK *and* FURNITURE

Designs for the Finish Man



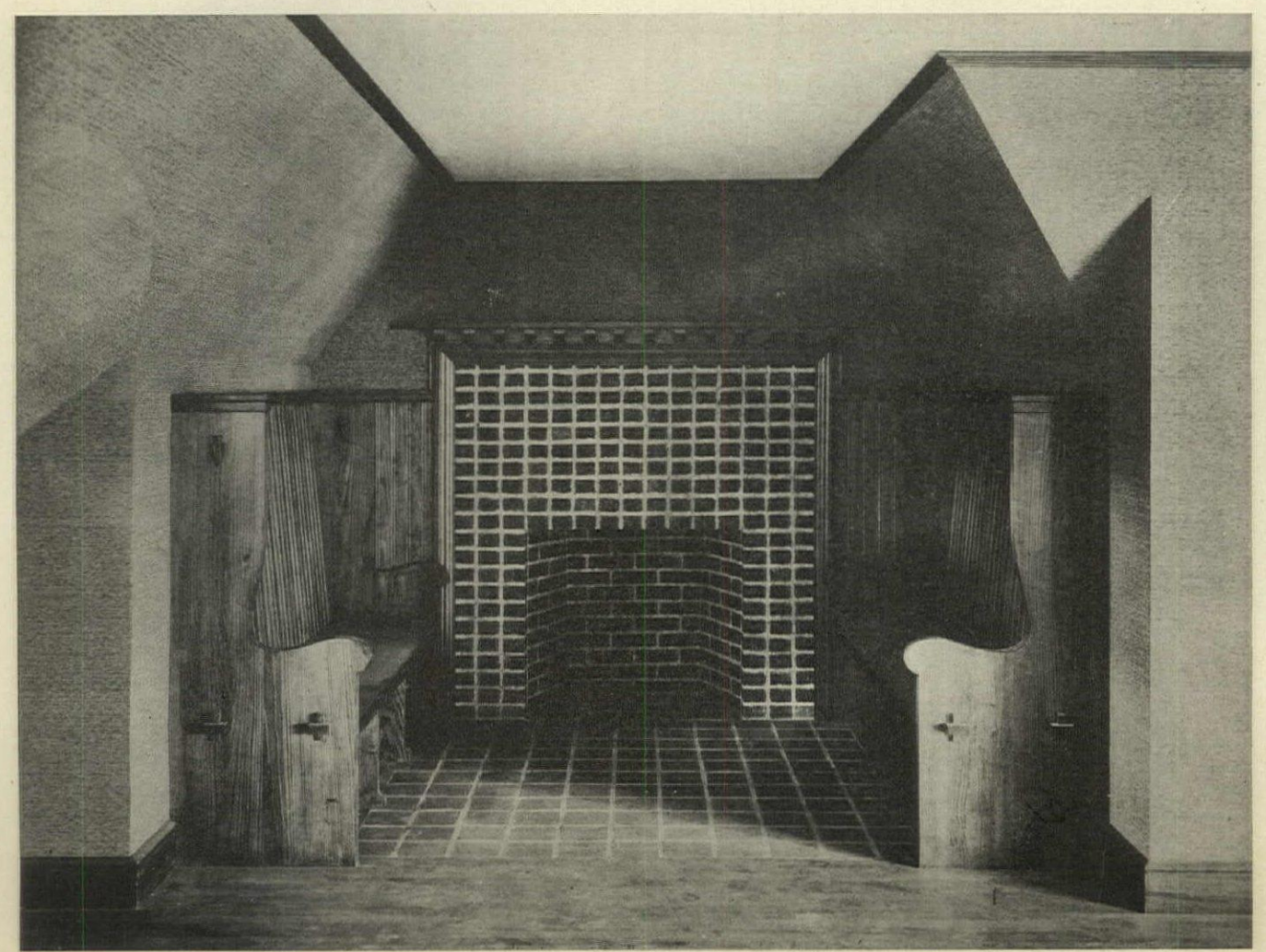
A Fireplace Ingle Nook with Benches

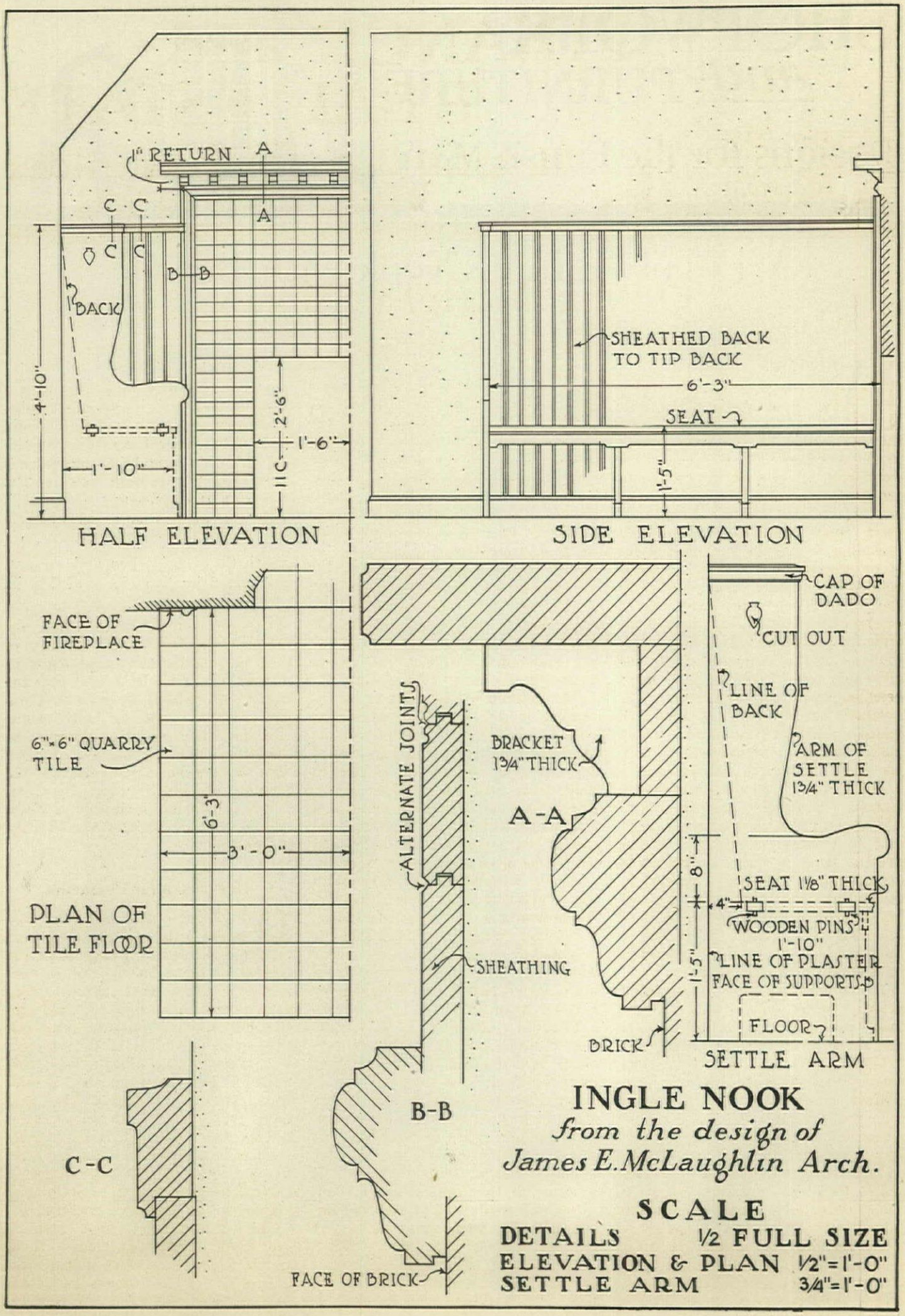
With special drawings from designs by
James E. McLaughlin, Architect

WITH the increasing popularity of bungalows there is a strong demand for built-in furniture. It simplifies the problem of furnishing a house which in these days is a large item and it also makes the work of taking care of a house easier for the housewife.

In the illustration below is shown a very good example of a fireplace ingle nook. It is used at the end of a room finished in the third story for a study but it could just as well be used in a first story living room. It is of generous size, having a width of 8 ft. 6 ins. and a depth of 6 ft. 3 ins. The floor between the benches is paved with 6 x 6 red quarry tiles and the face of the fireplace is laid up with a rough textured face brick in "checkerboard" bond composed of all headers.

The woodwork is of simple character and is designed to display the natural beauty of the grain of the wood. The brick facing of the fireplace is finished by a heavy moulding mitred at the top above which is a narrow shelf supported by cut out brackets of 1¾-in. V-jointed sheathing which is given an individual touch by the special moulding at every second joint. The ends of the benches are built up from 1¾-in. stock through which tongues on the seat project and are fastened with wooden pins. The space beneath the seat is open and the seat supported by two pieces of 1¾ in. stock cut to pattern.





INGLE NOOK

from the design of
James E. McLaughlin Arch.

SCALE

DETAILS ½ FULL SIZE
ELEVATION & PLAN ½"=1'-0"
SETTLE ARM ¾"=1'-0"

FINANCE and REAL ESTATE

Helpful Data for the Builder Who Builds to Sell

Outside Mortgage Money

By C. Stanley Taylor

FROM recent inquiries which have been received by this Department it would seem that a number of builders, failing to get mortgage money locally, are wondering whether it is possible to get mortgage loans from individuals or corporations located outside of their own territory. Generally speaking, it may be said that there is practically no outside mortgage money obtainable. As practically every builder has experienced, mortgage money is at best very difficult to obtain. In some cases, such as in the Detroit district, the allowable rates of interest have been increased, and where money is available at all there is usually a bonus payment involved which makes it almost impractical to utilize such funds to advantage.

Just when building loan and permanent mortgage money will "loosen up" it is extremely difficult to predict. Certainly, at the present time so many inducements are offered to the use of capital in other lines that the stable line of building is suffering from lack of financing in a manner never before known when the need of buildings of every kind was so great.

A comparative study of building activity shows that where the demand is greatest and rental incomes and sales possibilities are highly developed, building is much more active than at other points. It is plainly evident that some mortgage money is available if a sufficient inducement is offered to the lender; but to be able to make a sufficient inducement there must be a reasonably attractive investment first to the builder or owner who undertakes a new building operation.

In seeking to obtain mortgage money, therefore, the usual procedure must be somewhat reversed, and a builder who is undertaking a new project should (possibly with the assistance of a real estate broker) determine exactly what offer he can make in order to get the necessary building loan. It may be that the rental income or the sales possibility of the operation which he contemplates is such that he can afford to pay unusually high rates or a substantial bonus in order to obtain required mortgage funds. In the case of an investment property it may be that local rentals are so high that it will be possible to set aside a sinking fund to take care of the additional interest fees represented in the cost of financing.

The builder's best method of obtaining money at the present time would seem to be from individuals or from loaning institutions which are not generally in the market to make loans, but which might be induced to make necessary loans if a sufficiently attractive offer for the use of the money can be made. In many instances an ordinary loan application will be turned down with the statement that there are no funds available. On the other hand, if accompanying this application it is possible to make an inducement in the way of a bonus offered, much more consideration will be given by loaning institutions.

Certainly, however, it is evident that if in no locality in the country there is sufficient money to meet local building loan demands, it is practically impossible to get money from such sources for use elsewhere. The builder who is working out plans, therefore, hoping to get money from an outside source is wasting his time, unless he has definite connections or has received encouragement from some particular loaning interest.

In view of the increasing popularity of the co-operative method of financing building construction, it would be much more to the advantage of a builder to develop a project upon this plan, trusting to obtain financing through the contributions of a number of individuals interested in obtaining space in the contemplated building.

This co-operative method of financing the construction of buildings, which has been briefly described in former issues of THE BUILDERS' JOURNAL, would seem to be the logical next step in seeking mortgage money, rather than attempting through casual inquiry to find a source of mortgage loans in distant localities. It is true that for highly specialized operations there are national loaning institutions through which applications may be made for financing, but as a general rule, and as already explained, the seeking of outside mortgage loan funds constitutes definitely a waste of time on the part of the average builder.

New Plans for Financing

DURING the past two years real estate subdivisions have been enjoying phenomenal success in the market of home building sites, particularly on the easy payment plan. It is found, upon analysis, that subdivision activity follows industrial development. Thus in the automobile towns of the Middle West this activity has been at its height. Many real estate dealers have predicted a great falling off of sales during this year but from average reports it would seem that the public, particularly that percentage of the public represented by industrial employes, is steadily investing.

Real estate subdivision business has been highly developed to a point where attractive home sites are sold for low down payments and on easy weekly or monthly in-

stallments. While it is understood that a large percentage of these home building sites will not be built upon for many years the purchase of sites, together with the known condition of housing shortage in practically every industrial community, offers reassurance to many builders as to the development of sound activity in this field of investment. If it were not for the difficulty of obtaining building loans thousands of homes would be constructed immediately in spite of high costs, because where a housing shortage exists rental increases have been so great that owners of lots would be willing to build at almost any cost if they could be assisted in financing building operations.

Gradually, practical plans for financing home building are being developed in various communities and through these plans it will be possible for the speculative builder to keep his assets liquid and to continue the construction of homes. Certainly the first step in obtaining a home or in causing a home to be built is the purchase of a lot, and following a continued period of activity in home site purchasing there is always a period of activity in home building which extends even into a time when general business conditions are not good.

Many owners of lots are at the present time seeking to meet the housing shortage by building inexpensive shacks, ready-cut houses or garages on lots which they have purchased on easy payment plans, contemplating living in such buildings until they are in a position to build permanent homes. Wise builders are taking advantage of this state of the public mind by developing practical plans for houses which can be constructed one unit at a time and for the construction of garages which can be made habitable until such time as the owner is in a position to build his home. The construction of shacks or very inexpensive houses on these lots is definitely a waste and every builder should be alert to encourage the construction of a building which will have value in years to come rather than one which must be abandoned before many years.

In many industrial towns signs of real estate activity may be seen on every hand, and on many subdivisions where restrictions are not too drastic small shacks will be seen under construction where it would be far more advisable to expend the same amount of money in building a small unit of a future house, or in building a garage which will ultimately be used for such purpose when the home is constructed. The use of a garage for a temporary home is increasing not only among industrial employes, but among persons who normally could afford much better living conditions. Instances are not uncommon where two- and three-car garages are constructed for use as comfortable living quarters to be occupied by the family until such time as building and mortgage money conditions are more favorable to building permanent homes.

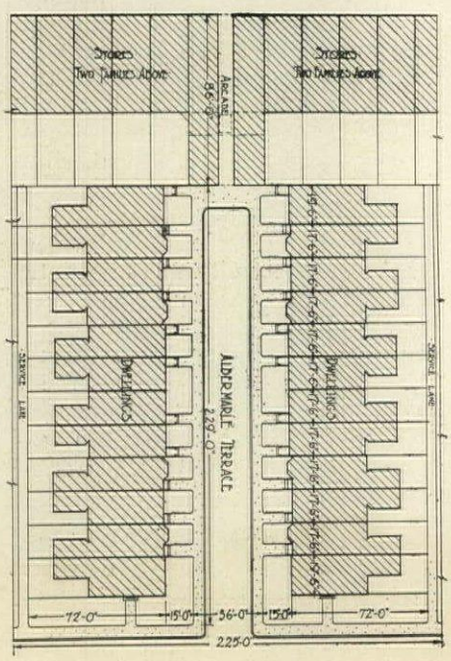
Albermarle Terrace, Brooklyn, N. Y.

An attractive city house and small apartment development grouped on deep plot of land

By Minwood Realty Associates — Slee & Bryson, Architects

THIS group of city houses in Brooklyn shows an intensive use of a deep plot of ground with a comparatively small frontage on a principal street. The entire plot, running from one street to the other, is 315 ft. deep and 225 ft. wide. The principal street is devoted to business and this frontage is taken up with stores on the first floor and apartments above. The space back of the stores, 229 ft. deep, is divided in halves by a roadway 36 ft. wide including sidewalks. An arcade through the store building section connects this terrace with the business street and the other end connects directly with a main residential street.

