TABLE OF CONTENTS FOR JANUARY, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

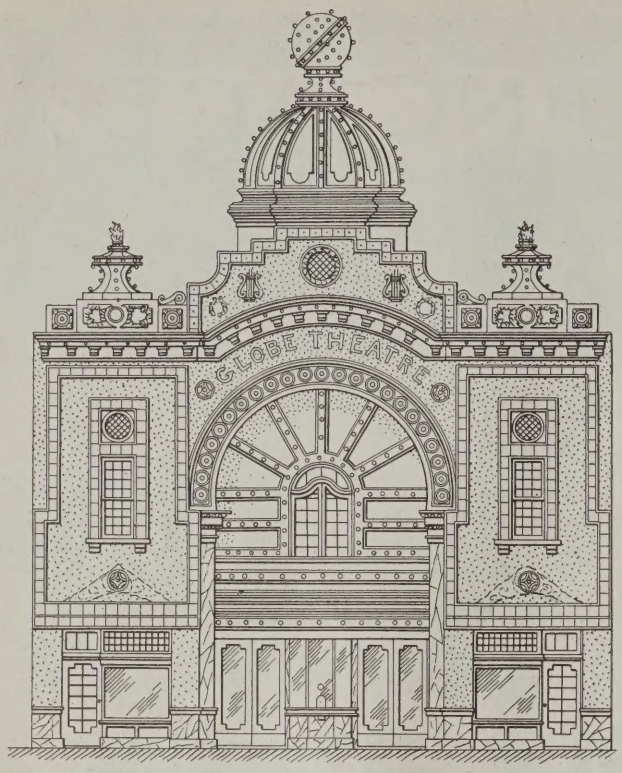
NEW YORK, JANUARY, 1915

A Modern Moving Picture Theatre

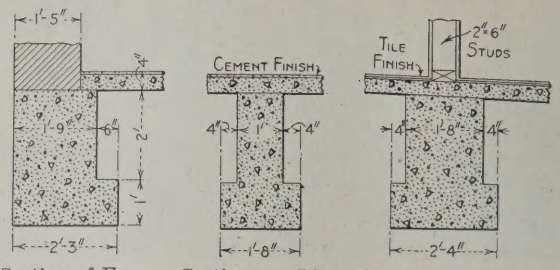
Interesting Details of a Southern California Example of One of These Popular Places of Amusement

SMALL indeed is the village or town that does not in these progressive days boast of at least one moving picture theatre as a place of amusement for its pleasure-loving inhabitants, and when it comes to the cities, these theatres are found in rapidly increasing numbers, running up into the hundreds in many of the more important centers of business activity. The statement has been made that there are at the present time something like 20,000 moving picture theatres in the United States, with a daily average attendance of more than five millions of people. The very fact of these large numbers attests most strikingly to the popularity of the moving picture theatre as a place of amusement for old as well as young, and while

General View of the "Globe" Moving Picture Theatre at Los Angeles, Cal.—L. B. & A. L. Valk, Architects

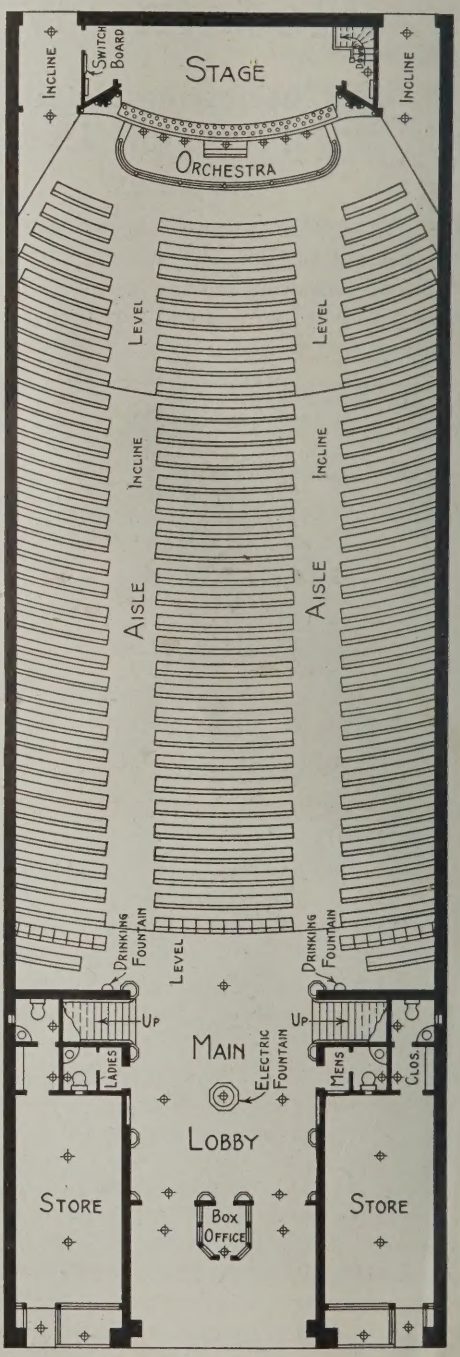


Front Elevation Showing Ornamental Treatment of Façade—Scale 1/16 In. to the Foot

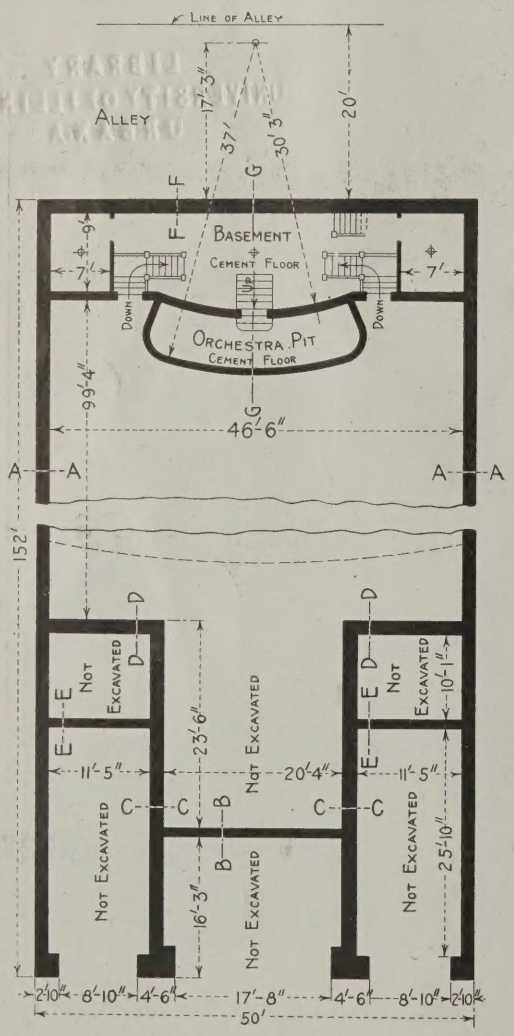


Section of Foundation on Line A-A | Section on Line B-B | Section on Line C-C

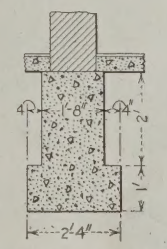
Scale ¼ In. to the Foot



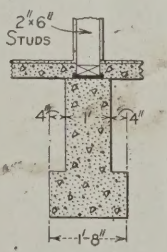
Plan of Building Showing Stores and Auditorium—Scale 3/64 In. to the Foot



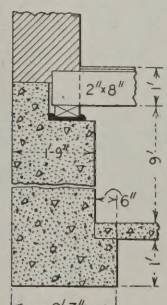
Partial Foundation Plan—Scale 3/64 In. to the Foot



Section on Line D-D



Section on Line E-E



Section on Line F-F

Scale ¼ In. to the Foot

A Modern Moving Picture Theatre—Plans, Elevation and Miscellaneous Constructive Details

affording entertainment to the audiences is also educational in many respects. So great has been the pressure for buildings of this character that some architects have devoted their energies almost exclusively to this class of work.