Single houses are built on each side of this terrace with a set-back of 15 ft. The end houses are slightly larger than the others, having a frontage of 19 ft. 6 ins. while the intermediate houses are 17 ft. 6 ins. wide. The plans are similar, only slight changes being made in the arrangement of stairs and fireplaces in the living rooms to give an individual touch. Entrance is into the living room, in most cases through a vestibule. This room extends the full length of the house and is about 22 ft. deep. The stairs are in this room and special attention has been given them to make an attractive feature. Each living room has a fireplace provided with a flue for burning wood. In some of the houses the fireplace is arranged in an ingle back of the stairs and with a large tile hearth.



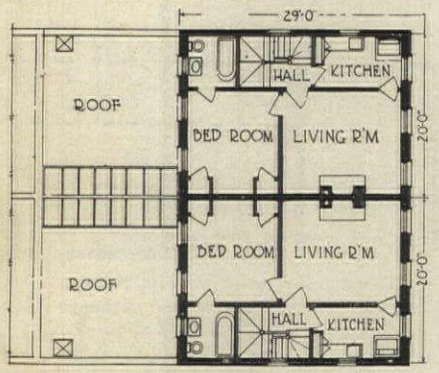
The kitchen and a small serving room is located in a narrow extension which affords an open court between houses and from which the dining rooms are lighted. Entrance to the basement is from the kitchen; here is the heating plant for the house and also the laundry.

The second and third floors are given over to bedrooms with a bathroom on each floor. It will be noted that most of the bathrooms are in the center of the house without any windows. This is a convenient arrangement and simplifies the planning of a city house when the building code permits it. Ventilation is had by means of an air shaft which may be seen on the third floor plan. Inside bathrooms have been proved more efficient in hotels, aside from their space saving qualities, because the passage of air is from the adjoining rooms through the bathroom and out the air shaft; in the bathroom with an open window, the air often passes out of the bathroom and

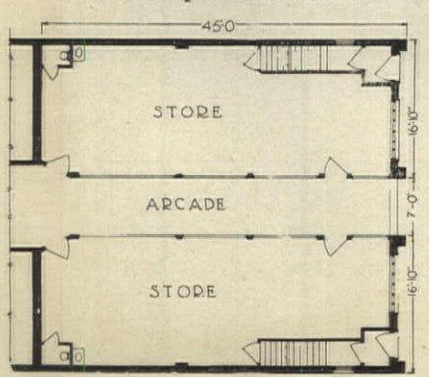
Above is shown a general view of the development looking down the terrace toward the store and apartment buildings. Both sides of street alike; note the variety in exteriors although plans are the same

into the adjoining rooms thereby defeating the real purpose of ventilation.

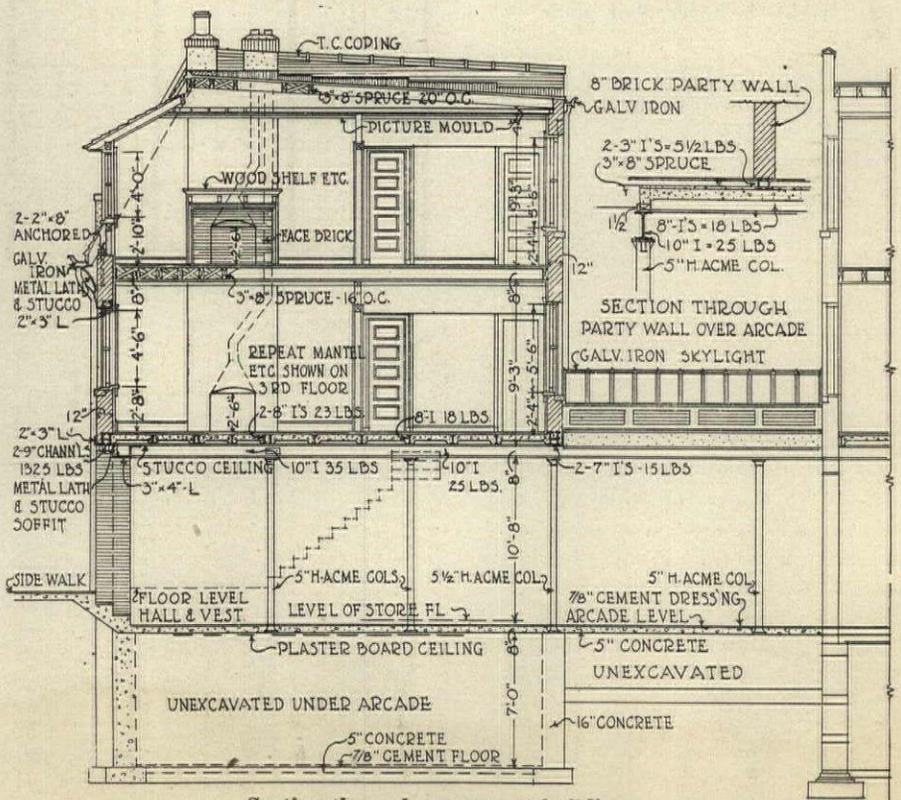
On the exterior considerable variety has been given the houses by simple means. The end and center houses have been carried to full three stories with a parapet and flat roof. The intervening houses have a sloping roof in front covered with slate in which dormers are placed to light the bedrooms. Some of the houses



Plan of apartment above



Plan of stores



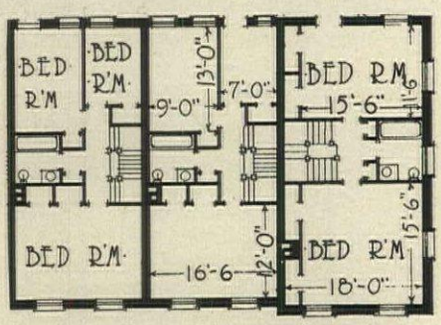
Section through apartment building

Above is detail view of houses and at right the three floor plans

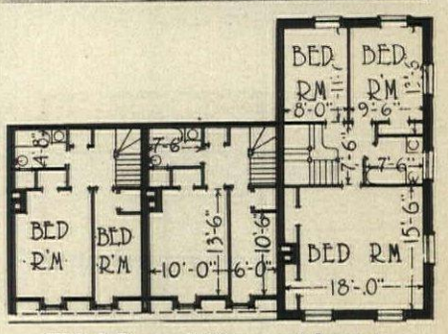
have bay windows in the living rooms and others have mullioned groups of three windows. Variety is also had by the different treatment of the entrance doorways and the varied set-backs. The exterior walls are of red face brick with white painted wood trim.

At the end of the terrace there is an extension of the store and apartment buildings. This is given a residential character to accord with the houses on either side. The plans of this portion are shown on page 39 and also a section through the building which shows the construction of the arcade. The entrance to the stores is from the arcade and the entrance to the apartments from the terrace.

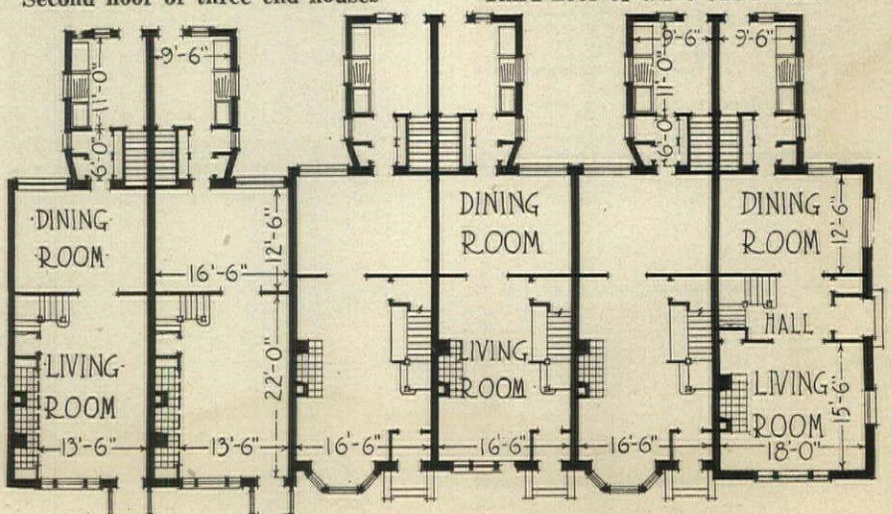
The apartments, numbering four in all, show a very compact arrangement of two rooms each with kitchenette and bath, a type that is popular today because of its being possible to rent at a moderate figure.



Second floor of three end houses



Third floor of three end houses



First floor plan of half one side of street. See plot plan on page 38

BUSINESS GETTING METHODS

Ideas that have worked for others

Builders' Relations with the Architect

By C. Stanley Taylor, Associate Editor

IT is evident, as a result of conversation with many builders, that the architect is today given too little credit for his position in the building field. It is acknowledged by builders that the architect's position is one of power, almost dictatorial. On the other hand it is claimed by the average builder that the architect does not know his business and is difficult to deal with.

If there were not some truth in this contention this comment would not be as common as it is. It is true that the architect is, to a certain extent, unbusinesslike and that in many cases he is not fully familiar with the best building practice. It may be, however, that a frank analysis of this situation will be of aid to builders in their contact with architects; and inversely, of value to the architect in his dealings with builders.

Breaking away from general comment into specific charges from the builder's viewpoint, we hear statements to the effect that the architect in the designing of dwellings and similar types of buildings does not plan economically nor in accordance with standard practice. It is claimed that in many instances much saving could be effected by the use of dimensions better fitted to standard sizes of material and forms of equipment; and that through the introduction of certain elements of design the builder's job is made more difficult. Again, it is claimed that the architect's requirements under his supervision are often too drastic, and do not admit of sound practice which, to him, may appear improper.

The remedy for this condition is in the first place the development of a better understanding between the architectural profession and contracting builders. To best serve the interest of the owner the architect and builder must work in harmony. It is hardly fair to expect the architect to be thoroughly familiar with the many short cuts and acceptable forms of practice in the field. Naturally, the more an architect knows of general construction work the better he will be able to design; but, on the other hand, it should be the builder's aim to aid the architect through the medium of proper suggestions and constructive criticism presented in a co-operative rather than an antagonistic manner.

The real function of the architect in the field of dwelling design and in the designing of store groups and similar buildings is primarily to incorporate the wishes of the owner into a design which will have the merits of attractiveness and utility. Consequently, the architect, after conference with the owner, prepares sketch plans to meet his approval. After the sketch plans are prepared it is customary to develop working drawings and specifications, and it is in this part of the work that co-operation between the architect and the builder is often lacking. Having determined from sketch plans the general artistic and utility features of the building, the next problem is to so design the building and develop specifications that the total cost to the owner will be as low as may be reasonably expected.

Usually, when the architect is ready to take up the sketch plans with the owner, he calls in the builder to give him an approximate cost. At this time comes the builder's first opportunity of co-operation with the architect and it gives the builder a chance of making suggestions regarding the sketch plans. For instance, it may be that the architect has incorporated, as part of his design, one or two unnecessary breaks in the cellar wall. Every builder knows that straight lines in ground plans are conducive to economy, and that each break in these lines adds to the cost of the building. Similarly, in the design of the roof, it is well known that additional roof planes, dormers and other deviations from simple roof design add materially to the cost of the roof. Also in the location of plumbing stacks, chimneys, etc., there may be many suggestions made as to possible economies.

In other words, a good builder can take the average sketch plan and show several ways in which a definite saving in cost will result from simple changes in the design, which often will not detract from the artistic merit, comfort or utility of the building. Suggestions of this kind will be received gratefully and gracefully by the architect if they are presented in an uncritical manner by the builder. It is easy to attack a plan and cause resentment on the part of the designer through whose creative power it has been developed. On the other hand helpful suggestions will be received gladly.

In the outline specifications which may be prepared to accompany the sketch plan there are many opportunities for the builder to give practical advice to the architect. It may be that certain materials or equipment have been specified which are not obtainable. If this information can be given to the architect by a builder it will save disappointment on the owner's part. Again, there is the question of slow delivery of materials which may hold up a job if the builder is required to adhere to specifications; a discussion of this point will usually be effective in getting materials specified that can be easily obtained.

As the work proceeds and working drawings and specifications are completed, there are two methods through which the work may be given out. It may be given to a selected builder, on a fixed fee basis, or competitive bids may be called

for. In bidding on work the relations with the architect must be given careful consideration. Some builders bid on plans and specifications as submitted. Others, who are perhaps wiser, will submit a bid as requested, but will also submit recommended changes in plans and specifications with an estimate of the saving involved.

After the work is given out there should be no weakening of the relationship between the builder and architect. The builder will have problems to face, many of them of an unexpected nature, and he will find that if he keeps the architect informed of conditions affecting the job and a proper record of progress, he will have no trouble in obtaining co-operation to help him over rough spots which occur on every job under present conditions.

The architect, on the other hand, must realize the difficulties which the builder is facing. The builder often deals with sub-contractors and certainly with material men. Very often he is promised deliveries or prices and failure on the part of a dealer or sub-contractor to carry out an agreement will place a builder in a bad position. It is therefore very important in the builder's relation with the architect to be certain of his relations with sub-contractors and dealers, particularly if he is to do the work on the so-called "cost plus" basis, or on the basis of a fixed fee for his expert services. If he is taking the building at a guaranteed figure he will, in turn, have guarantees from dealers and sub-contractors, as far as he is able to obtain them.

If the builder has figured too low it is always better business to explain the situation frankly to the architect and to the owner than to attempt to load the job with extras and in other devious ways to squirm out of a bad bargain. Very few persons wish to obtain something for nothing, and if a builder has honestly done his best to give real service, but through force of circumstances is forced into a loss, it will be found that if the architect and the owner have been intelligently apprised of the developing condition of possible loss to the builder (which never comes suddenly), a fair adjustment will usually be made.

The builder should never, under any circumstances, go over the architect's head and complain to the owner about what he might consider defects in design or poor judgment until he has first given the architect definite information covering the various points. Builders in many instances have made the error of attempting to curry favor with an owner by criticism of the architect's plans and methods. This is not co-operation, nor is it fair dealing.

Another method of co-operation with architects, which offers great possibilities for the builder in developing his business, is in connection with the preliminary work necessary to get a job. Architects are often called upon to furnish sketch plans before they have been definitely retained. While it seems unfair that this should be expected and particularly that there should be unprofessional competition among architects seeking commissions, it is quite evident that this is ordinarily done, particularly among architects whose practice is confined to smaller domestic work.

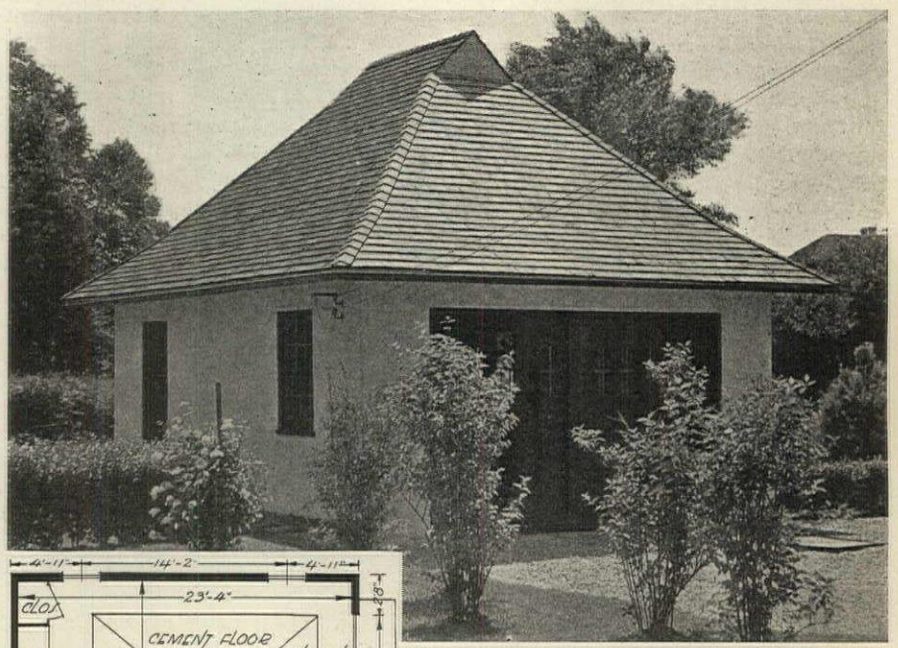
A good architect and a practical builder, however, are often in a position to work out sketch plans which will greatly aid in the promotion of some building project. Usually it will be found that the idea originates with the builder who will approach an architect with the idea of co-operating to develop a work. This is sound practice. It is often the case that architects and builders together will develop a line of work in which they specialize.

On the other hand, it is usually bad business for a builder to attempt to displace an architect in order to bring in someone who he knows will favor him. This is often done and many architects lose commissions through activity of this type on the part of builders. The influence used may result from matters of policy or friendship but in the long run it does not pay to earn the antagonism of an architect if one wishes to be a successful building contractor.

The architects' offices offer a fertile field for new business, and the wise builder who is doing good work will make it a point to let the various architects know of his operations and of his successes. He will deliberately create as friendly an atmosphere as possible and will be ready at all times to co-operate with architects in an advisory capacity. Constructive advice is welcomed by the wise architect more today than ever before in the history of the profession, because the architect is realizing to a greater extent than ever the value of proper business connections and the need of a better knowledge of field conditions and practice than he may possess.

A Two-Car Garage

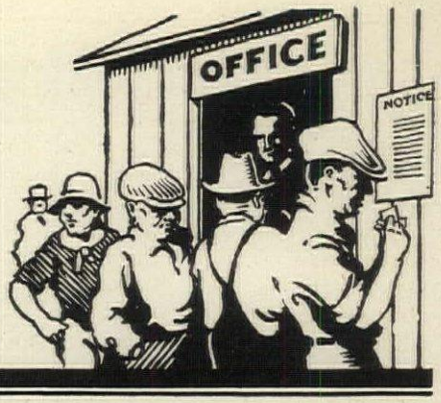
Good proportions make this building distinctive



This garage has room for two cars. It is stucco on frame construction and has a unique roof which gives it an individual look. Fitted with work bench and closets. Doors are sliding. Frank J. Forester, architect

OFFICE and JOB MANAGEMENT

Things the other man has found out that save money



Methods in Quantity Estimating

Part V. Footings and Foundations

By Frederick H. Hunter

SINCE the examples of estimating sheets appeared in the September issue, three readers have written inquiring as to the figures set down in the dimension columns of these examples. The point that puzzles them is that 15 ft. 6 ins. is set down as 15½ ft., etc., and not the way that they are accustomed to seeing it. The common method in this country is to set down dimensions in feet and inches, but some years ago the writer tried the suggestion of an English quantity surveyor and set down the inches as fractions of a foot. After using this method of booking dimensions for a time he adopted it and would never think of changing back to the old way. When one multiplies the dimensions set down on the estimate sheet to obtain the area or volume of the item, the inches are immediately changed into fractions of a foot and this change might just as well be made when setting down the figures as to go through the process later. Any man who will try the method of setting down fractions of a foot instead of inches, and will use it long enough to become accustomed to it, will never think of changing back.

In actual work, the fractions, 1/3, ½ and 2/3 of a foot will cover almost every case,—¼ and ¾ being occasionally used. It is seldom necessary to set down a fraction any smaller than these; they are enough for practical purposes. Brick walls are almost always 1/3, 2/3 or an even foot in thickness and the heights and lengths will be near enough for estimating purposes if taken to the nearest third or quarter of a foot. Indeed, for long dimensions, on large work, it is seldom necessary to set down anything nearer than the nearest whole foot, —as the difference resulting from setting down a fraction of a foot in the length is very small in comparison with the whole quantity. When the dimensions have been extended it is well to eliminate fractions, setting down only whole feet in the result. For a fraction less than ½, drop it; over ½ call a whole foot and if just ½ drop it one time and call it a whole foot the next time.

While accuracy in estimating is important, it is not necessary to go into extreme detail in measuring, and on plans that are not fully dimensioned it is not possible to do so as the plans, if drawn closely to scale, may have shrunk or stretched a bit either in the tracing or the print. The cost of a unit of building cannot be worked out in the same close manner that can be done in the manufacture of products in a factory.

There are so many changing conditions that come into any building operation, affecting the price, that it is not possible to say in advance exactly what any unit of work will cost. A man may have worked out the unit costs on one job with great care, and yet another job, done where the prices of materials and the rates of labor are the same, and the building of the same general character, will show that the actual costs of similar operations work out more or less. It is probable that two or three per cent of difference is as close as the most expert building man can set prices and 5% is as close as it is usually possible to get at what a unit of work is likely to cost.

From this it is evident that a variation of a fraction of a foot in measuring the girth of a building does not make a difference in the quantities at all comparable with the smallest difference that any man can estimate to be a definite cost. For this reason hair splitting in measuring estimating quantities is not essential. We do not mean, however, that close attention and thorough study are not necessary; mistakes in quantities occur usually from want of thoroughness in finding out just what the plans mean, or from carelessness in carrying on the work. A few inches more or less on the length of a wall changes the quantity very slightly,—a similar variation in the height is much more vital, while an error as to the thickness is a serious matter.

We will now resume our study of quantity methods where we left off last month to explain the details of estimating sheets. Having considered the excavation, grading, etc., the next subject to take up, naturally, is the foundation. Concrete is nearly always used for this purpose, although in some regions, where stone is scarce, brick foundation walls with a concrete footing are sometimes used,—and where field or ledge stone is plenty rubble foundations are frequently most economical for frame buildings and other light construction. The unit of pricing concrete is usually the cubic yard, and for the forms, or "cribbing" as many carpenters call it, which holds the concrete in place until it is set, the square foot of "contact surface" (or "face foot" of forms, as some designate it) is the usual unit. Some builders prefer to use the cubic foot for the concrete but this makes no particular difference, as the price on such a basis would be 1/27 as large as for the cubic yard.

Generally there is a footing course at the bottom of a wall to distribute the weight over a larger area of soil than the wall itself would rest upon. If the soil is at all firm this footing course can usually be placed, without the use of forms, in a trench cut to its exact dimension. It is easy to measure the footing course if the plans are clear, measuring into one

item all the footing which has the same width and depth and which runs at the same level. In measuring the footing course, if you are taking the footing for more than one wall in a single measurement, take the length of the first from "out to out" and then start the second wall from the inner face of the angle so as not to include the concrete in the corner twice. By making it a rule always to "take the corner ahead of you," as it is called, you are less likely to get into trouble through doubling your corners than if you have no regular rule. A small check mark with colored pencil on the blue print to show where the measurements were begun also helps in preventing mistakes. Whenever a change in the width or depth of the footing occurs a new measurement must of course be started and a separate item be put down.

If the footing changes level, a form will be needed on one side where the step down occurs; the bank will usually hold the other face of the step. In the case of poor bearing soil, where it is necessary to drive piles, or where there is a good deal of water to contend with, it is necessary to place forms for the footing course. These forms can generally be made by driving stakes and setting a board with a width equal to the depth of the footing up against the stakes and nailing lightly in place. Even where the soil is good it is sometimes necessary to form one side of the footing course in this way if a tile or stone drain is to be run just outside the wall, because the excavation for the drain will come in front of the outer face of the footing.

These remarks about the footing for a wall also apply to the footing of a column, where there is only one block of concrete, or to the lowest course of a "stepped footing." For each of the blocks above the bottom course of a stepped footing it is necessary to figure forms all around. For example, if the bottom course of the footing is 5 ft. square and placed without forms the block on top of this is perhaps 3 ft. 6 ins. square and 1 ft. high, and the concrete dimension is of course, 3½ x 3½ x 1—or 12 cu. ft. The form measurement for this would be around the four sides of the concrete, that is four faces 3½ x 1, or 14 sq. ft., and for the next block which perhaps is 2 x 2 x 1, the form dimension would be 8 ft.

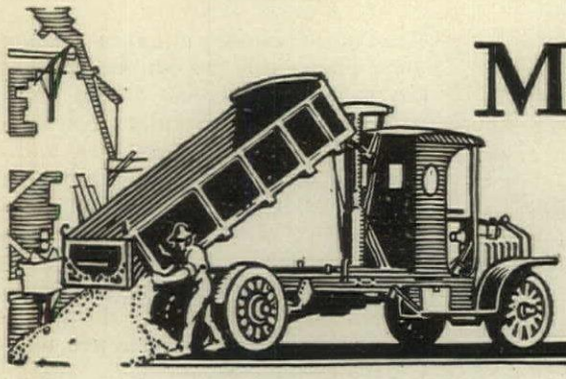
Once in a while column foundations will be found with a "splayed footing,"—that is the block of concrete is shaped like a pyramid with the top cut off, the sides slanting in. The top of the concrete is just large enough to receive the iron base of the column, while the bottom is large enough to give the desired bearing area. From an engineer's point of view this is an ideal footing as it distributes the concentrated weight of the column over the necessary area of soil in the simplest manner—but as a matter of practical construction it is a poor proposition. The forms for such foundations are quite expensive to build and then have to be filled from the small opening at the top, which makes it hard to ram the concrete properly and get a good job. If the foundation is all below the basement level, so that the appearance does not matter, most builders would prefer to build it as a stepped footing making the bottom course, say a foot high and as large square as the bottom of the footing and on top of that another block of concrete a foot high—the dimensions of this block being whatever the width of the splayed footing would be at the bottom of this course and so on until the top is reached. In this method, of course, there is a little more concrete used and a slightly larger area of form surface than for the splayed footing, but the forms are so much simpler to build and the concrete is placed so much more easily that it is usually worth while to build them in this way. Most practical engineers and architects make their plans with stepped footings rather than splayed footings.

If the splayed footing has to be used any way, it is best to draw a series of horizontal lines on the section of the footing a foot apart and take the concrete off in a series of blocks, taking the dimensions of the footing midway of each block—times the height of that block. This will give very nearly the exact amount of concrete in the splayed foundation. It is not correct, however, to take it off in a single operation, taking the dimensions of the concrete half way up the pier and multiplying by the height. This will give less than the actual volume of the concrete. In case the pyramid were carried up to the point, the volume of concrete figured in this way would be only ¾ the real amount. For the form surface of such a splayed foundation, however, it is correct to take the width of each face half way up and multiply by the height of the form measured along the slant, multiplying by 4 for the four sides of the pyramid. These forms should, of course, be kept as a separate item from ordinary forms, as they cost more per square foot to build.

For foundation walls above the footing course, if the wall goes to the same height all around the building, it is often easy to include the entire circumference of the building in one measurement. In measuring the length, however, be sure not to include the corners twice as will be done if the measurements are made on the elevations instead of on the plans. If the length is measured on the plans the sides can be taken clear through "out to out" of the wall and the ends simply from the inside face of one side wall to the inner face of the wall opposite. The forms for each unit of wall will be the length and height of the wall as measured for the concrete times 2 for the two faces of the wall so that the areas can be readily set down for each. The length taken for the concrete works out right for the forms because that part of the form for the side wall which would come where the end wall abuts, and is therefore not needed, fills in exactly the end of the side wall for which no form has been measured. In case the two walls forming the corner are not the same width the difference in the area of the forms is too small to be of consequence. In case the wall has internal corners care should be taken to see that the corners are included once and not twice. Cross walls and wing walls, of course, would be measured in the same way. In a complicated foundation check marks made as you proceed, to show what has been taken, are almost essential to getting off the work correctly.

Some builders in figuring forms are not satisfied with the surface area taken as we have explained but figure out in considerable detail just what lumber they would use, that is, how many feet of matched boards, and how many feet of studding in building the forms, how much for bracing, etc. This detailed method is seldom used by large builders as the quantity of lumber required will work out very close to 3 board feet for each face foot of forms to be built and a general consideration of the character of the form work for the foundations will be sufficient guide for an experienced man in setting prices.

In figuring forms it must be remembered that the form lumber may often be used several times. When used twice on the same job the total cost, per foot of form area, would be about 80% what they would be if formed at once; if used three times, about 75%.



MOTOR TRUCKS

Efficient Methods in their Use and Upkeep

Caring for the Truck in Winter Weather

By H. F. Blanchard, Associate Editor

ENGINES are harder to start in cold weather and these days are not far off. The reason for the hard starting is the fact that gasolene does not vaporize readily in cold air. Before cranking the engine be sure to pull out the choke, if there is one, and if the engine still refuses to start, tickle the carbureter,—that is, lift the float needle valve from its seat and hold it off until the carbureter floods.

If the engine still refuses to start pour about a teaspoonful of gasolene into the priming cup of each cylinder. The easiest way to do this is to fill an oil can full of gasolene and to squirt a little into each cup. On very cold mornings it may be necessary to prime the engine with high test gasolene or ether, both of which may be purchased at the drug store.

Another method to hasten easy starting on cold mornings is to heat the gasolene before or after vaporization. A variety of electric mixture heaters may be purchased for this work; their cost is small, and they are readily installed. Just before cranking the engine the electric heater is put into operation, warming the air or the gasolene or both as the case may be, sufficiently to permit starting. Filling the cooling system with hot water will make starting possible, when other methods are not available.

The advice just given is equally applicable to the truck that has stood all night in an unheated garage or which has been stopped along the road or at a job, for a considerable period, during which time it has become stone cold.

Of course it is desirable to store the truck in a heated garage but this is not always possible. A wide variety of heating devices is made for small garages where no provision has been made for heat in the building. Gas heaters, which take up practically no room, are absolutely fire safe and fully automatic and may be purchased at a reasonable price. These devices are made particularly for this purpose and fully fill the bill. Nor do they consume much gas.

A still more economical arrangement is to heat the engine and radiator. How cold the rest of the truck becomes really does not matter. There are many simple devices for doing this. Some operate on gas, others on kerosene, and still others on electricity. One of the best heaters of this type consists of a small kerosene stove provided with a wick yet burning a blue flame. The heat from the stove is carried up through a flaring horn whose opening fits tight against the radiator front of the truck so that the heat passes through the radiator heating the water in it and warming the engine beyond.

Another heater acts on the radiator water direct, water being drawn from the bottom of the radiator, passing through the heater and being discharged as warm water into the filler opening at the top of the radiator. The whole device is simply hung on the radiator and is operated by gas. Still another type consists of an electrical heating pad which is placed under the hood, radiating sufficient heat to the engine to prevent it from becoming too cold. A charcoal foot warmer may also be employed in this way.

A radiator cover and a hood cover are both desirable for winter driving. If the cooling system is adequate for hot weather then the engine must necessarily be over-

Pulling up a steep grade. This gives a good idea of the ability of the motor truck. The grade shown is over 20%

cooled if the cooling system is used unchanged in cold weather. Such a procedure will result in loss of power and lessened fuel economy. It is advisable to reduce the efficiency of the radiator by covering part of it up with a suitable cover, just how much depending on the coldness of the weather and the efficiency of the cooling system. A hood cover tends to keep the heat in and is therefore an aid to the radiator cover. When the engine is stopped it is well to close the radiator cover so as to conserve the heat as much as possible.

Radiator covers consisting of a series of metal shutters are coming more and more into vogue. These devices are made to fit most makes of trucks and are easily installed. In one style the opening and closing of the shutters is controlled by a push and pull rod within the driver's compartment. On a very cold day the shutters might be completely closed and on a very warm day opened all the way. The object, of course, is to make the adjustment such that the cooling water will be quite warm, say 150 to 180° Fahr., and yet not hot enough to boil. A radiator thermometer is a great aid in regulating the temperature.

Another type of radiator shutter is automatic, the shutters opening or closing, apparently of their own will, keeping the cooling water at practically an even temperature. This action is secured by a thermostat built into the device. This shutter may be installed in a few minutes.