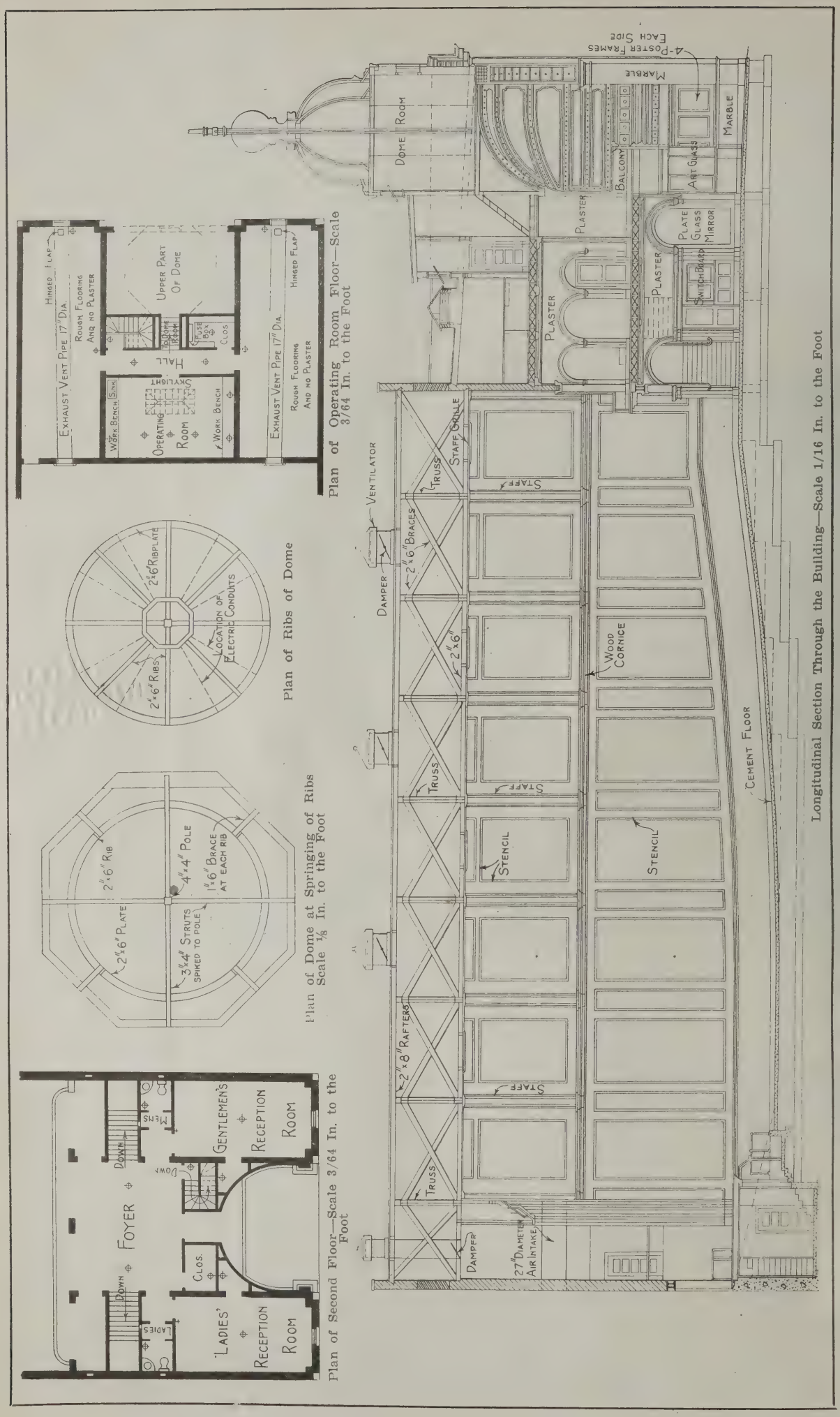
A typical example of what is being done along this line is illustrated upon the first seven pages of this article. It represents one of the largest and most attractive moving picture theatres on the Pacific coast and is modern in all respects. The pictures which are here presented afford an excellent idea of the exterior and interior appearance of the building while the plans and various details show the general arrangement and constructive features.

The building which covers a ground area 50 x 152 ft. is of brick construction with 17 in. walls above grade, while below, the concrete foundations are 20 in. thick, resting on footings which extend 4 in. beyond the wall on either side, thus giving a total width of 28 in. The proportions of the mixture were one part Portland cement 2½ parts clean sharp sand and 3½ parts of crushed stone that would pass through a 2 in. ring. The front of the building is highly ornamental, as may be seen from the picture on page 19 and also from a study of the scale elevation. The effects are produced by the use of cement-plaster for the outside coating in conjunction with staff ornamentation. The stucco or cement-plaster work of the front was composed of a mixture in the proportions for the first or scratch coat of one bag of Portland cement, 300 lbs. of clean graded sand, 40 lbs. of hydrated lime and three pounds of plasterers' hair or fiber. For the second coat the proportions were one bag of white Portland cement mixed half and half with clean sharp sand, to which was added 15 lbs. of hydrated lime, and finished in "stipple" effect. There are bands of staff outlining the front of the structure and also the windows, while above the cornice are ornamental features symbolic of music.

The dome room, which rises above the main body of the structure, has a roof of No. 24 galvanized iron surmounted by a globe, and this in turn is topped by a flagpole not fully shown in the picture. In the construction of the dome there are 3 x 4 in. struts spiked to a 4 x 4 in. center pole. The rib plate as well as the ribs themselves are 2 x 6 in. On each rib is a 1 x 6 in. brace, the entire framing being such as to render the work rigid.

A Modern Moving Picture Theatre—Interior View Looking Toward the Stage and Showing the Two Exits at Right and Left of It; Also, the Two Intake-fan Openings Just Above the Cornice Each Side of the Proscenium Arch. Some of the Foul Air Vents are Seen in the Ceiling

The main roof of the building is covered with what is known as Malthoid roofing resting on 2 x 8 in. joists, which are supported by the trusses. In laying the roofing it may be interesting to state that the roofboards were first sprinkled with hot Maltha, and over it were placed two layers of P. & B. No. 2 asphalt saturated felt, weighing 14 lbs. per 100 sq. ft., one width being lapped 17 in. over another. After the roof was entirely covered the laps were nailed every foot. The felt thus applied received an extra heavy coating of hot Maltha, into which was bedded two-ply Malthoid roofing lapped 2 inches and thoroughly cemented to the felt. Galvanized iron counter flashings were inserted in the brick walls and securely fastened with metal plugs and well pointed with cement-mortar. The fire walls were mopped with hot



A Modern Moving Picture Theatre—Plans, Longitudinal Vertical Section and Various Constructive Details

Maltha except around the outlets, where P. & B. paint was used. The result is a very satisfactory roof for the purpose. Extending through the roof are 4 galvanized iron vents with dampers, the location being clearly shown on the longitudinal section. The skylight over the operating room is of wired glass, and is provided with louvres.

The exterior lobby of the theatre is one of the most attractive features of the building, it being finished in English vein white Italian marble for the wainscoting and pilasters, with a base of pink Tennessee marble. This lobby is recessed in semi-circular outline and embellished with what may be described as belt crosses and a groined ceiling, the ribs of which carry a multiplicity of electric light bulbs. The arch of the lobby is ornamented with a double band of rosettes made of staff. The dome and the globe which surmounts it also carry a great number of bulbs, and when lighted at night the building is a conspicuous feature of the business section of the city.

In the lobby is an art glass box office in copper frame, and on each side there are four glass poster boards or frames for advertising purposes. A detail of one of these is presented on another page. The floor of the lobby is of tiling on a concrete base and is laid with a slight pitch. The main lobby is composed of 1 in. hexagonal tile with figured pattern, while the border is made up of ¾ in. square tile. The main entrance doors are fitted with plate glass.

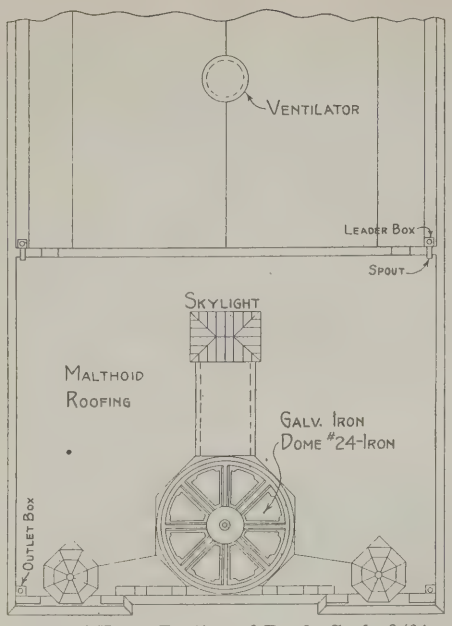
At the right and left of the main lobby is a small store measuring 14 x 40 ft. in plan with plate glass and copper fronts and with prism glass at the top of each front as shown in the illustrations presented herewith.

Passing into the main lobby or foyer, which has a cement floor, with sleepers bedded in the concrete to serve as nailing strips for carpet, the eye is attracted by the electric fountain located in the center of the area. At the right is a lavatory and toilet for men, and on the left is one for women. Just beyond, on either side, are the stairs leading to the second floor, where are found the men's smoking room and, on the opposite side of the foyer, the ladies' resting room.

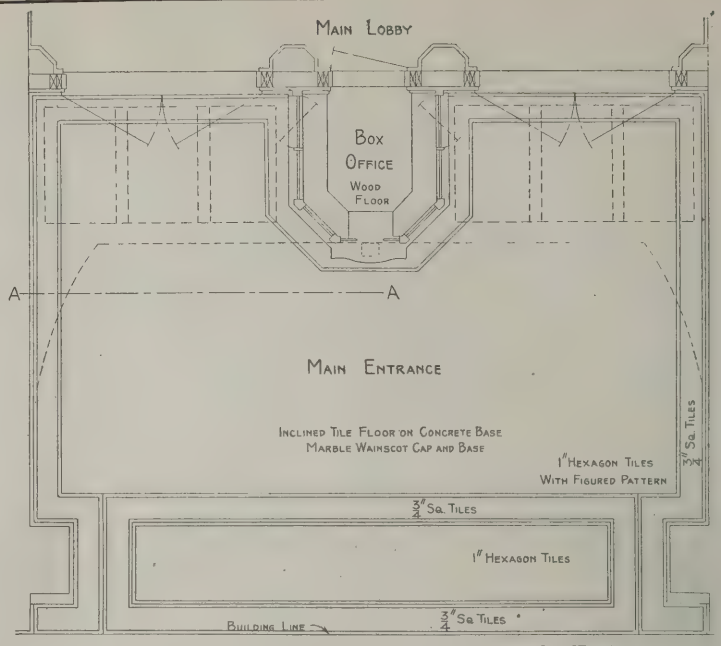
A Modern Moving Picture Theatre—View in Foyer, Showing Stairs Leading to Second-Floor Balcony and Rest Rooms—The Box Office is Seen at the Left With Main Entrances on Either Side of It

The auditorium has a seating capacity of 760 persons, which with the balcony over the first floor foyer gives a total of 850. The auditorium has a 4 in. cement-concrete floor with an incline from the front to a point 25 ft. from the orchestra, beyond which to the stage it is level. There are two main aisles, giving three rows of seats. The aisles are covered with carpet, which is fastened to wooden sleepers bedded in the concrete. At the right and left of the main entrance to the auditorium are drinking fountains.