With the first crisp fall mornings irregular running of the engine may be noted. Loss of power and some missing may occur. In this case be sure that the hot air stove is properly connected up. This is the device which draws warm air from around the exhaust pipe and carries it to the carbureter. Practically all trucks now have this equipment but if it is missing it is advisable to have it added. When it is installed it often happens that during the summer, when there is not so much need for it, some part of it drops out of place without being noticed until the weather becomes colder. If the intake manifold or the carbureter or both are water jacketed, care should be taken to see that all valves are opened so that hot water may flow to these jackets.

It is not safe to operate the truck without an anti-freezing mixture in the radiator. Alcohol or glycerine or some compound recommended by a local garage man should be used. However, if the truck is operated

A heavy duty service trailer under a one man control

without such a mixture, the engine should not be stopped outside on freezing days. If it is necessary to stop it more than a minute or so it is advisable to drain the water from the radiator. Freezing of the radiator or the engine is a serious matter. Freezing cracks the cylinder casting and it is expensive to buy a new one or have the old one welded, not to mention the time lost when the truck is laid up.

Freezing will occur with greatest rapidity with a honeycomb radiator, since the radiating surface is very large and the water passages very small. Lighter oil and lighter grease are advisable in cold weather. This applies to all parts of the machine with perhaps the exception of the engine.

Rutted, icy roads are ruinous to tires, both solid and pneumatic, the sharp, jagged pieces of ice quickly cutting the tires to shreds. Particular care, therefore, is advisable when running over roads which are in bad condition. On very cold days, in the colder sections of the country, steaming radiators are not uncommon, the reason being that the extreme cold has frozen some part of the water circulating system solid. Anti-freezing mixtures, radiator and hood covers are protection against this difficulty.

A heater for warming the driver's compartment on cold days may be a desirable investment. A driver who is comfortable will do better work and abuse his truck less than a driver who is not comfortable. The man who sits in a warm cab is not likely to stop his truck along the way while he goes in some place to get warm. Considering these facts it is plain that the comfort of the driver is important. The first step in the right direction is to see that the driver's compartment is adequately protected against the elements by the installation of windshield, curtains, etc. The next step is to provide a warming device or heater if weather conditions are severe. Such a heater may be a self-contained charcoal type such as has been used for years on wagons. The device is usually square or oval and makes an excellent foot rest. Heat is obtained by the slow combustion of a specially prepared charcoal briquette which is placed inside. An exhaust heater may also be used for keeping the driver warm. It derives its heat from the use of the exhaust gases of the engine which are diverted through it for that purpose.

A warm cab means a contented driver. This means better work, fewer stops and less abuse to the truck

CONTRACTING EQUIPMENT

Reliable Information on Time and Labor Saving Devices

Winter Time Equipment for Contractors

By Harold C. Bond

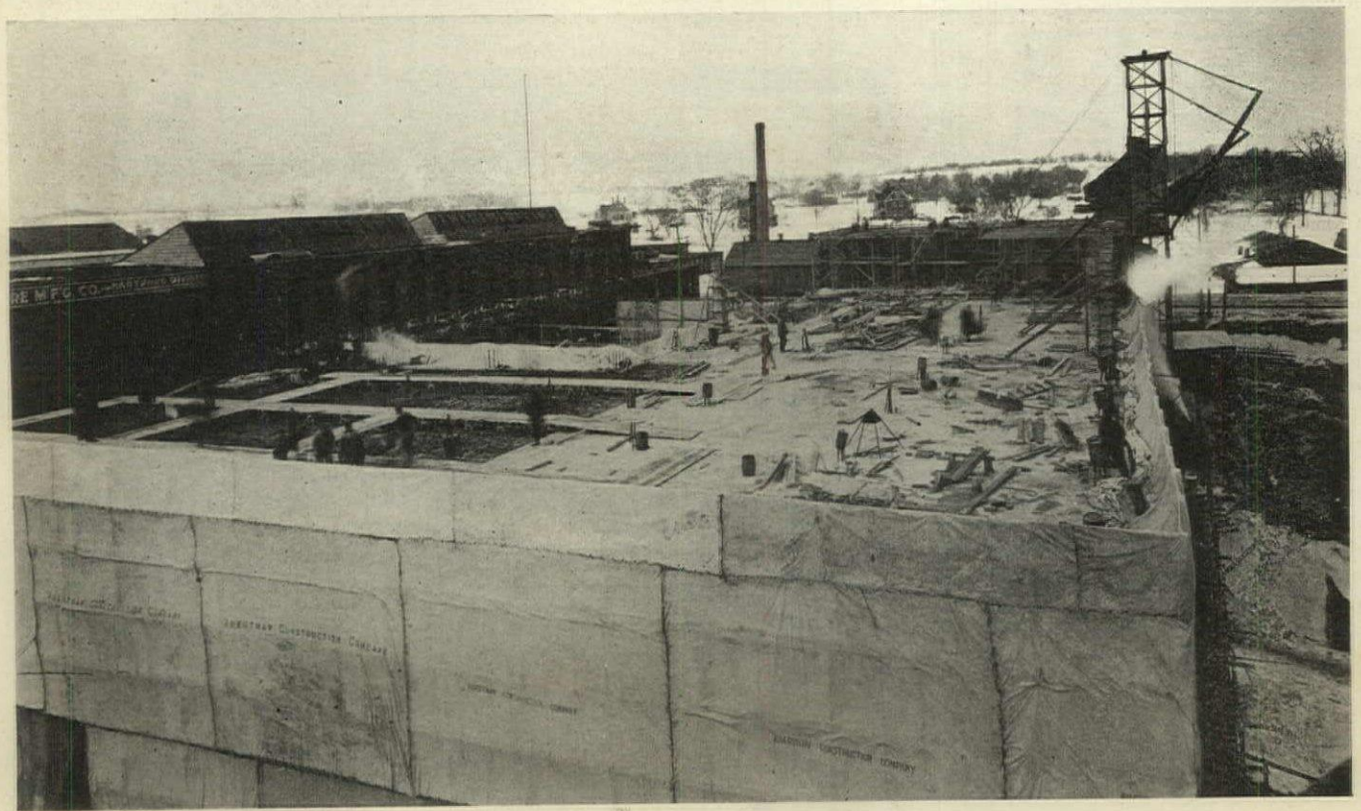
THE war year of 1917 first demonstrated in a large way the possibility of continuing construction work uninterruptedly throughout the severest winter weather. The achievement of the Aberthaw Construction Co. as an example at Squantum, Mass., where a bleak, wind swept plain was converted into an immense destroyer building plant during weather when the thermometer scarcely rose above zero, and when the working conditions were as difficult as a New England winter could make them is perhaps only one of the many outstanding instances of what can now be done to combat the cold and make construction work not only feasible but safe all the year round.

Most building activities naturally take place during the spring and summer months, but during that period—and this is particularly true under present conditions—labor is scarce and independent, there are shortages of building materials and transportation delays, and other difficulties crop up continually. In winter, on the other hand, the labor situation is likely to be easier and the let up in demand for materials helps toward prompt deliveries on the job. Assured that these two major factors are taken care of, the contractor is free to devote his chief attention to the work itself, usually with good results.

Cold weather concrete work necessarily requires special precaution, such as the heating of the sand, stone and mixing water. The placed concrete must also be protected against freezing at least until the initial set has taken place. Every contractor is familiar with the merits of tarpaulins or old canvas sails for covering materials and enclosing the sections where work is in progress and also with the use of salamanders for heating and drying out the enclosed sections. There are, too, frostproofing compounds which are added to the loose materials before mixing with the purpose of lowering the freezing point of concrete and mortar.

The most important development in winter construction work is, however, undoubtedly the adapta-

On some jobs it is necessary to house in portions of the work with canvas and maintain a safe temperature by means of salamanders or steam coils



The heater can be attached to nearly any kind of concrete mixer in a few minutes; the tank is merely set on the ground near by, the hose connected up and operation is ready to commence

tion of portable kerosene burners to this field. These burners are designed on the same principle as a plumber's blow torch, considerably enlarged, with pressure flames giving forth intense heat. They burn kerosene, the cheapest fuel, and are absolutely safe. They fall into two general divisions,—concrete heaters and thawing outfits.

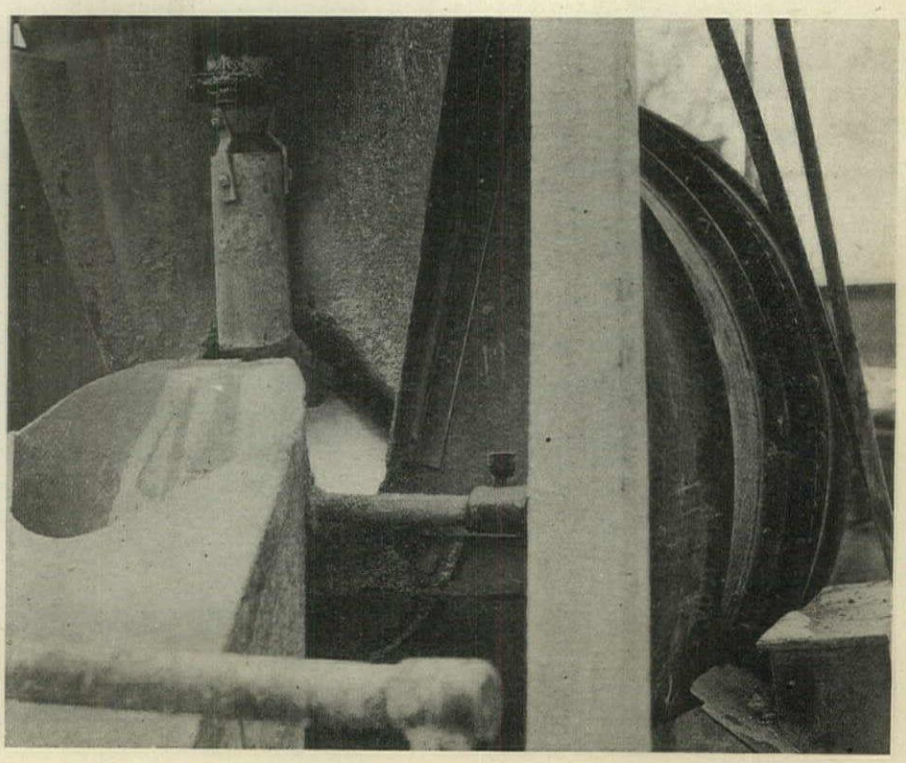
A concrete heater consists of a fuel tank, ranging in capacity from 12 to 20 gallons and equipped with a powerful hand air pump, a special burner enclosed in a deflector which is attached to the mixer, and a length of special oil-resisting hose connecting the tank and the burner. Heaters come in two sizes usually, one for one-bag mixers and smaller, and one for larger machines. The apparatus can be attached to nearly any kind of concrete mixer in a few minutes; the tank is merely set on the ground near by and the hose connected up, and operation is ready to commence. A live flame enters the mixer from the charging side, through the deflector, and plays directly upon the materials while they are being mixed in the drum. The result is that the concrete comes out of the machine steaming hot, insuring a perfect set. In extremely cold weather the materials are allowed to remain in the mixer a little longer than usual until thoroughly heated and the concrete will retain this heat for from 48 to 64 hours during setting.

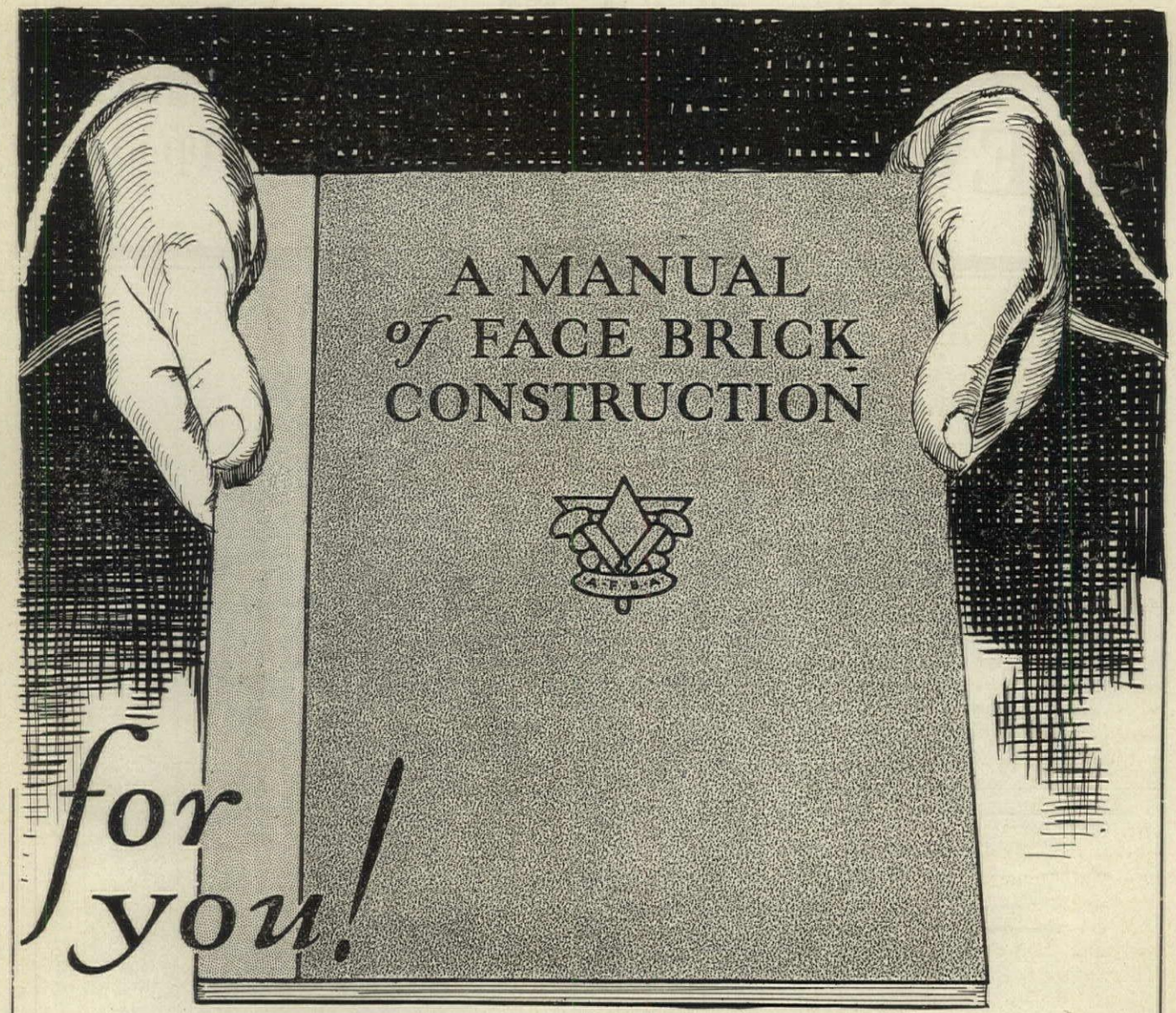
It is remarkable how in a comparatively short time the concrete heater has established itself as an indispensable part of every contractor's equipment and an accepted factor in cold weather concrete construction. It eliminates expensive shut downs and enables the contractor to mix safe concrete in freezing weather. The burner can also readily be detached from the mixer and used for taking the frost out of frozen material piles and for thawing out frozen lumps. The cost of the concrete heaters is moderate and they pay for themselves in a very few days of cold weather.

The live flame enters the mixer from the charging side, through the deflector, and plays directly upon the materials while they are being mixed in the drum

The thawing outfits are similar to the concrete heaters except that they do not have deflectors for attachment to the mixers and are made in a greater range of sizes. They are useful for melting ice and snow, thawing frozen ground, thawing out frozen materials in freight cars, opening water pipes and culverts, removing ice from railroad switches, and many similar purposes. One thawing outfit will easily do the work of several men hammering the sides of a steel hopper bottom freight car to dislodge frozen coal. Water department officials find them invaluable for softening frozen ground before excavating, particularly when breaks are occurring and speed is essential. In the summer these outfits can be advantageously used for lead melting, babbitting and other classes of work where their quick, powerful flames take the place of wood fires. They are really, therefore, all-the-year-round equipment with great possibilities for contractors.

The shortage of buildings which exists everywhere at present makes it imperative that this winter at least construction work should proceed without let up. There are unquestionably inconveniences and slight additional costs involved in cold weather jobs, but now that the practicability of mixing safe concrete in zero weather has been fully demonstrated these inconveniences are more than offset by the greater availability of materials and labor and the advantages of earlier completion of a building.





HERE at last is a practical text book for the carpenter-contractor and builder, on face brick construction, such as you have been looking for and such as you cannot afford to be without.

It is the work of architects and practical builders. Lavishly illustrated with half-tones, pen drawings, and colored reproductions of paintings, which show a variety of small, face brick houses, it covers fully all the necessary details in the use of face brick

We will send you a copy of this Manual for $1.00, although it costs us more to deliver it at your address. But we want you to become acquainted with the advantages to yourself as well as others of using face brick. If you don't like the book, send it back and we will return your money.

Address, Department BJ10.

A·F·B·A
USE FACE BRICK
—it Pays

The Table of Contents speaks for itself

THE AMERICAN FACE BRICK ASSOCIATION

110 South Dearborn Street, Chicago

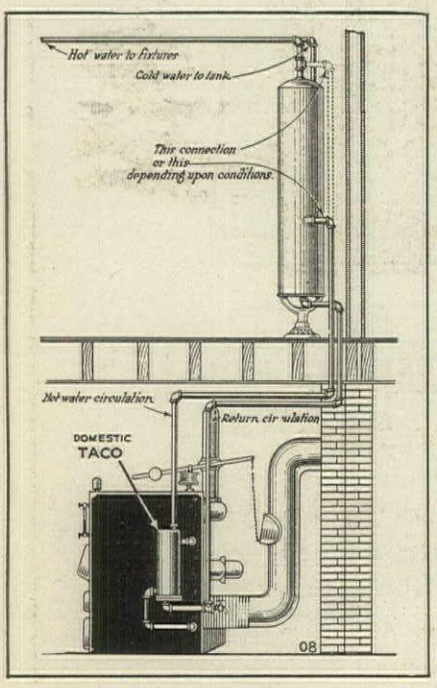
WHAT'S NEW

New Materials and Equipment that Keep Your Work Up to Date

An Improved Hot Water Heater

NO heat other than that from the heating apparatus of an ordinary house is required for the operation of the Domestic "Taco" Water Heater, produced by the Thermal Appliance Company, Inc., 125 East 46th St., New York.

The heater will cut coal or gas bills for the reason that it operates in conjunction with the home heating plant, using the same fire. It is of simple construction and designed to provide a constant hot water supply.



The principal operation of the Domestic "Taco" Water Heater is very simple. The water from the house heating boiler circulates through the "Taco" on the same principle that water circulates through a hot water heating system. The water from the boiler gives off its heat as it passes through the water heater and is cooled and, therefore, becomes heavier and travels downward; the water in the heating boiler is constantly being heated and has a tendency to rise. By this process a positive, rapid circulation of water through the water heater is constantly assured, making a very efficient heating apparatus.

It may be installed in either a vertical or a horizontal position below the water line. It interferes in no way with any part of the heating plant. Most of the standard types of boilers are already provided with tapped openings and with types of boilers not so provided it is a simple matter for the plumber to make them.

Manufacturers of building materials and equipment are invited to contribute to this department brief descriptions accompanied by single-column illustrations of new products which will be published without charge.

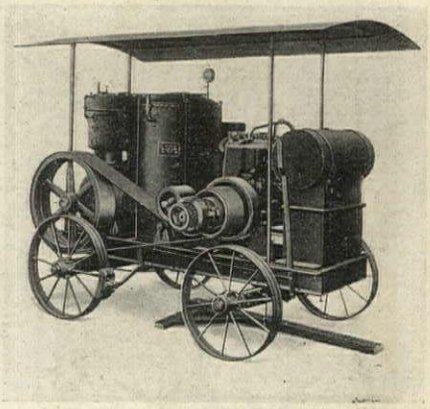
Readers are advised that the data presented is accepted from the manufacturer without any responsibility on the part of the publishers for statements made.

A Portable Air Compressor That Is Giving Satisfaction

A PORTABLE air compressor built especially for the contractor has been placed on the market by the Chicago Pneumatic Tool Company.

This compressor meets the demand for a portable compressor to operate pneumatic tools for road building and construction work. The unit is compact and very light in weight. The air end of this popular machine consists of a two-cylinder, single acting vertical air compressor having 8-in. diameter by 6-in. stroke, water-cooled cylinders and plate valves. These valves have been designed for an operating speed of 400 revolutions per minute. At this speed its capacity is 140 cu. ft. per minute.

Maximum capacity and minimum weight of this compressor are due to its high speed vertical design. It discharges directly into an air receiver having a volume of 10 cu. ft.



The power end of the outfit consists of a vertical four-cylinder gasolene engine having 4¾-in. diameter by 5-in. stroke water-jacketed cylinders. This engine operates at 1,000 revolutions per minute.

The ratio of speed reduction, together with the short belt drive and the use of the idler effectively eliminates belt slippage with its resultant transmission losses and belt troubles. The fuel consumption when operating at full load is 25 pints of gasolene per hour. It will operate one rock drill or from three to five pneumatic hammers.

A positive system of circulation thoroughly cools both engine and compressor. The cooling water is forced through the jackets and a high grade efficient radiator by two centrifugal circulating water pumps,—one driven by a belt from the compressor shaft, the other by gears from the engine shaft. Heat is extracted by means of a rapidly revolving fan operating directly behind the radiator. Little water is required for this system of cooling and it is simple and reliable in operation.

Selected List of Manufacturers' Literature

FOR THE SERVICE OF BUILDERS, CONTRACTORS, ARCHITECTS AND ENGINEERS

The publications listed in these columns are the most important of those issued by leading manufacturers identified with the building industry. They may be had without charge, unless otherwise noted, by applying on your business stationery to The Builders' Journal, 142 Berkeley Street, Boston, Mass., or the manufacturer direct, in which case kindly mention this publication.

Listings in this Department are available to any manufacturer at the rate of $5 per listing per month.

BOILERS—See Heating Equipment

BRICK

American Enameled Brick and Tile Co., 52 Vanderbilt Avenue, New York.
Enameled Brick. Circular. Illustrated.
Fire Brick. Circular. Illustrated.

American Face Brick Association, 1151 Westminster Bldg., Chicago, Ill.
The Story of Brick. Booklet. 7 x 9¼ in. 55 pp. Illustrated. Presents the merits of face brick from structural and artistic standpoints. Tables of comparative costs.
The Home of Beauty. Booklet. 8 x 10 in. 72 pp. Color plates. Presents fifty designs for small face brick houses submitted in national competition by architects. Text by Aymar Embury II, Architect.

Bradford Brick Co., 2 Main Street, Bradford, Pa.
"Red" Catalog. 7⅝ x 5 in. 30 pp. Illustrated. Covers dry pressed and impervious smooth-faced brick.

Common Brick Manufacturers Association of America, 1312 Schofield Bldg., Cleveland, Ohio.
Brick for the Average Man's Home. Book. 8½ x 11 in. 72 pp. Color plates. Book of plans for bungalows, houses and apartments for which working drawings are available Price $1.00.
Brick—How to Build and Estimate. Book. 8½ x 11 in. 48 pp. Illustrated. A manual for the brick builder on estimating and details of brick construction. Price 25c.

CEMENT

American Materials Company, 101 Park Avenue, New York; Weed Street and Sheffield Avenue, Chicago, Ill.
Elastica, the Stucco of Permanent Beauty. Catalog. 8½ x 11 in. 32 pp. Illustrated. Treatise on composition and application of Elastica Stucco.

Carney's Cement Company, Mankato, Minn. Booklet. 8 x 10 in. 20 pp. Illustrated. Complete information on product, showing prominent buildings in which this cement has been used.

Muller, Franklyn R. Co., Waukegan, Ill.
Everlastic Magnesite Stucco. Booklet. 8½ x 11 in.

Sandusky Cement Co., Dept. F, Cleveland, Ohio.
Medusa White Portland Cement, Stainless. Booklet. 8½ x 11 in. 48 pp. Illustrated.
Medusa Waterproof White Portland Cement. Booklet. 6 x 9 in. 32 pp. Illustrated.
Medusa Review. 6 x 9 in. 18 pp. Illustrated. House organ issued bi-monthly.

United States Materials Co., Weed Street and Sheffield Avenue, Chicago, Ill. See American Materials Co.

CONDUIT

National Metal Molding Co., 1113 Fulton Building, Pittsburgh, Pa.
Bulletin of all National Metal Molding Products. In correspondence folder. 9½ x 11½ in.
Sherarduct. Circular. 5 x 8 in. Illustrated.
Flexsteel. Circular. 5 x 8 in. Illustrated.

CONSTRUCTION, FIREPROOF

Bostwick Steel Lath Co., The, Niles, Ohio.
After The Fire. Booklet. 6 x 9 in. 13 pp. Illustrated. Showing the fire-resistance of Bostwick "Truss-Loop."

General Fireproofing Co., The, Youngstown, Ohio.
Fireproofing Handbook. Catalog. 6 x 9 in. 112 pp. A book dealing with the problems of fireproof construction, using as a basis the reinforcing materials—Self-Sentering, Trusset and Expanded Metal.
General Fireproofing. 8½ x 11 in. 16 pp. House organ issued monthly.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Fire Proofing Bulletin 171. 8½ x 11 in. 32 pp. Illustrated. A treatise on fire proof floor construction.

Northwestern Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Fireproof Construction. Catalog. 6 x 9 in. 72 pp. Illustrated. Handbook of practical suggestions for architects and contractors. Describing Nemco Expanded Metal Lath.
Fire-Proof Construction. Handbook. 6 x 9 in. 72 pp. Illustrated. Describing Kno-Burn expanded metal lath.

Republic Fireproofing Co., 26 Cortlandt Street, New York.
Republic Fireproofing Construction for Buildings. Booklet. 8½ x 11 in. 28 pp. Illustrated. A complete description on the two-way construction, its lightness, distribution of loads, saving of loads, saving in structural steel or concrete and its general adaptability to Fireproof Construction.

DOORS, WINDOWS AND TRIM, METAL

Merchant & Evans Co., 2019 Washington Avenue, Philadelphia, Pa.
Evans "Almetl" Fire Doors and Shutters. Catalog. 8½ x 10¾ in. 24 pp. Describes the entire line including "Star" Ventilators.

DOORS, WINDOWS AND TRIM, WOOD

Curtis Service Bureau, 6031–7031 S. Second Street, Clinton, Iowa.
Architectural Exterior and Interior Woodwork, Standardized. Catalog. 9 x 11½ in. 238 pp. Illustrated. Covers a complete line of architectural woodwork, standardized both as to designs and sizes. Builders are requested to apply through their dealer.

Morgan Sash and Door Co., Chicago, Ill.
The Door Beautiful. Catalog. 8½ x 11 in. 50 pp. Color plates. Showing doors in appropriate interior settings.
Masterpieces of Doorcraft. Catalog. 6⅞ x 8 in. 23 pp Color plates. Doors and types of architecture for which they are appropriate.
Adding Distinction to the Home. Catalog. 5 x 7⅜ in. 32 pp. Illustrated. Showing a number of entrances, various uses of French doors, mirror doors, flush doors, etc.

Reliance Fireproof Door Co., 47 Milton Street, Brooklyn, N. Y.
Reliance Fireproof Doors. Catalog. 6¼ x 9¼ in. 44 pp. Illustrated. Contains details of door and window construction, including molding and trim dies.

Stearns Lumber Co., A. T., Neponset, Mass.
Catalog "K." 9 x 12 in. 80 pp. Illustrated. Covering the entire line of exterior and interior finish, including Stearns' "Florida-Gulf" Cypress.

DUMBWAITERS

Kaestner & Hecht Co., Chicago, Ill.
Bulletin 520. Describes K. & H. Co. electric dumbwaiters. 8 pp.

Sedgwick Machine Works, 151 West 15th Street, New York.
Catalog and Service Sheets. Standard specifications, plans and prices for various types, etc. 4¼ x 8¼ in. 60 pp. Illustrated.

ELECTRICAL EQUIPMENT

Frink, I. P., Inc., 24th Street and 10th Avenue, New York, N. Y.
Catalogue 415. 8½ x 11 in. 46 pp. Photographs and scaled cross sections. Specialized bank lighting, screen and partition reflectors, double and single desk reflectors and Polaralite Signs.
Catalogue 421. 8½ x 11 in. 12 pp. Illustrated. Various reflectors for use in operating rooms and ward of the modern hospital.

General Electric Co., Schenectady, N. Y.
G. E. Specialty Catalog. 3¼ x 4½ in. 210 pp. Illustrated. Pocket size descriptive booklet with cloth binding. Gives dimensions, catalog numbers, capacities, package weights, etc., of a complete line of essential wiring devices.
Novanux. Booklet. 8 x 10½ in. 36 pp. Illustrated. Ornamental street lighting units.
Standard Unit Switchboard Panels. Booklet. 8 x 10½ in. Illustrated. An index to types of standard unit panels for large and small plants, alternating current and direct current, giving references to descriptive bulletins on each type.

Habirshaw Electric Cable Company, Inc., 10 East 43d Street, New York.
Plans and Specifications for the Home Electrical. Catalog. 11 x 14 in. 20 pp. Rubber, oiled paper, varnished cambric insulated wires and cables for every condition of service.

Hart & Hegeman Mfg. Co., The, 342 Capitol Avenue, Hartford, Conn.
Catalog "P." 4¾ x 6¼ in. 183 pp. Illustrated. H. & H. Switches and Paiste Wiring Materials.

Prometheus Electric Co., 511 West 42nd Street, New York.
Electrical Equipment. Booklet. 6 x 9 in. 5 pp. Illustrated. Electric plate warmers, sterilizers and mechanical heating devices.

Simplex Wire & Cable Co., 201 Devonshire Street, Boston, Mass.
Simplex Manual. Catalog and reference book. 6¾ x 4¼ in. 92 pp. Contains in addition to information regarding Simplex products, tables and data for the ready reference of architects, electrical engineers and contractors.

United Electric Co., Canton Ohio.
The Tuec in the Factory. Booklet. 8½ x 11 in. 6 pp. Illustrated. The application of air suction cleaning to factory practice.
The 260 Truck type Tuec. Booklet. 8½ x 11 in. Illustrated. 6 pp. A portable type vacuum cleaner combining the power of the stationary type with portability. Can be attached to any lamp socket.
The 260 Tuec. Booklet. 8½ x 11 in. 16 pp. Illustrated. A ¾ H. P. universal motor driven household stationary vacuum cleaner weighing less than 200 lbs.
The Tuec Pool Cleaning Tool. Booklet. 8½ x 11 in. 6 pp. Illustrated. A practical durable tool for removing sediment from vats, swimming pools, etc.

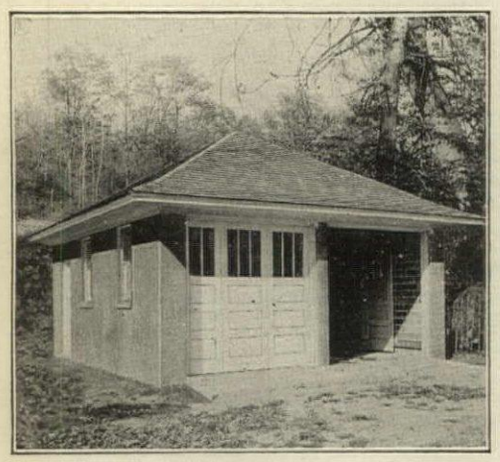
Western Electric Co., 195 Broadway, New York.
Western Electric Electrical Supply Year Book. Catalog. 6½ x 9½ in. 1248 pp. Illustrated. Listing equipment for every electrical need for homes, institutions, office buildings and industrial plants. Prices for estimating included.