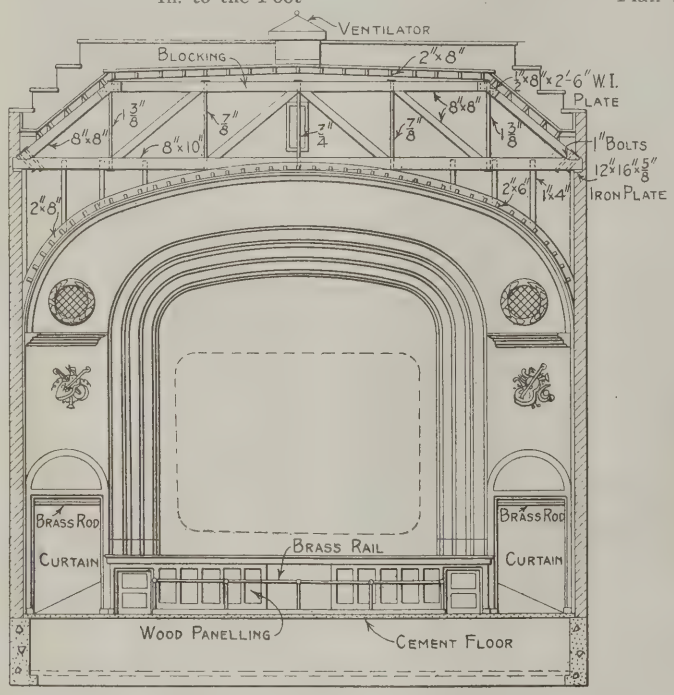
The orchestra pit has a cement floor, and is



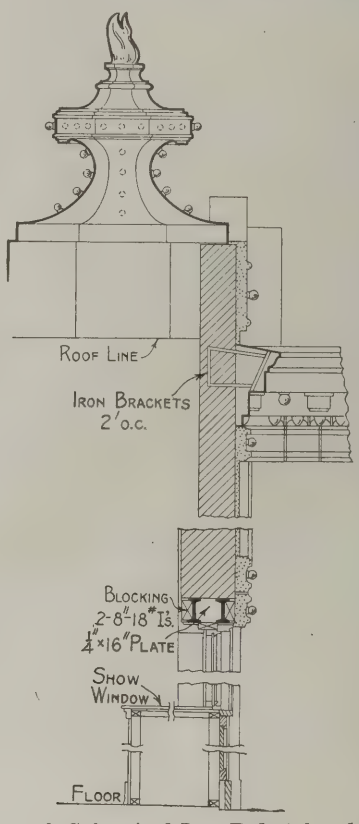
Plan of Front Portion of Roof—Scale 3/64 In. to the Foot



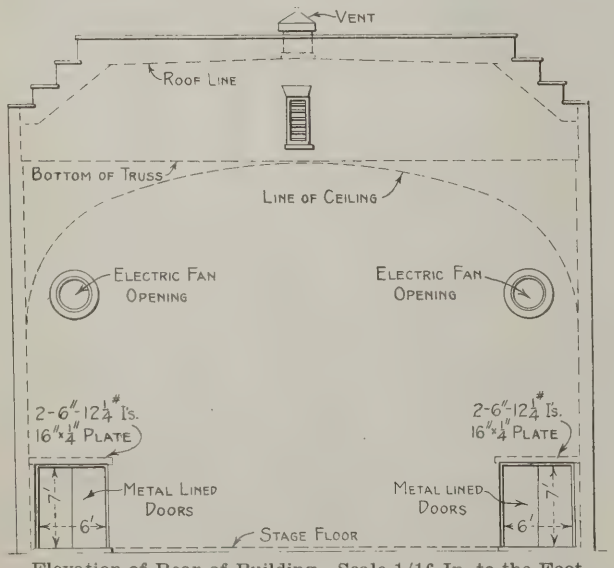
Plan of Main Entrance—Scale 3/16 In. to the Foot



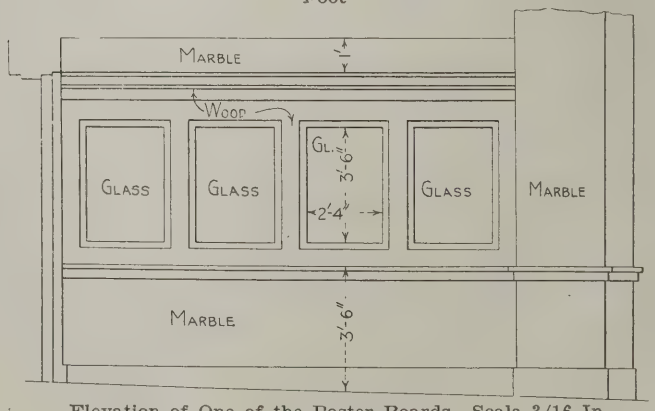
Vertical Cross Section Looking Toward the Stage—Scale 1/16 In. to the Foot



Section Through Galvanized Iron Pedestal and Cornice, Also Details of the Store Fronts—Scale 3/16 In. to the Foot



Elevation of Rear of Building—Scale 1/16 In. to the Foot



Elevation of One of the Poster Boards—Scale 3/16 In. to the Foot

A Modern Moving Picture Theatre—Miscellaneous Constructive Details, Cross Sections and Plans

separated from the auditorium by means of a brass railing and standards. The front of the stage below the footlights has wood paneling.

On each side of the stage is an exit to a 20 ft. alley in the rear of the building.

In the cross section of the building, looking towards the stage, the roof truss construction is clearly indicated. It will be seen that the top chords are 8 x 8 and the bottom ones 8 x 10 in., with diagonal struts 8 x 8 in. and vertical rods of 1 x ⅜ and ⅞ in. diameters. The joints at the extreme right and left of each top chord is reinforced with a wrought iron plate ½ in. thick, 8 in. wide and 2 ft. 6 in. in length. The joint at the foot of each truss is strengthened with two bolts each of 1 in. diameter and an iron plate ⅝ in. thick and 12 in. wide and 16 in. long.

The interior of the building is plastered on metal lath, and the ornamentation is of staff.

The lighting is on the indirect system, using the X-ray reflectors in the hanging fixtures shown in the various interior views. The electric system is so arranged that all the lights on the stage, embracing footlights, border lights, etc., are controlled from the operating room as well as from the stage switchboard, so that the man in the operating room at the front of the house can control all lights on the stage as well as those in the hanging fixtures in the ceiling of the auditorium. These lights are arranged on a "dimmer" so that they can be lowered at the time the picture is on the screen and raised to full capacity at will.

The plumbing equipment is of the modern type, use being made of syphon jet closets with "Republic" oil regulating flushing valves, and hand lever, thus doing away with tanks. The lavatories are supplied with hot and cold water connections and nickel plated fittings with China index handles. The position of the various fixtures is indicated on the plans.

The operating room located as shown is of fireproof construction, being lined with ¼ in. of asbestos, over which is placed sheet iron for the floor, side walls and ceiling. This room contains in the way of equipment two No. 6-A Powers moving picture machines, one dissolving stereopticon, a spotlight, and a complete motor generating set for transforming alternating into direct current.

A Modern Moving Picture Theatre—The Second-Floor Foyer, Showing Loge Seats in Boxes at the Right and French Double Doors at the Left Leading Out to Balcony Over the Box Office

The ventilation is by the intake and exhaust system. The fresh air is driven into the main auditorium by two 24 in. electric fans located over the exit doors on the stage end of the building, while on the front end of the auditorium are two 24 in. exhaust fans. These fans supply the proper amount of fresh air and exhaust the foul air in the proper proportion, thus giving to each person continuously the requisite quantity of fresh air. In addition, there are four openings in the ceiling, each 4 ft. in diameter, connecting with ventilators, which extend from the ceiling up through the roof as shown by the longitudinal section. These exhaust vent pipes are 17 in. in diameter and are made of No. 28 galvanized iron.

The picture of the interior of the theatre look-

ing towards the stage clearly shows the advertising curtain, the two exits on either side of the stage, the lighting fixtures and a portion of the ventilating system above the ceiling. Just above the cornice on either side of the stage may also be seen two intake fan openings.

Another picture represents a view of the lobby and foyer, showing one of the switchboards just beyond the door to the ladies' toilet room; the stairs leading to the foyer and balcony boxes on the second floor, a glimpse of the box office with the telephone on the desk and, on the left and right, the two main entrances from the outside.

The building, which we have made the basis of the present article, is the Globe Theatre, located in the heart of the city of Los Angeles, Cal., and was designed by Architects L. B. and A. L. Valk, theatre specialists, 424 to 426 Stimson Building, Los Angeles, Cal. The architects place the cost of the building at $24,000, but this does not include the equipment.

The contractor for the mason and carpentry work was A. Andreson, the roofing was done by the Parrafine Paint Co., the staff work by Watkins Bros., the indirect lighting system by W. H. Hutchinson Co., and the plumbing and gasfitting by S. C. Brown & Co., all of Los Angeles.

Proposed "Standard" Form of Builders' Contract

There has just been issued from the office of I. H. Scates, General Commissioner of the National Association of Builders' Exchanges, what is known as "Commissioners' Bulletin No. 3," relating to the work which is being done in the direction of standardizing building contracts. Reference is made to the conferences recently held between representatives of the American Institute of Architects and the Committee of the National Association of Builders' Exchanges, and as a result of the work accomplished there is now issued a "Draft of a Proposed Second Edition of the Standard Form of Agreement and General Conditions of the Contract," this having been prepared by the Standing Committee on Contracts and Specifications of the American Institute of Architects.

This subject was carefully considered at the convention of the American Institute of Architects just held in Washington, D. C., and it will also come up for consideration at the annual convention of the National Association of Builders' Exchanges, to be held the latter part of January.