An ice plant of Hollow Tile ready for the stucco finish

A Low Cost Method *for Industrial or Business Buildings*

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.



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.

HOLLOW TILE

The Most Economical Form of Permanent Construction

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 1810.

MASTERTILE

THE TRADE-MARK OF THE HOLLOW BUILDING TILE ASSOCIATION AND YOUR GUARANTEE OF A PRODUCT MADE IN ACCORDANCE WITH ASSOCIATION STANDARDS

THE HOLLOW BUILDING TILE ASSOCIATION

REPRESENTING AMERICA'S LEADING MANUFACTURERS

CONWAY BUILDING, CHICAGO

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 52*

ELECTRICAL EQUIPMENT — Continued

Western Electric Flip Switches. Folders. Illustrated. Listing a complete line of lighting switches operated by levers thrown up or down.

Western Electric Decorations for Duplexalites. Bulletin L-1. 6½ x 9½ in. 8 pp. Illustrated. Listing a great variety of shades and decorations in parchment, silk, etc., for standard Duplexalites.

ELEVATORS

Kaestner & Hecht Co., Chicago, Ill.
Bulletin 500. Contains 32 pp. Giving general information on passenger elevators for high buildings.

Sedgwick Machine Works, 151 West 15th Street, New York.
Catalog and descriptive pamphlets. 4¼ x 8¼ in. 70 pp. Illustrated. Descriptive pamphlets on hand power freight elevators, sidewalk elevators, automobile elevators, etc.

FENCES

American Fence Construction Co., 106 Church Street, New York.
Afco Factory Fences. Booklet. 9 x 12 in. 32 pp. Illustrated.
Residential Fences. Booklets. 7 x 2½ in. Illustrated. A series of booklets on residential fences consisting of photographs, productions and brief descriptions.

FIRE DOORS—See Doors, Windows and Trim, Metal

FLOORING

Armstrong Cork & Insulation Co., 132 24th Street, Pittsburgh, Pa.
Linotile Floors. Catalog. 6 x 9 in. 40 pp. Color plates. Describes Linotile, a composition of ground cork, wood flour, linseed oil and various gums and pigments in tile form.
The Ten-Point Cork Floor. Booklet. 3½ x 6 in. 16 pp. Shows design panels in color for Cork Tile floors.

Armstrong Cork Co. (Linoleum Dept.), Lancaster, Pa.
Armstrong's Linoleum Floors. Catalog. 8½ x 11 in. 54 pp. Color plates. A technical treatise on linoleum, including tables and specifications for installing linoleum floors.
The Artistic Possibilities of Armstrong's Linoleum Floors. Booklet. 11¼ x 16½ in. 12 pp. Color plates.
Armstrong's Linoleum Pattern Book, 1920. Catalog. 3½ x 6 in. 176 pp. Color plates. Reproductions in color of all patterns of linoleum and cork carpet in the Armstrong line.
Quality Sample Book. Three books. 3½ x 5¾ in. Showing all grades and thicknesses in the Armstrong line of linoleum and cork carpets.

Johns-Manville Co., H. W., New York City.
A Flooring That's "Made to Fit." Booklet. 3½ x 6 in. 14 pp. Illustrated. Descriptive of Johns-Manville Asphalt Mastic Flooring.

Muller Co., Franklyn R., Waukegan, Ill.
Asbestone Composition Flooring. Circulars. 8½ x 11 in. Description and Specifications.

FLOOR HARDENERS

Anti-Hydro Waterproofing Co., 299 Broadway, New York.
Floor Hardening. Circular. 6½ x 8½ in. 4 pp. Describes an inexpensive method for producing permanently smooth, dustless and wearproof floors.

Sonneborn Sons, Inc., L., 266 Pearl Street, New York.
Concrete and Lapidolith. Booklet. 5⅜ x 8¼ in. 24 pp. Illustrated. Describing relation of Lapidolith chemical floor hardener to concrete construction.
Why Lapidolize? Booklet. 8½ x 11 in. 11 pp. Illustrated. Reasons why Lapidolith should be specified.
Lapidolith Specifications. Circular. 8½ x 10¾ in. 2 pp.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
Agatex and Its Performances. Booklet. 8½ x 11 in. Describes the methods of hardening concrete floors by the application of a chemical which forms a new surface as hard as agate.

FURNACES—See Heating Equipment

FURNITURE

Leavens Co., Inc., The William, 32 Canal Street, Boston, Mass.
Catalog. 7 x 9 in. 200 loose leaved pp. Illustrated with wood cuts.

GARAGE CONSTRUCTION

Ramp Building Corporation, 50 Church Street, New York, N. Y.
The d'Humy Motoramp System of Building Design. Booklet. 8½ x 11 in. 20 pp. Illustrated. Describing the d'Humy system of ramp construction for garages, service buildings, factories, warehouses, etc., where it is desirable to drive automobiles and motor trucks or industrial tractors under their own power from floor to floor.

GLASS CONSTRUCTION

Mississippi Wire Glass, 220 Fifth Avenue, New York.
Mississippi Wire Glass. Catalog. 3⅞ x 8½ in. 32 pp. Illustrated. Covers the complete line.

HARDWARE

Cutler Mail Chute Company, Rochester, N. Y.
Cutler Mail Chute Model F. Booklet. 4 x 9¼ in. 8 pp. Illustrated.

L. P. T. Specialty Co., 846 Builders Exchange, Minneapolis, Minn.
Details and Specifications for Counter Balanced Window Hardware. 8½ x 11 in. Illustrated with drawings and blue prints.

McKinney Mfg. Co., Pittsburgh, Pa.
McKinney Cabinet Hardware. Catalog. 6 x 9 in. 32 pp. Illustrated. Describes complete line of hardware for cabinet and furniture work.
McKinney Hardware for Sliding Doors. Booklet. 6 x 9 in. 18 pp. Illustrated. Describes different types of sliding door hardware.

Smith & Egge Mfg. Co., The, Bridgeport, Conn.
Catalog No. 10. 6¾ x 9 in. 42 pp. Illustrated. Covers a complete line of chains, hardware and specialties.

Stanley Works, The. New Britain, Conn.
Wrought Hardware. Catalog. BJ10. 6½ x 10 in. Color plates. Shows all of the Stanley Works products made of steel from their own mills.
Eight Garages and their Stanley Garage Hardware. Booklet. 5 x 6¾ in. 32 pp. Illustrated. Illustrations and floor plans of eight typical garages that have been correctly equipped with Stanley Garage Hardware.
Ball Bearing Butts. Booklet. B8. 5 x 7¼ in. 32 pp. Illustrated. Concise description of various butts manufactured.
Stanley Specially Designed Garage Hardware. Booklet. B-50. 6 x 9 in. 24 pp. Illustrated. Detailed pictures and descriptions of various garage hardware equipment.

Vonnegut Hardware Co., Indianapolis, Ind.
Von Duprin Self-Releasing Fire Exit Devices. Catalog 12F. 8 x 11 in. 41 pp. Illustrated.
"Saving Lives." Booklet. 3¼ x 6 in. 16 pp. Illustrated. A brief outline why Self-Releasing Fire Exit Devices should be used.

Yale & Towne Mfg. Co., The, Stamford, Conn.
Burglar Foils. Booklet. 3½ x 6 in. 12 pp. Illustrated. Describing an important new lock.

HEATING EQUIPMENT

American Radiator Co., 816 South Michigan Avenue, Chicago, Ill.
Engineers' Data Book. 8 x 10¾ in. 48 pp. Illustrated. Valuable engineering data for estimating heating and ventilating requirements.
Ventilation for Vento Heaters. Catalog. 8 x 10¾ in. 24 pp. Illustrated. Examples of installation.
Ideal Type "A" Boiler. Catalog. 6 x 8½ in. 46 pp. Illustrated. Describes this new type of boiler accompanied by charts and tables.

James B. Clow & Sons, 534 S. Franklin Street, Chicago, Ill.
Gasteam Catalog. 6 x 9 in. 16 pp. Illustrated. New radiator using gas for fuel.

Abram Cox, American & Dauphin Streets, Philadelphia, Pa.
Catalog 73. 9 x 12 in. 40 pp. Illustrated. Covers the complete line.
Industrial Housing Circular. 8 x 10½ in. 12 pp. Illustrated. Modern industrial housing projects with specifications for heating equipment.

Gorton & Lidgerwood Co., 96 Liberty Street, New York.
Gorton Self-Feeding Boilers. Booklet. 4¼ x 7¼ in. 32 pp. Illustrated. Descriptions, specifications and prices.

Graver Corporation, East Chicago, Ind.
Hot Water Service Heaters. Booklet. 8½ x 11 in. 4 pp. Illustrated. Describing Graver vertical and horizontal service heaters which utilize exhaust steam for heating.

Kelly Controller Co., 175 W. Jackson Blvd., Chicago, Ill.
The Kelly Low Pressure Controller. Booklet. 4 x 9 in. 22 pp. Illustrated. Describing what The Kelly Controller accomplishes, its mechanical operation, and its application.

Kewanee Boiler Co., Kewanee, Ill.
Kewanee on the Job. Catalog. 8½ x 11 in. 80 pp. Illustrated. Showing installations of Kewanee boilers, water heaters, radiators, etc.
Catalog No. 73. 6 x 9 in. 35 pp. Illustrated. Describes Kewanee steel power boilers with complete specifications.
Catalog No. 74. 6 x 9 in. 35 pp. Illustrated. Describes Kewanee steel heating boilers with specifications.
Catalog No. 75. 8½ x 11 in. 6 pp. Illustrated. Specifications on Tabasco Water Heaters, Kewanee water heating garbage burners and Kewanee steel tanks.

Moline Heat, Dept. C, Moline, Ill.
Moline Heat. Catalog. 8½ x 11 in. 46 pp. Illustrated. Covers the complete line.
Moline Heat Supplement A. 8½ x 11 in. 32 pp. Illustrated. Moline Heat as applied to factories, central station, dry kiln heating, etc.

Page Boiler Co., The Wm. H., 141 West 36th Street, New York.
Page Boilers. Catalog. 4½ x 8 in. 84 pp. Illustrated. Descriptions, specifications and methods of installing Page Round and Square Sectional Boilers.
Monarch Smokeless Boilers. Circular. 8½ x 11 in. Illustrated. Describing the Monarch Down-draft Smokeless Boilers.

Pratt & Cady Co., Hartford, Conn.
Heaters and Pumps. Booklet. 6¼ x 3½ in. 12 pp. Illustrated. Covering feed water heaters, hot water generators, duplex and triplex power pumps.

Riverside Boiler Works, Cambridge, Mass.
Riverside Range Boilers and Tanks. Catalog. 6 x 3 in. 35 pp. Illustrated. Shows sizes regularly manufactured, methods of installation and descriptions of processes used in manufacturing.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 54*

HEATING EQUIPMENT—Continued

Smith Co., H. B., 57 Main Street, Westfield, Mass.
General Boiler and Radiator Catalog. 4 x 7 in. 90 pp. Illustrated. Giving ratings, dimensions, capacities and working pressures.
Engineer's Data Ring Book. 4 x 7 in. 125 pp. Illustrated.
Architect's and Contractor's Binders. These binders are made up of 9½ x 11 in. folders of different kinds giving dimensions, price lists, and erecting directions on the different lines of our manufacture.

United States Radiator Corporation, Detroit, Mich.
The Complete Line. Catalog. 4¼ x 7¼ in. 255 pp. Illustrated. Contains important technical information of special interest to architects and heating engineers.
A Day's Work. Booklet. 3½ x 6 in. 20 pp. Suggestions from employees for the purpose of promoting service and good will.

Utica Heating Co., Utica, N. Y.
Imperial Boilers & Heating Supplies. Catalog. 3½ x 6½ in. 52 pp. Illustrated.
Imperial Super Smokeless Boilers. Loose leaf catalog. 8½ x 11 in. 24 pp.
Superior Warm Air Furnaces. Catalog. 4½ x 8 in. 36 pp. Illustrated.
New Idea Pipeless Furnaces. Circular. 8½ x 11 in. 4 pp. Illustrated.

HOISTS

Gillis & Geoghegan, 544 West Broadway, New York.
Man Saving Load Lifting. Booklet. 6 x 8¾ in. 8 pp. Illustrated. Labor saving service in the lifting or lowering of lighter loads, through the use of G. & G. Telescopic and Non-telescopic Hoists.
Removing Ashes. Booklet. 6 x 8¾ in. 6 pp. Illustrated. Removing ashes from boiler room directly to wagon by electrically operated Telescopic Hoists.

HOLLOW TILE—See Tile, Hollow

INSULATION

Armstrong Cork Co., 132 Twenty-fourth Street, Pittsburgh, Pa.
Nonpareil Corkboard Insulation. Catalog. 6 x 9 in. 152 pp. Illustrated. Describes use in cold storage warehouses and wherever constant low temperatures are necessary.
Nonpareil Cork Covering. Catalog. 6 x 9 in. 64 pp. Illustrated. Describes the insulation of cold pipes and tanks of all kinds.

Philip Carey Co., The, Cincinnati, Ohio.
Carey Asbestos and Magnesia Products. Catalog. 6 x 9 in. 72 pp. Illustrated.

Magnesia Association of America, 721 Bulletin Building, Philadelphia, Pa.
Defend Your Steam. Booklet. 7½ x 10 in. 80 pp. Illustrated. A treatise covering every phase of heat insulation.
Standard Specifications. Booklet. 8½ x 11 in. 12 pp. Specifications for the application of 85 per cent Magnesia pipe covering.
Better Heated Houses. Catalog. 6 x 3½ in. 12 pp. Illustrated.
Coal Saving Tables. Booklet. 6 x 3¼ in. 4 pp.

United States Mineral Wool Co., 280 Madison Avenue, New York.
Uses of Mineral Wool in Building. Catalog. 5¼ x 6¾ in. 23 pp. Illustrated.

INCINERATORS

Kerner Incinerator Co., 595 Clinton Street, Milwaukee, Wis.
The Kernerator. Booklet. 5½ x 9¼ in. 40 pp. Illustrated. Descriptions, installations and testimonials.

JOISTS AND STUDS, PRESSED STEEL

General Fireproofing Co., Youngstown, Ohio.
Steel Lumber. Hand Book. 4 x 6½ in. 72 pp. Illustrated. Data on the use of Steel Lumber and Metal Lath for economical fireproof construction. Tables and Specifications.

North Western Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Pressed Steel Lumber Manual. Catalog. 6 x 9 in. 56 pp. Illustrated. Describes a new system of light weight fireproof construction.

Truscon Steel Co., Youngstown, Ohio.
Truscon Standard Buildings, 4th ed. Catalog. 8½ x 11 in. 40 pp. Illustrated. Erection details, cross-section diagrams and adaptations are given.

Truscon Structural Pressed Steel. Catalog. 8½ x 11 in. 24 pp. Illustrated. Information on Pressed Steel Beams and Joists for light occupancy buildings. Tables, specifications and views of installations.

KITCHEN EQUIPMENT

Aluminum Cooking Utensils Co., New Kensington, Pa.
Wear-Ever. Catalog. 6 x 9 in. 55 pp. Illustrated.

LATH, METAL AND REINFORCING

The Bostwick Steel Lath Co., Niles, Ohio.
Bostwick Steel Lath, Revised Edition 1920. Catalog. 9 x 11½ in. 28 pp. Illustrated. Covers the entire line. Drawings and Specifications.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 55*

LATH, METAL AND REINFORCING — Continued

General Fireproofing Co., Youngstown, Ohio.
Herringbone Rigid Metal Lath. Catalog. 8½ x 11 in. 32 pp. Illustrated. A treatise on the many uses of Metal Lath.
Trussit. Booklet. 6 x 9 in. 16 pp. Illustrated. Detailed descriptions on the use of Trussit as a reinforcement for Concrete.
Self-Sentering—A Reinforcement for Concrete Floors, Roofs and Walls. Booklet. 8½ x 11 in. 36 pp. Illustrated.