The primary principles running through all the proposed changes are: First, that the rights and responsibilities of the contractor and owner must be defined as clearly and definitely as possible upon the signing of the contract; second, that the determination of any questions which cannot be defined in advance shall ultimately rest with an impartial tribunal or arbitration. A working principle is added to these that the architect—responsible to the owner for the integrity and despatch of the work—shall have the right to control the primary decision in matters of question and to require the work to proceed in accordance with his views subject to the ultimate determination of the rights of the parties under the contract, by arbitration.

Coming Meeting of the National Association of Builders' Exchanges

As announced in our last issue, the annual convention of the National Association of Builders' Exchanges will be held in Columbus, Ohio, January 26 to 28 inclusive, with headquarters and sessions at the Virginia Hotel, Third and Gay Streets. We understand from Secretary Vollmer that since the last annual meeting the membership of the association has increased 50 per cent. and a most successful gathering is anticipated at the coming convention. The delegates that will represent the various builders associations and allied lines will be chosen for their peculiar fitness and ability.

The most important work of the convention will be to act upon the proposed standard documents to be used in connection with the business of building construction. It is expected that every large building center in the United States will be represented and that the results accomplished will be far reaching in their importance to the trade at large.

Architectural League of New York

The thirteenth annual exhibition of the Architectural League of New York will be held as usual in the building of the American Fine Arts Society, 215 West 57th Street, New York City, and will continue from February 7 to February 27 inclusive. The exhibition will consist of drawings and models of proposed or executed work in structural, decorative and landscape architecture; sketches and finished examples of decorative painting; sketches, models and finished examples of decorative and monumental sculpture; drawings and models of works in the decorative arts, and pnotographs of executed work in any of the above branches.

The New York Chapter of the American Institute of Architects has established a medal of honor for award to designers of buildings represented in the annual exhibition of the Architectural League. It has also established a medal of honor for award to mural painters represented in the annual exhibition, and a medal of honor for award to sculptors.

There will be the usual Henry O. Avery prize of $50 for sculpture and a Special Prize of $300 for the best design submitted by an architect, sculptor and mural painter in collaboration. The subject will be a decorative garden feature terminating a vista formed by a grass alley flanked by hedges 8 ft. high and 10 ft. apart extending through the center of a small garden which is surrounded by a wall 10 ft. high.

Materials for Boston Schoolhouses

The Schoolhouse Commission of Boston, Mass., has recently introduced into its specifications a requirement that all steel and iron work, and all stone and mill work, for schoolhouses, must be fabricated and worked in shops within 10 miles of Boston. The commission states that it will rigidly enforce this requirement, and they indicate that the object of the commission is to enable the commission to have frequent shop inspection of all material entering into the construction of schoolhouses in the city of Boston.

An Attractive Bungalow Costing $4000

A Suburban Home Having Three Bedrooms and Unusually Spacious Living Room—Treatment of Roof a Feature

MANY building contractors throughout the country are finding it profitable to erect different types of residences where the cost of construction comes within the means of the man with a modest income. This is especially true where some of the larger cities are making gigantic strides in the development of their outlying districts. In and about the city of Chicago are many contractors who prepare their own plans, and these architect-builders have the faculty of designing structures with harmonious exteriors and charming interiors that are typical examples of the work executed by the more progressive members of the profession. The attractive bungalow illustrated and described in the present article is one of many comfortable houses erected by W. D. Shoupe in Chicago Lawn, Ill., one of the many growing suburbs of which the city of Chicago can boast.

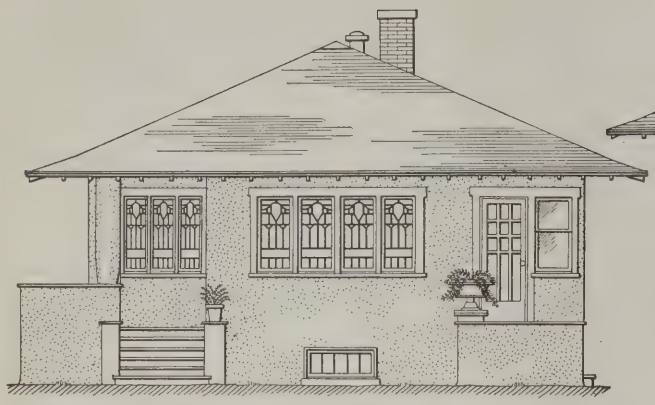
From a careful study of the floor plans the interested reader will perceive that the sizes of the rooms have been worked out with a view to dividing the available space proportionately to the uses to which the several rooms are devoted. In the exterior treatment a most noticeable aspect is the long sweeping roof of dark brown which forms a pleasing contrast with the white stucco. The painted surfaces are also of dark brown which tend to enhance the general effect.

An Attractive Bungalow Costing $4,000—Designed and Erected by W. D. Shoupe at Chicago Lawn, Ill.

The pictures of the exterior show the bungalow to be erected on a corner lot. The building has an eastern frontage, and on this side are two porch entrances, one on the northeast corner leading to the dining room and that at the southeast corner giving access to the living room. At the northwest corner is another porch from which one enters the kitchen. It will be seen that the entire space between the porches on the eastern frontage is occupied by the living room with its open fireplace and mantel, a view of which is afforded by the picture which shows the dining room beyond. On the outside a built-in flower box of concrete directly beneath the living room windows adds to the general effect.

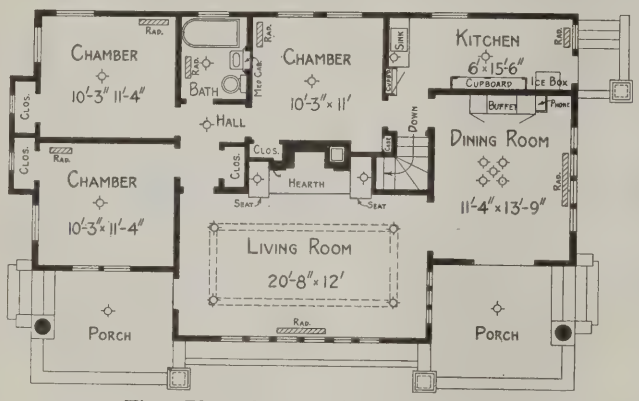
The building has foundations of concrete, composed of a mixture of one part Portland cement, three parts sharp torpedo sand and five parts crushed stone, well mixed and applied. The footings measure 20 in. in width and 8 in. thick, the walls being 10 in. wide and 4 ft. high. The cellar floor is also of a concrete mixture of the proportions mentioned.

The general effects in the living room are greatly enhanced by the fireplace and hearth built of rough Roman brick with raked joint, and the same kind

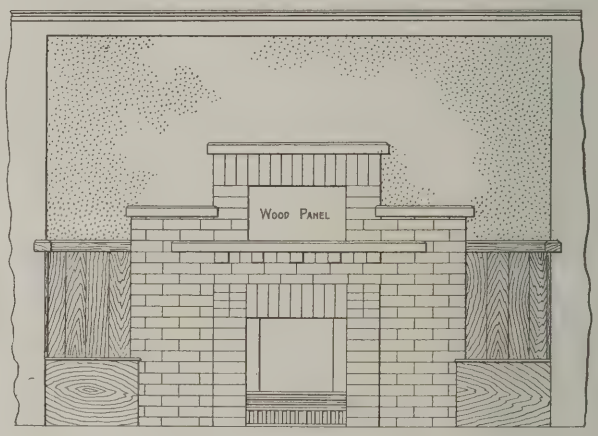


North End Elevation—Scale 3/32 In. to the Foot

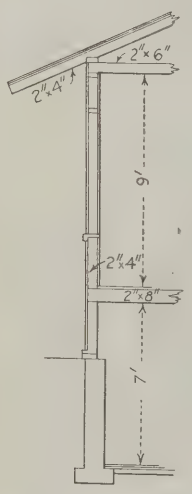
South End Elevation—Scale 3/32 In. to the Foot



Floor Plan—Scale 1/16 In. to the Foot

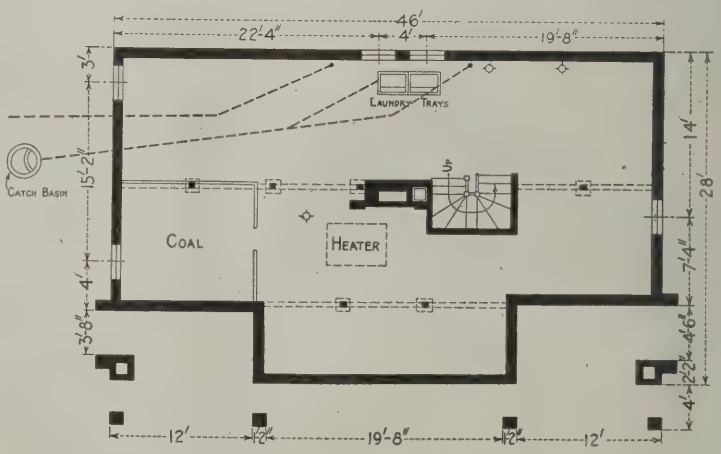


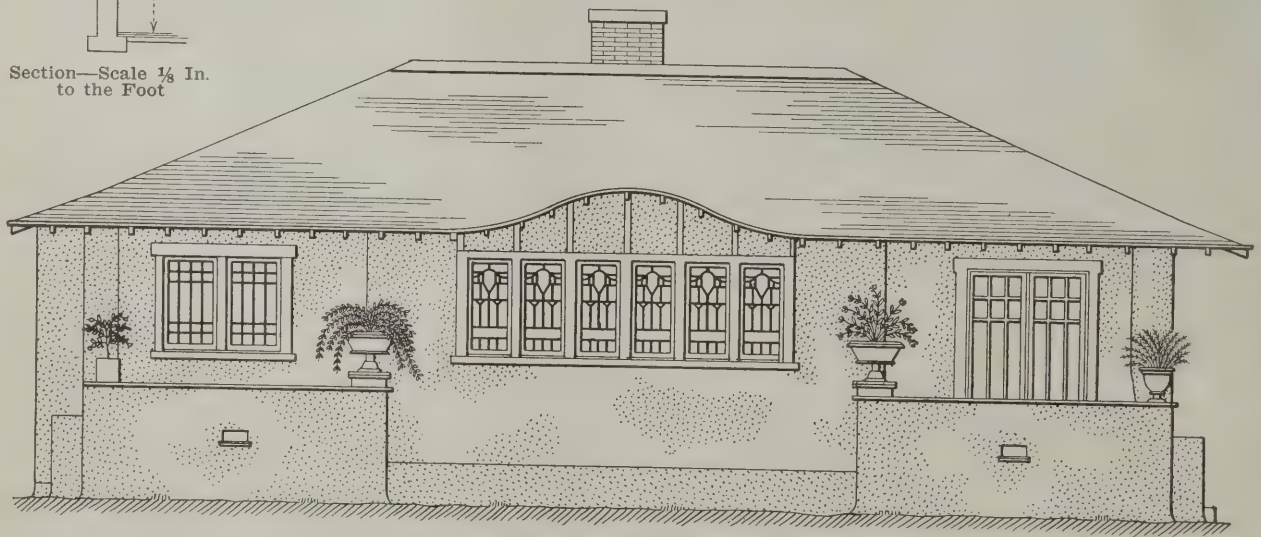
Detail of Fireplace and Mantel in Living Room



Section—Scale ⅛ In. to the Foot

At the Right Is the Foundation Plan Showing Position of Stairs, Laundry Tubs, Heater, Etc.—Scale 1/16 In. to the Foot





The Front or East Elevation—Scale ⅛ In. to the Foot

An Attractive Bungalow Costing $4,000*—Plans, Elevations and Miscellaneous Details*

of brick is used in the construction of the chimney.

The trim throughout is of oak. The doors inside and out are 1¾ in. thick, waxed and polished. Windows are 1⅜ in. thick, of white pine.

The east side of the living room has six large windows which are shaded by the swell on the roof at that side. This graceful effect has been carried out on all of the leaded work on most of the interior and exterior windows and doors and also on the windows of the china cabinet in the dining room.

The columns at the northeast and southeast corners of the bungalow are not solid wooden columns as might be supposed from the pictures. On the contrary in the center of each is a post which supports the main corners of the roof. Around china closets. The lighting arrangement is of the direct and semi-indirect types.

The door shown at the rear left-hand corner of the dining room picture leads to the kitchen. The space in this room is ample, and the conveniences include a large cupboard and dish cabinet. At the right of this, near the window, is an enameled iron sink. Directly outside the entrance to the kitchen is a stairway to the basement.

There are three well-lighted bedrooms with spacious closets and very conveniently located as to the bathroom, which is on the west side of the house. It is fitted with standard fixtures made by the Republic Manufacturing Co., of Chicago. The bathroom equipment also includes a built-in medicine cabinet. The floor is of octagonal tile, with

An Attractive Bungalow Costing $4,000—*A Detail of the Entrance to the Living Room*

this were built 1 x 2 in. furring strips wrapped with metal; then plastered and stuccoed.

The house is 48 ft. long and 32 ft. wide, and from the floor plan it will be noticed that the arrangement provides for excellent natural lighting facilities throughout the building, as may be seen from the plan. On either side of the hearth seats have been provided, with electric lights directly above. Additional electric lighting facilities are installed at each corner of the ceiling beam. On each porch there is a light above the door.

Beyond the living room is the dining room, on the west side of which are two china closets as shown in the picture with several drawers between to take care of cutlery and napery. To the right of the china closet a telephone shelf has been conveniently placed. The plate rail is seen above the the walls finished in white, in imitation of tile. The doors of the bedrooms are enameled white in cases where they are made to harmonize with the interior decoration.

In the small hall off the bathroom is a large linen closet.

The girders are 6 x 8 in., rafters and wall plates 2 x 4 in., floor joists 2 x 8 in., and inside studs 2 x 4 in., placed 16 in. on centers. The exterior framing of hemlock is covered with 8-in. sheathing boards, over which is placed a layer of Slater's building felt. This in turn carries the outside coating of stucco made with "Medusa" waterproofed white cement, manufactured by the Sandusky Portland Cement Co., Sandusky, Ohio.

The roof is finished with "Style D" strip shingles a product of the Vulcanite Roofing Co., Chi-

cago, Ill. This roofing is laid in strips and secured with standard roofing nails. An idea of the decorative effect may be gained from the exterior view on the first page of this article. It is supplied in rolls 12¾ in. wide containing one strip, four rolls being used to the square.

The house is heated by hot water, the radiators being distributed as shown on the floor plan. The boiler is type "422 W" manufactured by the American Radiator Co., of Chicago. Two 2½-in. mains are carried off and proper connections made to the risers. Provision for the hot water supply to the faucets is made by a connection to the boiler. A 30-gal. hot water tank is provided in this instance.

In the basement is a two-piece granitoid laundry tray made by Charles Wesely, Jr., of Chicago, Ill.

All plumbing fixtures have been installed on the west side of the building to facilitate connections with the waste and supply lines.

The concrete cap given the chimney is of the same proportions as used for the foundation work. The pictures of the exterior show that the porches have been given a pitch for drainage purposes.

The bungalow here described was erected for about $4,000. The plans were prepared and the work supervised by W. D. Shoupe, of Chicago Lawn, Ill.

The Quantity System of Estimating

The following editorial on the above subject appearing in a recent issue of the *Brickbuilder* cannot fail to impress every member of the profession with the necessity of some modification of the present method of estimating the cost of buildings:

"A few months ago we brought to the attention of our readers the general dissatisfaction which is felt with present methods of estimating and their resultant effect on competitive bidding, calling attention at the same time to the efforts which are being made to establish an American System of Quantity Surveying, which it is claimed will be effective in bringing about better conditions of estimating, equally beneficial to owner and contractor. We published in recent issues expressions of opinion from chapters of the American Institute of Architects and from individual architects, which came to us as a result of our presentation of this subject. Their letters indicated that they recognized the need for improved methods in estimating, and that they were agreeable to welcome and further any sincere efforts which were made to attain this end.

"The advocates of the Quantity System are constantly enlarging their sphere of influence, and as the advantages to both owner and contractor become more apparent they are arousing the interest and securing the support of the architectural profession. This is, however, as it should be, for architects should be eager to support and adopt any measure which will effect a clear and just understanding between owner and contractor. In the architect's professional employment he assumes the unique and exceptional legal combination of an agent for the owner and at the same time arbitrator between the owner and the contractor. Such an exceptional duty makes the offices of an architect particularly difficult, and it is evident that anything which can be construed to lessen the difficulties which may arise in the fulfilment of his duties should be warmly welcomed by him. It is easily acknowledged that the chief disputes which arise between owner and contractor, and which require arbitration on the part of the architect, are due to misinterpretation of what the contract calls for, and in the settlement of charges incurred by extra work which are due in some cases to omissions in specifications and other causes directly chargeable to the architect, and in others of equal frequency, to express desires on the part of the client to include other items than those in the original contract.

Reasons for Misunderstandings

"The first reason for such misunderstandings, however, the Quantity System of Estimating as proposed would remove, for before completing the bill of quantities all omissions and other defects would be determined and cleared up, with the result that the documents when they reach the contractor will be as complete and accurate as it is possible to make them.

"It is not so with plans and specifications, which may be, and often are, contradictory and capable of two or more interpretations. In such cases the bidder has forced upon him a condition which causes and encourages guess work methods, as to what another person has in his mind, as to what he really means by certain lines and words, and occasions often arise when it is difficult, if not impossible, to determine what the true intention is until perhaps after the estimate has been submitted.

"The bill of quantities carefully prepared will entirely remove this dangerous element of chance. It should be furnished to each bidder and contain everything which is essential for the contractor to have when making up his figures. It should be prepared by efficient men whose competency and integrity have been assured, and should further be guaranteed by them and made the basis of the contract equally with the drawings and specifications."

Value of Sawdust

A recent investigation by the New York State College of Forestry in co-operation with the United States Forest Service of the wood-using industries of the state has disclosed the fact that enormous quantities of larger sizes of lumber are now being manufactured into small articles, when they might profitably be made from slabs and other material formerly wasted. Wood is becoming of such value and the forests are being so rapidly depleted that new uses must be found for these materials. For instance sawdust is now becoming of sufficient value to ship it to points where it can be used for ice packing, stable bedding, stuffing for upholstery, packing glassware and for the shipment of metals, crockery, etc. In Europe sawdust is compressed into briquettes and sold for fuel, and a few plants have already been organized in this country for utilizing sawdust in this way.

A factory and office building to cost $150,000 and cover an area 120 x 400 ft. is going up in Manchester, a suburb of Calgary, Alberta.

A View in the Living Room, Showing Open Fireplace and Mantel

An Attractive Bungalow Costing $4,000—*The Dining Room Looking Toward the China Closets*

Does "Millwork" Include Glass?

An Important Legal Decision Which Is of Special Interest and Value to Builders and Millmen

By A. L. H. Street

IN a decision just handed down by the Minnesota Supreme Court it is held that a contract to furnish the "millwork" for a building, as applied to window sash, includes ordinary window glass properly set, but that the question whether it includes art or cathedral glass called for by the main building contract under which the millwork subcontract is entered into may be influenced by the interpretation placed upon the subcontract by experienced builders and millwork men. The decision does answer this question, being merely to the effect that in this case it was improper for the trial judge to base a decision solely upon the subcontract and without regard to expert testimony. But the Supreme Court does inferentially say that when a contract to furnish millwork for a church building is silent as to whether art or cathedral glass is covered by it, the matter will be controlled by trade custom prevailing in the locality.