North Western Expanded Metal Co., 934 Old Colony Building, Chicago, Ill.
Designing Data. Catalog. 6 x 9 in. 94 pp. Illustrated. Describes most efficient use of Econo Expanded Metal Reinforcing.
Formless Concrete Construction. Catalog. 6 x 9 in. 80 pp. Illustrated. Describes use of T-Rib Chanelath, a form and reinforcing for concrete.

Truscon Steel Co., Youngstown, Ohio.
High Rib and Metal Lath. 18th ed. Catalog. 8½ x 11 in. 64 pp. Illustrated. Gives properties of laths, specifications, special uses and views of installations.

LIME

Kelley Island Lime & Transport Co., Leader News Building, Cleveland, Ohio.
The Perfect Finishing Lime. Catalog. 4½ x 7¼ in. 32 pp. Illustrated. Describes use and advantage of "Tiger Finish" and gives illustrations of several large jobs.
For Finish-Coat Plastering. Booklet. 3½ x 6½ in. 12 pp. Illustrated.

LUMBER

American Hardwood Mfrs. Association. Room 1402, 14 Main Street, Memphis, Tenn.
Technical Information about Red Gum. Booklet. 6 x 9 in. 16 pp. Illustrated.
Red Gum Facts. Booklet. 5½ x 8½ in. 14 pp. Illustrated. Oak Catalog. 6 x 9 in. 31 pp. Illustrated.

American Walnut Mfrs. Assoc., Rm. 1000, 616 S. Michigan Blvd., Chicago, Ill.
American Walnut, the Choice of the Master Craftsman. Booklet. 7 x 9 in. 45 pp. Illustrated. The use of walnut in fine furniture and woodwork.
Specification Notes for American Walnut Interior Trim. 8½ x 11 in. 3 pp. Includes notes on the different styles of finish suitable for walnut.

Arkansas Soft Pine Bureau, 1551 Boyle Building, Little Rock, Ark.
Arkansas Soft Pine Handbook. 8½ x 11 in. 64 pp. Illustrated. Treatise on soft pine.
Arkansas Soft Pine. How to Finish and Paint it. Booklet. 5 x 7 in. 36 pp. Illustrated. Information on proper painting and finishing for outside work and inside trim.
The Home You Long For. Loose Leaf Folder. 8½ x 11 in. 36 pp. Illustrated. Contains 8 home designs, by Robert Seyfarth, Architect, Chicago. Illustrations include exterior and floor plans with architect's estimate.

California Redwood Association, 760 Exposition Building, San Francisco, Calif.
California Redwood Homes. Booklet. 6 x 9 in. 16 pp. Illustrated.
Specialty Uses of California Redwood. Booklet. 6 x 9 in. 24 pp. Illustrated.
California Redwood on the Farm. Booklet. 3¾ x 9¼ in. 40 pp. Illustrated.
How to Finish California Redwood. Booklet. 3¾ x 9¼ in. 16 pp. Illustrated. Formulae and instructions.

Long Bell Lumber Co., R. A. Long Building, Kansas City, Mo.
The Post Everlasting. Booklet. 10½ x 7½ in. 32 pp. Illustrated. Information regarding creosoted yellow pine fence posts, barn poles, paving blocks, etc.
Poles That Resist Decay. Booklet. 9¼ x 4 in. 16 pp. Illustrated. Poles for telegraph, telephone, high power transmission lines.

North Carolina Pine Association, 91 Bank of Commerce Building, Norfolk, Va.
Home Builders Book. 8½ x 11 in. 24 pp. Color plates. A book for the consumer, with plans and suggestions on attractive modern rooms.
Book of Interiors. 8½ x 11 in. 16 pp. Color plates. A book for the architect or consumer, showing many beautiful woodwork effects.
Architect's Specification Manual. 9½ x 11½ in. 8 pp. Illustrated.

METAL LATH—See Lath, Metal and Reinforcing

METALS

American Brass Co., Waterbury, Conn.
Price List and Data Book. Loose Leaf Catalog. 3⅞ x 7 in. 168 pp. Illustrated. Covers entire line of sheets, rods, tubes, etc., in various metals. Useful tables.
Price List and Tables of Weights of Seamless Brass and Copper Tubes. 4¼ x 6¾ in. 60 pp.
Price List No. 12. 4¼ x 6¾ in. 40 pp. Useful tables of weights and data pages for brass, bronze and nickel silver sheets, wire and rods.
Tobin Bronze. Catalog. 4¼ x 6¾ in. 304 pp. Illustrated. Describes its use and gives specifications.

METALS — Continued

American Sheet & Tin Plate Co., Frick Building, Pittsburgh, Pa.
Reference Book. Pocket Ed. 2½ x 4½ in. 168 pp. Illustrated. Covers the complete line of Sheet and Tin Mill Products.
Copper—Its Effect Upon Steel for Roofing Tin. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes the merits of high grade roofing tin plates and the advantages of the copper-steel alloy.
Apollo and Apollo-Keystone Galvanized Sheets. Catalog. 8½ x 11 in. 20 pp. Illustrated.
Research on the Corrosion Resistance of Copper Steel. Booklet. 8½ x 11 in. 24 pp. Illustrated. Technical information on results of atmospheric corrosion tests of various sheets under actual weather conditions.
Facts Simply and Briefly Told. Booklet. 8½ x 11 in. 16 pp. Illustrated. Non-technical statements relating to Keystone Copper Steel.
Black Sheets and Special Sheets. Catalog. 8½ x 11 in. 28 pp. Illustrated. Describes standard grades of Black and Uncoated Sheets, together with weights, bundling tables, etc.
Bright Tin Plates. Catalog. 8½ x 11 in. 16 pp.

International Nickel Company, 43 Exchange Place, New York, N. Y.
Pamphlet. 3½ x 6 in. 8 pp. Illustrated. Describing the wire strength and durability of Monel Screens.

METAL TRIM — See Doors, Windows and Trim, Metal

METAL WORK, ORNAMENTAL

Hope & Sons, Henry, 103 Park Avenue, New York.
Hope's Leadwork Catalog. 9 x 12 in. 46 pp. Illustrated.

Polachek Bronze & Iron Co., John, 476 Hancock Street and 579 Boulevard, Long Island City, N. Y.
Honor Roll Tablets, Memorial Tablets and Monuments in Bronze. Booklet. 6 x 9 in. 28 pp. Illustrated.
Distinctive Metal Work. Booklet. 8½ x 11 in. 8 pp. Illustrated.
Special Design Portfolio. Looseleaf Catalog. 6 x 9 in. 32 pp. Illustrated. Information as to size, number of names or letters accommodated on Memorial Tablets.

NURSERIES

Bobbink & Atkins, Rutherford, N. J.
Nursery Catalog. 10 x 7 in. 82 pp. Illustrated.
Home Grounds Book. 7¾ x 5⅛ in. 50 pp. Illustrated. Concise explanatory notes on residential landscape work.
World's Choicest Roses. Catalog. 7 x 10 in. 32 pp. Illustrated. Complete list of roses hardy in Northern States.

Davey Tree Expert Co., The, Kent, Ohio.
When Your Trees Need the Tree Surgeon. Booklet. 9¼ x 8 in. 16 pp. Illustrated.

OFFICE SUPPLIES

Angel, Inc., H. Reeve, 7–11 Spruce St., New York.
Drawing Papers. Sample Book. 3½ x 5½ in. Showing all the surfaces and substances in general demand.

American Lead Pencil Co., 220 Fifth Avenue, New York.
Venus Pencil in Mechanical Drafting. Booklet. 6 x 9 in. 16 pp. Illustrated.
Venus Pencil in Your School. Booklet. 6 x 9 in. 16 pp. Illustrated.

Dixon Crucible Co., Joseph, Pencil Dept., 224 J. Jersey City, N.J.
Finding Your Pencil. Booklet. 6¼ x 3¼ in. 16 pp. Illustrated.
The First Five. Booklet. 3½ x 5¼ in. 10 pp. Illustrated.
A Study in Sepia. Booklet. 7 x 4½ in. 5 pp. Illustrated.

Faber Co., Eberhard, 37 Greenpoint Avenue, Brooklyn, N. Y.
Eberhard Faber Pencils, How They Are Made. Booklet. 4¾ x 6¾ in. 23 pp. Illustrated.

N. Y. Blueprint Paper Co., 102 Reade St., New York.
Catalog of Drawing Materials, Mathematical and Engineering Instruments. 4 x 6 in. 400 pp. Illustrated. Covers the complete line.

PAINTS, STAINS, VARNISHES AND WOOD FINISHES

Berry Brothers, Detroit, Michigan.
"Natural Woods and How to Finish Them." Booklet. 6½ x 4¾ in. 95 pp. Containing technical information and advice concerning wood finishing.
"Beautiful Homes." Booklet. 8½ x 6½ in. 26 pp. Illustrated in colors. Giving information to home builders and others on interior finishing.

Boston Varnish Co., Everett Station, Boston, Mass.
The Inviting Home. Booklet. 5½ x 9 in. 16 pp. Color Plates. A briefly worded book on painting for the busy architect or decorator.
The White Enamel Specification Book. 6 x 9 in. 12 pp. Explaining the use of Kyanize White Enamel on interior or exterior surfaces.

Cabot, Inc., Samuel, Boston, Mass.
Cabot's Creosote Stains. Booklet. 4 x 8½ in. 16 pp. Illustrated.

Clinton Metallic Paint Co., Clinton, N. Y.
Clinton Mortar Colors. Booklet. 3½ x 6¾ in. 8 pp. Illustrated. Complete description of Clinton Mortar Colors with color samples.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 56*

PAINTS, STAINS, VARNISHES AND WOOD FINISHES — Cont.

Creo-Dipt Company, Inc., 1025 Oliver St., Tonawanda, N. Y.
Dixie White. Folder. 3½ x 8 in. 3 pp. Illustrated. A heavy white stain which produces the whitewashed effect.

Devoe & Raynolds Co., Inc., 101 Fulton Street, New York.
Architectural Finishes. Catalog. 5 x 7 in. 40 pp. Specifications and suggestions for painting, varnishing, staining and enameling.
Harmony in the Home. Booklet. 4½ x 6 in. 24 pp. Illustrated. Flat finish wall paints, color suggestions and specifications.

Eagle-Picher Lead Co., The, 208 S. La Salle Street, Chicago, Ill.
Protective Coatings for Structural Metals. Book. 6 x 9 in. 48 pp. Illustrated.

Fox Co., M. Ewing, New York, N. Y.
Calcimines. Booklet. 3¼ x 6¼ in. 8 pp. Color cards.
Water Paints. Booklet. 3¼ x 6¼ in. 6 pp. Color cards.

Murphy Varnish Co., The, Chicago, Ill.
Beautiful Floors and How to Care for Them. Booklet. 3⅜ x 6¼ in. 16 pp. Illustrated.
Murphy Varnish. Booklet. 3⅜ x 6¼ in. 12 pp. Illustrated. Advantages of Waterproof Varnishes.
How to Have a Modern Bathroom. Leaflet. 3⅜ x 6¼ in. 4 pp. Illustrated.
Modern Sanitary Kitchen. Leaflet. 3⅜ x 6¼ in. 4 pp. Illustrated.

O'Brien Varnish Co., 1121 Washington Avenue, South Bend, Ind.
That Magic Thing Called Color. Booklet. 5½ x 8½ in. 24 pp. Illustrated. Short treatise on the use of color in the home, special reference to walls and ceilings.
Architects' Specification Manual. 8½ x 11 in. 50 pp. Complete specifications for all paint products.

The Sherwin-Williams Co., 882 Canal Road, Cleveland, Ohio.
A Book of Painting and Varnishing Specifications. 8½ x 11 in. 30 pp. A text book on painting and finishing.
Announcement of Sherwin-Williams Flat-Tone Multi-Color Effects. Booklet. 2½ x 6 in. 10 pp. Illustrated. Development of a new system of wall decoration.
Monthly Architectural Bulletin. 8½ x 11 in. Bulletin issued periodically on painting and finishing.

Smith & Co., Edward, P. O. Box 76, City Hall Station, New York, N. Y.
Architect's Hand Book. 4¾ x 7½ in. 24 pp. Specifications and suggestions for painting, varnishing, enameling, etc.

Sonneborn Sons, Inc., L., Dept. 4, 264 Pearl Street, New York.
Paint Specifications. Booklet. 8½ x 10¾ in. 4 pp.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R., Detroit, Mich.
Spread the Sunshine Inside. Booklet. 5 x 8 in. 24 pp. Describes methods for light saving by the application of light reflecting enamels to interior walls of factories and workrooms.

Wadsworth-Howland Co., Inc., Boston, Mass.
Paints and Varnishes. Catalog. 5¾ x 8½ in. 140 pp. Illustrated. Covers the complete line.

PIPE

Byers Co., A. M., Pittsburgh, Pa.
General Information for Pipe Users. Bulletin No. 26. 8½ x 11 in. 24 pp. Illustrated. Description of materials and processes employed in the manufacture of Byers Pipe. Contains many useful tables.
An investigation of Pipe Corrosion. Bulletin No. 30. 8½ x 11 in. 20 pp. Illustrated. A report of general interest to architects, engineers and builders.
Corrosion of Wrought Iron, Cast Iron and Steel Pipe in House Drainage Systems. Bulletin No. 32. 8½ x 11 in. 36 pp. Illustrated. Data obtained through investigations conducted in New York and Chicago.
The Installation Cost of Pipe. Bulletin No. 8. 8½ x 11 in. 32 pp. Illustrated. Cost analyses of 20 different pipe installations in power and industrial plants, office buildings, hotels, residences, etc.

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "A." 4 x 6½ in. 706 pp. Illustrated. Shows a full line of steam, gas and water works supplies.

National Tube Co., Frick Building, Pittsburgh, Pa.
National Bulletin No. 11, History, Characteristics and Advantages of National Pipe. Catalog. 8½ x 11 in. 48 pp. Illustrated.
National Bulletin No. 25. National Pipe in Large Buildings. Catalog. 8½ x 11 in. 88 pp. Illustrated.
National Bulletin No. 7, Manufacture and Advantages of National Welding Scale Free Pipe. Booklet. 8½ x 11 in. 16 pp. Illustrated.
National Bulletin No. 3, Prevention of Corrosion in Pipe. Booklet. 8½ x 11 in. 24 pp. Illustrated. Contains the results of carefully conducted investigations.

U. S. Cast Iron Pipe & Foundry Co., Burlington, N. J.
Keystone Columns. Architectural Service Sheet. 16½ x 21½ in. Illustrated. Standard specifications with description and formula for calculating cast iron building columns.

PLUMBING EQUIPMENT

Brunswick-Balke-Collender Co., 623 S. Wabash Avenue, Chicago, Ill.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 4 pp. Illustrated.
Whale-bone-ite Seat. Booklet. 3½ x 6¼ in. 8 pp. Illustrated.

PLUMBING EQUIPMENT — Continued

Clow & Sons, James B., 534 S. Franklin Street, Chicago, Ill.
Catalog "M." 9¼ x 12 in. 184 pp. Illustrated. Shows complete line of plumbing fixtures for Schools, Railroads and Industrial Plants.

Crane Company, 836 S. Michigan Avenue, Chicago, Ill.
Crane Products in World Wide Use. Catalog. 5 x 9½ in. 24 pp. Illustrated.
Plumbing Suggestions for Home Builders. Catalog. 3 x 6 in. 80 pp. Illustrated.
Plumbing Suggestions for Industrial Plants. Catalog. 4 x 6½ in. 43 pp. Illustrated.
No. 50 Steam Pocket Catalog. 4 x 6½ in. 775 pp. Illustrated. Describes the complete line of the Crane Co.

Eagle-Picher Lead Co., The, 208 S. La Salle Street, Chicago, Ill.
Plumbers' Lead Guide. Catalog. 4⅞ x 7⅝ in. 52 pp. Illustrated.