Nature of the Agreement

Defendant, having been awarded the contract to erect a church under plans and specifications which required certain windows to be set with cathedral glass, entered into an agreement with plaintiff whereby plaintiff undertook to furnish all the millwork for the building at a fixed price. Plaintiff, having failed to include this glass in his work, defendant claimed a deduction from the agreed price to cover the value of the glass, and litigation on this point followed. The trial judge decided, as a matter of law based solely upon an interpretation of the agreement, that plaintiff was bound to furnish the cathedral glass as part of the "millwork," but the Supreme Court reversed this decision on the ground that the question should have been determined with reference to testimony given by experienced builders and millwork men, although this testimony was conflicting. It was virtually conceded that, as applied to window sash, "millwork" includes ordinary glass properly set, but the witnesses were not agreed as to whether it includes cathedral glass. The Supreme Court says:

What the Supreme Court Said

"We are of the opinion, and so hold, that the question whether cathedral glass was included within plaintiff's contract, furnish the millwork of the building, should not on this record have been disposed of as a matter of law from a construction of the contract alone. If the case had been submitted upon the written contract, together with the building plans and specifications, no doubt the question would have resolved itself into one of construction for the court. And though if it be conceded that the contract, as found in written specifications, is not ambiguous, and therefore not open to oral explanation, a concession not entirely free from doubt, we are quite clear that the evidence above referred to, showing a diversity of opinion among the builders and millworkers upon the question, all of which was offered and received without objection, made the rights and obligations of the parties thereunder sufficiently uncertain as to require a consideration of the evidence and a finding upon the issue, one way or the other, as one of fact or mixed law and fact."

Accordingly the case was sent back to the trial court with instructions to the judge thereof to make a new finding, after considering the expert testimony referred to.

Novel Concrete Construction

Built in the manner of a frame house but with all the parts of concrete instead of wood, a Los Angeles structure is unique in construction. All the material is poured in forms "at the job" so that none of the thin clapboards, two by fours or other parts will be injured in handling. The boards are reinforced with wire netting and are about as thick as the ordinary lumber used in building. While the concrete is soft, they are pierced at the proper points to admit the nails that attach them to the frame. The 2 x 4's are reinforced with steel rods, as are the stair frames and other concrete timbers. The method of attaching the boards to the frame is original; to the outside of each 2 x 4 is wired a strip of wood just heavy enonugh to receive the nails. The concrete foundation is poured in ordinary forms as for any frame structure.

The advantage of this form of concrete building is economy of material, as far less cement is required than to build solid concrete walls. The air space between the outer wall and the plaster within is another decided advantage, making for even temperature. Ease of setting up is claimed for this style of building, for apparently there is nothing to it that the average carpenter could not handle. Of course, the "forms" are designed to be used repeatedly and are bolted together and taken apart without difficulty.

The Portland *Journal* is authority for the statement that the city of Portland, Ore., will demonstrate the merits of the quantity system of estimating in connection with the new city barns to be built at 16th and Jefferson streets and estimated to cost in the neighborhood of $50,000.

Construction of a Platform Stairway

An Expert Tells How to Frame the Horses and Erect the Stairway—Diagrams Illustrating the Work

A SHORT time ago we received an inquiry from a correspondent in Chester, Pa., signing himself "Apprentice" and asking how to frame the horses, erect and complete the platform stairway indicated in Fig. 1 of the accompanying sketches. The stairway was intended to have a closed stringer.

This problem was submitted to Morris Williams, the well-known stairbuilding expert, who furnishes the following in reply:

The plan presented by the correspondent calls for two steps starting to a platform and from the platform a flight of eleven steps to the second floor landing. The front elevation of the main flight is given in Fig. 2 of the sketches, while in Fig. 3 is an elevation of the platform flight. From these may be ascertained the length of all the newels.

The hight from the nosing to the top of the rail as shown in the sketches is 2 ft. 6 in. and the customary hight for the landing rail is 3 ft. from the floor to the top of the rail.

The landing newel on the second floor is shown in Fig. 1 wide enough to receive both the flight and landing rails, but it would look much better if made single and have the landing rail mitered as indicated at A of Fig. 1.

A better arrangement for the first two steps would be to have an open stringer instead of a closed one. A closed stringer for steps without a rail protection, as in this case, is dangerous, owing to the projection of the stringer above the steps.

The first and most important item in the construction of stairways is the correct manipulation of the allotted run and hight to secure the most serviceable step—one so proportioned that it will reduce the strain incurred in stepping from one floor to the other. A standard rule of proportion for a serviceable step is to take the width of an assumed tread from the number 24 and divide the remainder by 2 for the width of the riser.

For example, assuming a tread of 10 in. width, deducted from 24 leaves 14 as the remainder, then

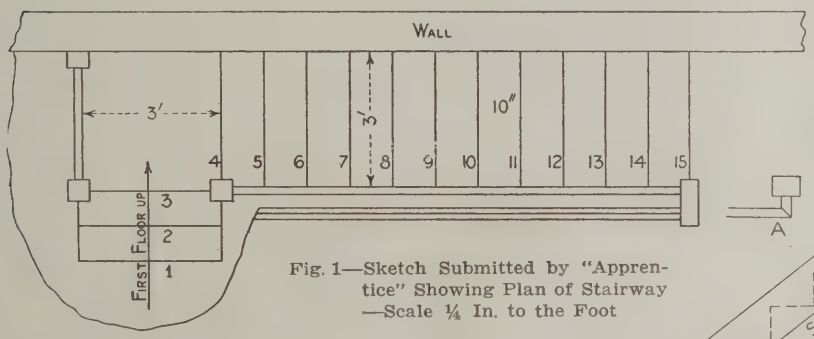


Fig. 1—Sketch Submitted by "Apprentice" Showing Plan of Stairway —Scale ¼ In. to the Foot

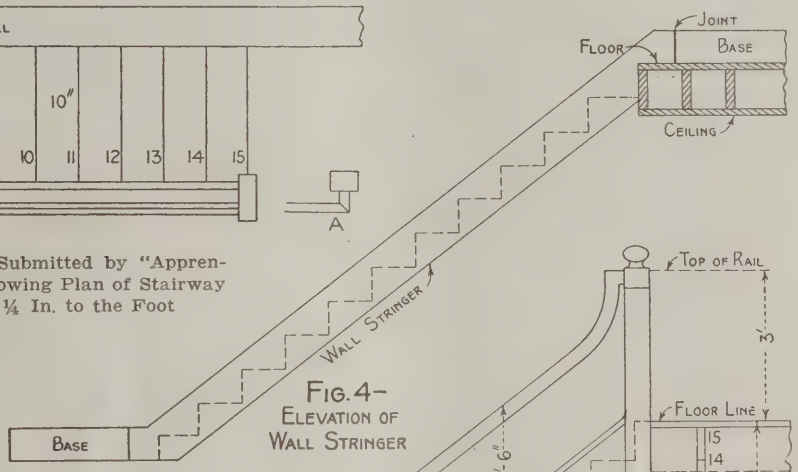


FIG. 4—ELEVATION OF WALL STRINGER

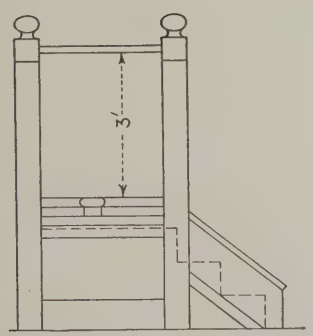


Fig. 3—Elevation of the Platform Flight

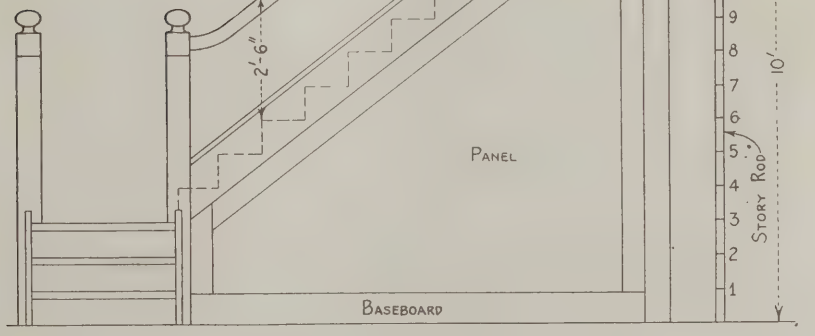


Fig. 2—Elevation of Main Flight of Stairs

Construction of a Platform Stairway—Sketches Submitted by Morris Williams

14 divided by 2 gives 7, indicating that this number is the most suitable width of riser for a 10-in. tread.

The rule also works in finding the right width of a tread for an assumed width of riser, as, for example, assume the riser to be 7 in.; this multiplied by 2 gives 14, and taking 14 from 24 leaves 10 as the width of the tread.

It appears from the plan, Fig. 1, that "Apprentice" has overlooked this important matter, for it shows only 15 risers. Assuming the hight from floor to floor as shown in Fig. 2 to be 10 ft.—the usual hight—the width of the risers as there shown will have to be 8 in. instead of 7 in. as required for a 10-in. tread. His plan, in order to be correct, calls for 17 risers; then a tread of 10 in. and a riser of 7 in. would be obtained.

In Fig. 4 of the sketches is shown the wall stringer and the manner in which it is cut at the top and bottom so as to butt with connecting baseboards.