Maddock's Sons Co., Thomas, Trenton, N. J.
Highest Grade Standardized Plumbing Fixtures for Every Need. Catalog. 5 x 7½ in. 94 pp. Illustrated. Covers the complete line.
Bathroom Individuality. Booklet. 6 x 9 in. 28 pp. Illustrated. Showing view of complete bathrooms with complete descriptions of floor plans.
Specifications for plumbing fixtures. Booklet. 9 x 12 in. 8 pp. Tables of specifications for industrial buildings, schools, apartments, hotels, etc.

Rundle-Spence Mfg. Co., Milwaukee, Wis.
Bubbling Fountains. Catalog. 5½ x 8 in. 74 pp. Illustrated.

PUMPS

Goulds Mfg. Co., The, Seneca Falls, N. Y.
Set of Twenty Bulletins. 7½ x 10⅝ in. 12 to 32 pp. each. Illustrated. Covers complete line of power and centrifugal pumps for all services.
Catalog "K." 6 x 9 in. 216 pp. Illustrated. Covers complete line of smaller size pumps.

REFRIGERATION

Isko Co., The, Chicago, Ill.
Electrical Refrigeration. Booklet. 8 x 3¼ in. 16 pp. Illustrated. Services and advantages of the household machine.
Bulletin No. 142. 8½ x 11 in. 4 pp. Illustrated. Isko electrical refrigeration for cooling drinking water systems.
Bulletin No. 140. 8½ x 11 in. 4 pp. Illustrated. Isko electrical refrigeration for both household and commercial use.

Johns-Manville Co., The H. W., Madison Avenue and 41st Street, New York, N. Y.
Johns-Manville System of Refrigeration. Booklet. 3½ x 6 in. 16 pp. Illustrated.

ROOFING

American Sheet and Tin Plate Co., Frick Building, Pittsburgh, Pa.
Better Buildings. Catalog. 8½ x 11 in. 32 pp. Illustrated. Describes corrugated and formed roofing together with table of weights and methods of application.

Barrett Co., The, Chicago, Ill.
Barrett Everlastic Fiber Coating. Booklet. 3⅜ x 6 in. 8 pp. Illustrated. A new liquid cement for covering roofs and how to apply it.
Barrett Service Sheets. 8½ x 11 in. For architects, builders and contractors.

Philip Carey Co., The, Cincinnati, Ohio.
Architects' Specifications for Carey Building Material. 8½ x 11 in. 48 pp. Illustrated.

Creo-Dipt Company Inc., North Tonawanda, N. Y.
Thatch Roofs. Booklet. 8½ x 11 in. Illustrated. Showing the varied effects obtainable with Stained Shingles.

Johns-Manville Co., The H. W., Madison Avenue and 41st Street, New York.
Johns-Manville Asbestos Shingles. Booklet. 3½ x 6 in. 32 pp. Illustrated. Prices, construction data and specifications.
Johns-Manville Roofing and Building Materials. Catalog. 3½ x 6 in. 24 pp. Illustrated. Describes building materials such as asbestos wood, sound deadening and insulating felts, waterproofing, etc.

Keasbey & Mattison Co., Ambler, Pa.
Ambler Asbestos Shingles. Catalog. 5½ x 8½ in. 40 pp. Illustrated.
Ambler Asbestos Corrugated Roofing and Siding. Catalog. 8½ x 11 in. 36 pp. Illustrated. Standard Purlin Spacing Tables.
Ambler Asbestos Corrugated Roofing and Siding. Catalog. 8½ x 11 in. 20 pp. Illustrated. Prices and specifications.
Ambler Asbestos Building Lumber. Catalog. 8½ x 11 in. 32 pp. Illustrated.

Ludowici-Celadon Co., Chicago, Ill.
Roofing Tile. A Detailed Reference for Architects' Use. Handbook. 9 x 13 in. 106 pp. Illustrated. A working handbook for architects.
Roof Beautiful. Catalog. 6½ x 8½ in. 39 pp. Illustrated.
Folder No. 8. 3¾ x 9 in. 10 pp. Illustrated. A condensed catalog.

SELECTED LIST OF MANUFACTURERS' PUBLICATIONS — *Continued from page 57*

SEWAGE DISPOSAL

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Specification Sheets. 7¾ x 10¼ in. 46 pp. Illustrated. Detailed drawings and specifications covering water supply and sewage disposal systems.

SHRUBS, TREES, ETC.—See Nurseries

STORE FRONTS

Kawneer Co., The, Niles, Mich.
Kawneer Solid Copper Store Fronts. Catalog "K." 8½ x 11 in. 32 pp. Illustrated. Information about various members used in the pioneer Kawneer construction.
Book of Designs. Catalog. 6 x 9 in. 64 pp. Illustrated.

New Jersey Terra Cotta Co., Singer Building, New York.
Store Front. Booklet. 8½ x 11 in. 20 pp. Illustrated.

Zouri Drawn Metal Co., Chicago Heights, Ill.
Key to Getting the People In. Catalog BJ8. 6 x 9 in. 68 pp. Illustrated. Zouri Safety Sash, corner and division bars have been approved by the Underwriter's Laboratories and are manufactured under their supervision.

STUCCO—See Cement, Portland.

STUCCO AND WALL BOARD

Bishopric Manufacturing Co., 9 Este Avenue, Cincinnati, Ohio.
Homes Built on the Wisdom of Ages. Catalog. 6 x 9 in. 48 pp. Illustrated. Describing the use of Bishopric stucco board and Bishopric sheathing board.

Carey Co., The Philip, Cincinnati, Ohio.
Carey Board for Better Building. Catalog. 6 x 9 in. 32 pp. Illustrated.

TELEPHONE, INTER-COMMUNICATING

Western Electric Co., 195 Broadway, New York.
Specification for W. E. Inter-phones and Private Telephone Systems. 8 x 10¾ in. 88 pp. Illustrated.

TERRA COTTA

Northwestern Terra Cotta Co., The, 2525 Clybourn Ave., Chicago, Ill.
Booklet. 8¼ x 11 in. 77 pp. Illustrated. Showing in a concise way the usefulness of terra cotta.

TILE, FLOOR AND WALL

Associated Tile Manufacturers, The, Beaver Falls, Pa.
Tile Floors and Walls for Hospitals. Booklet. 8½ x 11 in. 40 pp. Illustrated. Reasons for selecting Tile for hospitals.
Bring the Crowds to Your Market. Booklet. 8½ x 11 in. 16 pp. Illustrated. The use of Tile for the modern sanitary market.
Preparation for Tile. Booklet. 6 x 9 in. 32 pp. Illustrated. Describing the manner in which Tile is set and the various types of construction which are used as a foundation for the product.
Swimming Pools. Booklet. 8½ x 11 in. 32 pp. Illustrated. A handbook on swimming pools and their construction.

TILE, HOLLOW

Hollow Building Tile Association, Dept. 189, Conway Bldg., Chicago, Ill.
Handbook of Hollow Building Tile Construction. 8½ x 11 in. 104 pp. Illustrated. Complete treatise on most approved methods of hollow tile building construction and fireproofing.

National Fire Proofing Co., 250 Federal St., Pittsburgh, Pa.
Standard Wall Construction Bulletin 174. 8½ x 11. 32 pp. Illustrated. A complete treatise on the subject of hollow tile wall construction.
Industrial Housing Bulletin 172, 8½ x 11 in. 14 pp. Illustrated. Photographs and floor plans of typical workingmen's homes.
Natco on the Farm. 8½ x 11 in. 38 pp. Illustrated. A treatise on the subject of fire safe and permanent farm building construction.

VALVES

Jenkins Bros., 80 White Street, New York.
The Valve Behind a Good Heating System. Booklet. 4½ x 7¼ in. 16 pp. Color plates.
Jenkins Valves for Plumbing Service. Booklet. 4½ x 7¼ in. 16 pp. Illustrated.

Pratt & Cady Co., Inc., Hartford, Conn.
Valves. Catalog. 9 x 6 in. 221 pp. Illustrated. Covers the complete line.

VENTILATION

Clarage Fan Co., Porter Street, Kalamazoo, Mich.
Clarage Multiblade Fans. Catalog No. 51. 8½ x 11 in. 64 pp. Illustrated.
Type S. P. Exhaust Fans. Catalog No. 111. 8½ x 11 in. 36 pp. Illustrated.
Type C. I. Fans and Blowers. Catalog No. 112. 8½ x 11 in. 8 pp. Illustrated.
Type S. P. Blowers. Catalog No. 23. 8½ x 11 in. 20 pp. Illustrated.

Globe Ventilator Co., Dept. P., Troy, N. Y.
Globe Ventilator's Catalog. 6 x 9 in. 32 pp. Illustrated.

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Moline Heat., Dept., C. Moline, Ill.
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Architect's and Engineer's Univent Data Book. 8½ x 11 in. 32 pp. Illustrated. Technical information on ventilating.

Royal Ventilator Co., 415 Locust Street, Philadelphia, Pa.
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Anti-Hydro Waterproofing Co., 299 Broadway, N. Y.
Waterproofing. Booklet. 3½ x 6 in. 4 pp. Methods used for waterproofing concrete and mortars.

Barrett Co., The, Chicago, Ill.
Barrett Elastigum. Booklet. 3¾ x 8½ in. 8 pp. Illustrated. Describes elastigum, a waterproof cement, and its application to parapet walls.
Barrett No-Aer-Leeks. Booklet. 3⅜ x 6 in. 8 pp. Illustrated. How it is applied to make air-tight and moisture proof walls around boiler settings.

Sandusky Cement Co., Dept. F, Cleveland, Ohio.
Medusa Waterproofing. Booklet. 6¾ x 9 in. 37 pp. Illustrated.

Toch Brothers, 320 Fifth Ave., New York, N. Y.
Toxement. Booklet. 5¼ x 8⅛ in. Illustrated. 24 pp. Describes Toxement, an integral waterproofing compound for concrete, stucco, cement, mortar, etc.

Truscon Laboratories, The, Cor. Caniff Avenue and Grand Trunk R. R. Detroit, Mich.
Structural Waterproofing. Handbook. 8½ x 11 in. 100 pp. Illustrated. A reliable and trustworthy text-book on modern waterproofing practice.
Truscon Stonetex. Booklet. 5 x 8 in. 36 pp. Illustrated. A booklet telling of methods to decorate and make brick, stucco and masonry free from stains by the application of a cement coating.

Wadsworth-Howland Co., Inc., Boston, Mass.
Bay State Waterproofings. Booklet. No. 10. 8½ x 11 in. Illustrated. Methods of applying Cement Coating.

WATER SOFTENERS

Graver Corp., East Chicago, Ind.
Graver Zeolite Softeners. Bulletin 509. 8½ x 11 in. 16 pp. Illustrated. Water softeners for homes, institutions, hotels, apartments, etc.
Graver Vertical Pressure Water Feeders. Bulletin 502. 8½ x 11 in. 8 pp. Illustrated. Detailed description of parts, capacities and dimensions.
Graver Small Continuous Water Softener. Bulletin 507. 8½ x 11 in. 12 pp. Illustrated. A softener for raw water ice plants and small steam power plants.

Permutit Company, The, 440 Fourth Ave., New York, N. Y.
Permutit-Water softened to No (Zero) Hardness. Booklet. 8½ x 11 in. 32 pp. Describing the original Zeolite process of softening water to zero hardness. An essential for homes, hotels, apartment houses, swimming pools, laundries, textile mills, paper mills, ice plants, etc., in hard water districts.

WATER STERILIZATION

R. U. V. Company, Inc., 165 Broadway, New York, N. Y.
Bound Bulletins. 8½ x 11 in. 27 pp. Illustrated.
Information on the sterilization of water and the sources of ultra violet rays.

WATER SYSTEMS

Kewanee Private Utilities, 442 Franklin St., Kewanee, Ill.
Modernize Your Farm. Booklet. 7¾ x 10¼ in. 16 pp. Illustrated. Description of water systems and lighting equipment.

WINDOW CORD

Samson Cordage Works, Boston, Mass.
Catalog. 3½ x 6¼ in. 24 pp. Illustrated. Covers complete line.

WINDOWS, CASEMENT

Crittall Casement Window Co., 685 East Atwater Street, Detroit, Mich.
Catalog No. 18. 9 x 12 in. 56 pp. Illustrated.

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Hoffman Casements. Catalog. 5½ x 8 in. 8 pp. Illustrated. Miniature details and phantom drawings.
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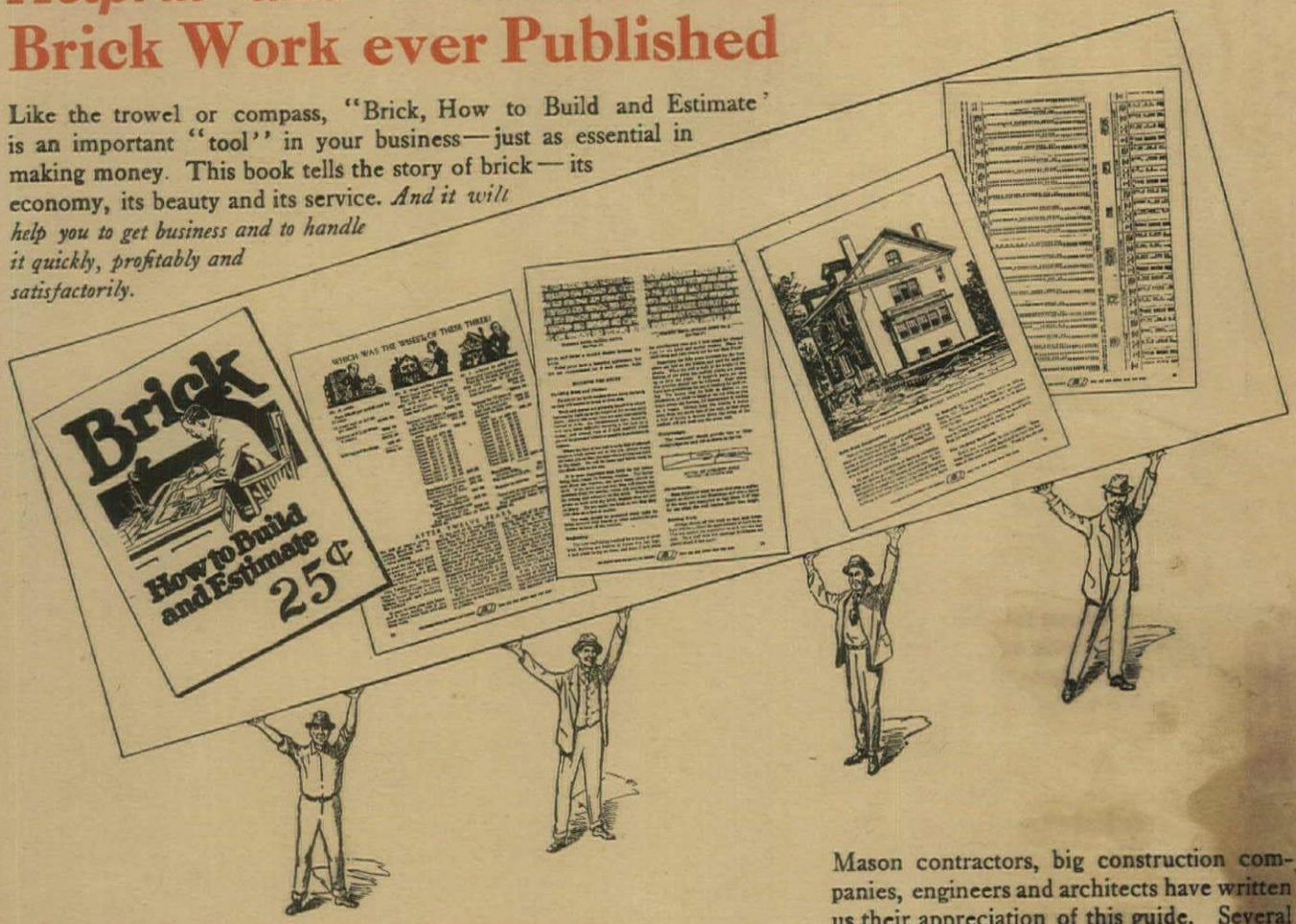

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