Fig. 5 illustrates a portion of the stringer and indicates the method of laying out the grooves for the steps. The template shown at the extreme left of the sketch is what is known as a "pitch board," representing the size of the step. One side is made up of the tread width;

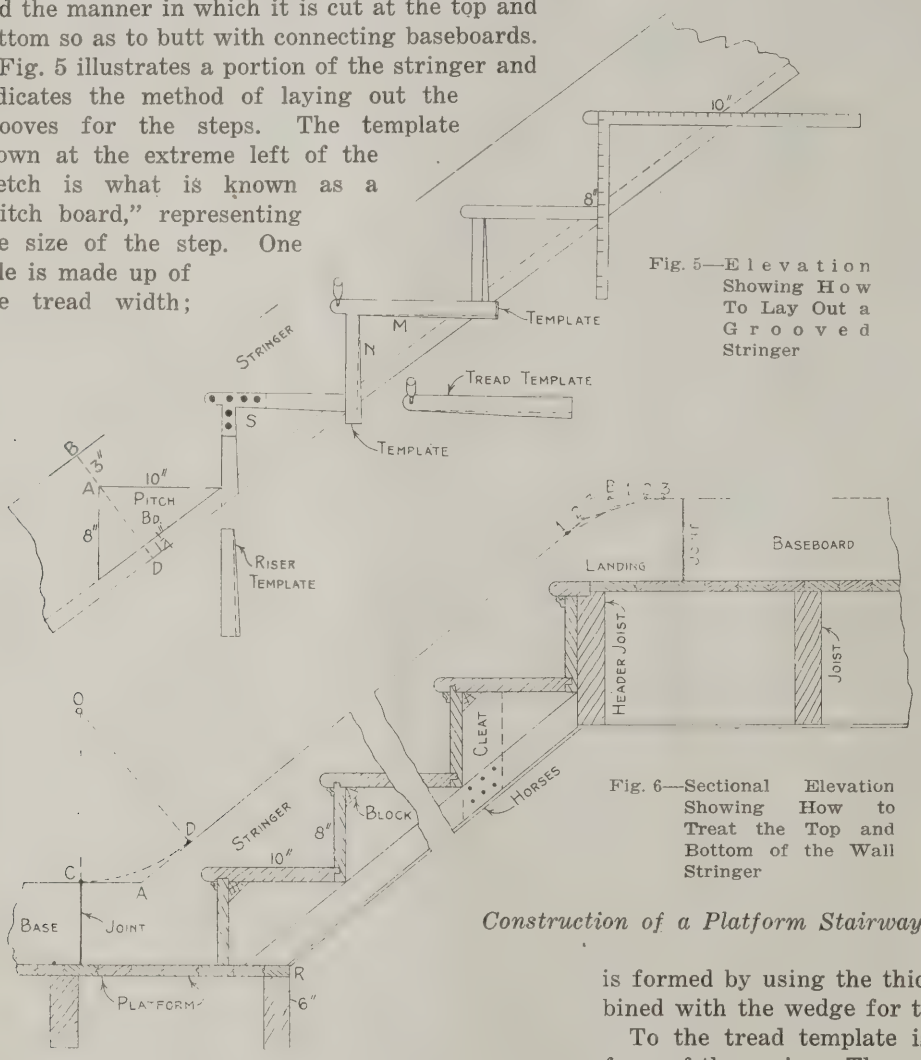


Fig. 5—Elevation Showing How To Lay Out a Grooved Stringer

Fig. 6—Sectional Elevation Showing How to Treat the Top and Bottom of the Wall Stringer

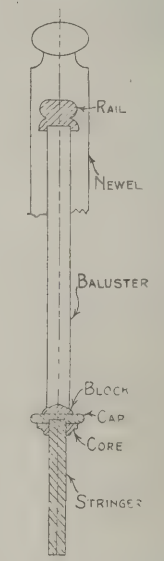


Fig. 9—Vertical Cross - Section Through Baluster, rail, stringer and Newel Post

Construction of a Platform Stairway—By Morris Williams

and the other side is made up of the riser width.

To find the exact width of board required for the stringer draw a perpendicular line to the long edge of the pitch board through the corner *A* and from *A* measure 3 in. to *B*, then measure 1¼ in. from the pitch board to *D*. The distance from *D* to *B* measures the width of the board required for the stringer—in this instance exactly 11 in.

To lay out the steps upon the stringer place the pitch board as shown upon the dotted line, using a brad awl, knife or a fine pencil to mark along the riser and tread edges, moving the pitch board along until all the required steps are laid out. Then it will appear as shown upon the stringers in Figs. 2 and 4. The marking off of the steps is sometimes done by the use of the steel square as shown at the top step in Fig. 5. The square is placed as indicated upon the dotted line with the 8-in. mark on the tongue for the riser and the 10-in. mark on the blade for the tread, moving it along to complete the marking in the same manner that the square is used in laying out a roof rafter.

After marking all the steps the next operation is to mark the grooves for the treads and risers. For this purpose two templates are prepared—one for the riser and the other for the tread. The templates are shown below the stringer in Fig. 5.

The width of the template for the riser is made up of the thickness of the riser and the form of the wedge combined, as indicated by the dotted line upon the template; similarly the one for the tread is formed by using the thickness of the tread combined with the wedge for the purpose.

To the tread template is added the length and form of the nosing. The rule pertaining to the projection of the nosing beyond the face of the riser is to make it equal to the thickness of the tread.

The method of using these templates is indicated at *M* and *N* in Fig. 5, the one for the tread being first placed as at *M* and the one for the riser is pushed against it. The outside of each follows the marks already made with the pitch board.

After marking the grooves for all the steps, clean them out by boring a few brace bit holes as indicated at *S* of Fig. 5. Clean out this portion with a chisel to the depth of ½ an inch. A saw may now be used to follow the marks, and the grooves may be completed with a router plane. There is a special stairbuilder's saw for these grooves, but

they can be worked with a tenon saw or a Huther dado head on an ordinary saw table.

The top and bottom portion of the stringer is illustrated in Fig. 6 for the purpose of showing a few of the other constructive details that it is well to know. At *B* upon the top portion is indicated a very simple method of forming an easement. Make 1-2-3 and 3-2-1 equal. Then connect 1-1, 2-2 and 3-3 as shown; the intersections of the lines will form the easement.

Another method is indicated at *A* of the same sketch. Make *A-C* and *A-D* equal in length. From *D* draw a line square to the pitch, and from *C* a perpendicular line intersecting the other at *O*. Then *O* is the center from which to strike the arc *C-D* forming the easement.

The cross-sections of the steps in Fig. 6 illustrate the usual method of binding the treads and risers together. Sometimes the method shown at the bottom riser is adopted, and for a cheap job the groove and tongue are omitted altogether.

Under the steps in Fig. 6 are shown carriage timbers usually called horses. They are mostly used under stairways in public buildings, and where great additional strength of support is required and are cut from 3 in. or 4 in. plank; in the same manner as an open stringer is cut. When cut in this way the treads and risers are nailed to them and the stringer is scribed to fit the treads and risers. The one shown in Fig. 6 is made out of a 3 x 4 scantling, is fixed in place as shown against the header joist at the top and resting upon the platform at the bottom. These kind support the stairs by being placed tight against the under side corner of each step. Sometimes a cleat as shown under the top step is nailed upon the horse timber and fixed tight against the tread and riser. The cleats are made of 1-in. boards.

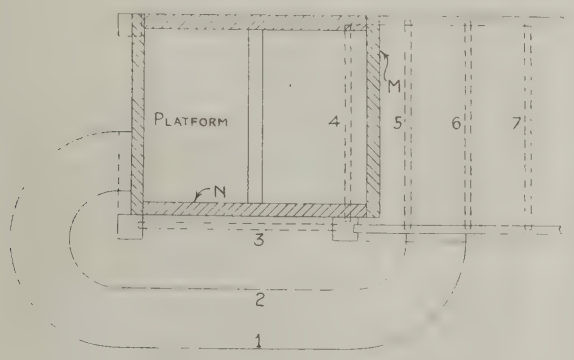


Fig. 7—Plan Showing How to Frame the Platform—Scale ⅜ In. to the Foot

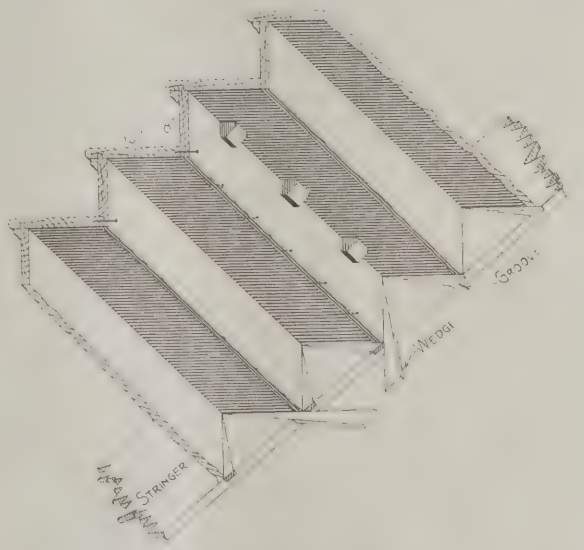


Fig. 8—Perspective View Showing Under Side of the Steps and Wall Stringer

Construction of a Platform Stairway—By Morris Williams

In Fig. 7 is clearly shown how to frame the platform. The dotted lines at 3 and 4 represent the platform risers and the enclosed space between them is the size of the platform as marked on the plan in Fig. 1. The framing is shown shaded and the side *N* is placed to align with the newel so that the newel when put up may be nailed against it. The side *M* is shown extending about 6 in. beyond the face of the platform riser 4; the object being to have a support for the horses under the main flight as indicated at *R* in Fig. 6.

The two round steps in Fig. 7 are presented as an improvement upon the plan furnished by "Apprentice" and shown in Fig. 1.

The newels in Fig. 7 are shown to be grooved about an inch deep to support stringer and risers.

An underside view of several steps fixed and wedged into the stringer is given in Fig. 8, where also are shown the risers nailed to the treads, together with a few blocks fitted and glued to the angle formed between the under side of the tread and the back of the riser. These blocks are also shown in Fig. 6.

A cross-section of the stringer, baluster, rail and newel is presented in Fig. 9 for the purpose of emphasizing the importance in the layout of having the same center for the different members; that is, that the center of the stringer, baluster, rail and newel align as shown by dotted line in this sketch.

Corrosion Tests of Plastered Metal Lath, Etc.

In the second part of the *Journal* of the American Concrete Institute, just issued and which covers the proceedings of the organization, there is a paper on "Some Comparative Corrosion Tests of Plastered Metal Lath" by J. G. Pearson of the Bureau of Standards, giving details of tests and observations on the weathering effect on mortar panels of various proportions and ingredients; also a report of the testing of a reinforced concrete flat slab floor by W. A. Slater showing a comparison between actual and design stresses. In addition is a "Report of the Committee on Specifications and Methods of Tests for Concrete Materials" giving results of experiments conducted under the supervision of the committee to determine the best form of concrete compression test piece and tests to obtain data to form a basis for standard specifications for sand, stone, etc.

Meeting of Secretaries of Builders' Exchanges

The third annual conference of Secretaries of the various Builders' Exchanges of the country will be held in the city of Dayton, Ohio, at the Hotel Algonquin on January 22, 1915.

Features of the Panama Exposition

Brief Reference to Some of the Lighting Facilities with Pictures of Two Important Pieces of Construction Work

DURING the past year we have from time to time made reference to the progress of the construction work on the site of the Panama-Pacific International Exposition which will open to the public on February 20, and have presented pictures of the more important buildings, thus affording interested readers an opportunity of forming some slight idea at least of the magnitude and beauty of the work which has been done. At this time we give a few additional features which may not be without interest as supplemental to what has gone before.

In the illustration occupying the center of this page we show one of the light standards on the parapet of the exposition along San Francisco harbor. The lighting of the exposition will be one of its most attractive features. There will be no bright or brilliant lights but a soft radiant glow which will disclose the exposition in all its details at night with the same clearness that it will be seen by day.

One of the Light Standards on the Parapet of the Panama-Pacific International Exposition Along San Francisco Harbor

The upper picture on the facing page is a view of the Palace of Varied Industries as it appeared completed on November 10, 1914, the picture having been taken from the South Gardens. This Palace is one of eight exhibit buildings forming a rectangle of which four face San Francisco harbor and four face the South Gardens nearest the encircling harbor of San Francisco. The outside walls of these buildings present an almost continuous façade, and this group is often called "A Walled City."

The central entrance here shown is patterned after the famous portal in a Santa Cruz Monastery at Toledo, Spain, and is reproduced at an erpenditure of $15,000. The only departure in the reproduction of the original was that the figures symbolizing the varied industries were substituted for the more canonical figures. The hight of the dome here shown is 160 ft. and its diameter is 100 ft.

The lower picture on the facing page is the forecourt or entrance to the Court of the Four Seasons upon the Marina on San Francisco harbor. This court is the most western of the three central courts that divide the main group of exhibit palaces from North to South. It was designed by Henry Bacon of Boston, Mass., who was the creator of the Lincoln Memorial at Washington. The subject matter of this Western court symbolizes and depicts the beneficence which nature has conferred upon the hardy pioneer who has pushed to the West. In the center of the forecourt is seen the Fountain of Ceres, by Miss Evelyn Beatrice Longman, the New York sculptress.

Luminous lighting standards which will cast light upon the walls and façades of the court may also be seen at the right and left. At night every detail of the sculpture and the columns will stand out as clearly as by day. The lights themselves will not be directly visible and they will not glare upon the eyes of the spectator.

In connection with the new group of buildings being erected along the banks of the Charles River at Cambridge for the Massachusetts Institute of Technology it is stated that nearly 1000 carloads of cut stone will be required.

The Palace of Varied Industries as it Appeared Completed on November 10, 1914 —*The View Was Taken From the South Gardens of the Exposition*

The Entrance Way to the Court of the Four Seasons Upon the Marina on San Francisco Harbor at the Panama-Pacific International Exposition

Cleveland's Building Situation

What Pres. G. A. Rutherford Had to Say at the Annual Meeting of The Builders' Exchange

AFTER briefly referring to the work of the organization as outlined in the report of the Board of Directors, President G. A. Rutherford of the Cleveland Builders' Exchange, at its annual meeting in November, spoke as follows of the relationship existing between architects and builders:

Considerable progress has been made during the past year in arriving at an understanding with the architects relative to matters which have long been causes of dispute and misunderstanding. About two years ago a joint committee with the Cleveland Chapter American Institute of Architects was appointed to consider the subject of improved plans and specifications. Before this committee began its work there came a request from the City Building Department for such a committee to assist in revising the City Building Code. As this work was regarded as of the greatest importance the committee immediately entered upon it and has been steadily engaged holding weekly sessions. In the meantime a national movement for establishing uniform conditions has been in progress, working from two directions, one of which centers in Boston and the other being fostered by the National Association of Builders' Exchanges with headquarters in Baltimore. A report on this subject issued by the American Institute of Architects has been made the basis of negotiations and recently a conference of representatives of the last two named organizations was held in Philadelphia at which an agreement was reached on nearly all points of difference. The Cleveland Chapter, through the chairman of the committee on this subject, requested our exchange to review the document issued by the national body of architects, but owing to the larger attention being given it the directors decided to await the results thus to be obtained before acting independently.

Harmony Between Architects and Builders

It now seems that harmonious conclusions are about to be reached, which conclusions will be reported to the National Convention of Builders' Exchanges to be held in Columbus in January. It is vitally important that our exchange be well represented at this convention. It is planned to hold the meetings of the Ohio State Association of Builders' Exchanges in the Capital City the day preceding the opening of the national gathering so that Ohio will surely have a good voice in the proceedings.

One of the objects in view is to adopt a set of general conditions for specifications, fair alike to the owner, architect and contractor. Once these conditions are approved by the national bodies they become official and every effort will be made to put them in general use throughout the country so that in every set of specifications these main points will be the same. When once studied and understood they will be always understood, which certainly will be a blessing to the contractor and estimator. In this connection I would also like to mention a special subject which is being considered by a committee representing the exchange and the local chapter, namely the practice of charging for the use of plans and specifications in figuring work. Numerous complaints have been made on this score and it would seem that some agreement worthy of general recognition should be made.

State Building Code

It is altogether probable that an effort will be made at the next session of the legislature, to enact the proposed State Building Code, completing the legislation started two sessions ago. Heretofore, Cleveland has had the support of Cincinnati and several other cities in advocating that cities having a population of 50,000 or more and having their own building regulations should be exempt from the application of the state code. Several of these cities, however, have recently indicated a change of sentiment on this score and it may be found a difficult matter to carry out this proposition. Our argument has been that conditions in regard to building are different in different cities and that cities are certainly not amenable to the same regulations as country districts. We also have felt that our city code, under direct supervision of local bodies, will meet our requirements better than a code adopted at Columbus and enforced by state authority from there.

Outlook for the New Year

Statistics from the office of the Commissioner of Buildings go to show that the building industry of Cleveland is experiencing a successful year. The record for the first ten months exceeds that for 1913, and November thus far is ahead of the same period for last year. This encourages me to believe that people recognize the fact that this is a good time to build. Certainly there is no wisdom in postponing projects when conditions are as favorable as they are at present. Should the foreign situation clear up in the near future, there will surely be a rush in all lines of activity, and many who have hesitated will surely regret that they did not take advantage of present opportunities. Normally the months of November and December are quiet in the matter of figuring new work, and it would be strange if there were not a similar situation now. There are many close observers of conditions who believe that 1915 will find the usual prospect of a busy year. This is based upon returning confidence in general business and the demand for new structures to keep pace with the growth of the city.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

SEVERAL loads are shown in Fig. 33 on a beam resting on two supports and overhanging one of the supports.

$$R_1 = \frac{100\times18+200\times16+150\times13+300\times11+50\times8+80}{16} = 665.625 \text{ lbs.}$$

$$R_2 = 880 - 665.625 = 214.375 \text{ lbs.}$$

Fig. 34 illustrates an example given in Vol. 1 of *Building Construction*, edited by F. M. Simpson, in which the weight of the beam is considered. The total length of the beam is 28 ft. and the weight is 100 lbs. per lineal foot.

$$R_1 = \frac{23\times100+14\times1200+9\times2800-5\times500}{20} = 3125 \text{ lbs.}$$

$$R_2 = 5500 - 3125 = 1875 \text{ lbs.}$$

For all the overhanging beam cases the amount

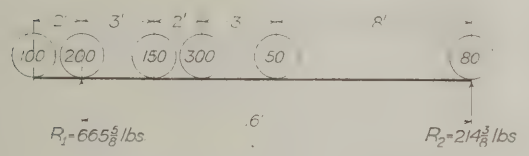


Fig. 33—Beam Carrying Several Concentrated Loads with Short Overhang at One End

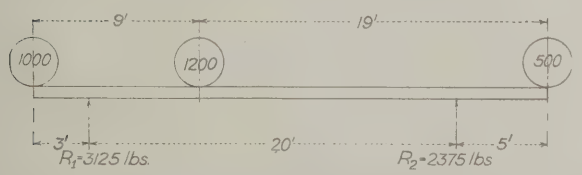


Fig. 34.—Beam Carrying Several Concentrated Loads, with Both Ends Overhanging

the beam for uniformly distributed loads covering the whole beam. This applies as well to the beam alone, for the weight of a beam is uniformly distributed.

In Fig. 35 the beam weighs 20 lbs. per lineal foot = 21 × 20 = 420 lbs. Half is carried on each support, for the overhang is equal at either end. Each support also carries the concentrated load nearest to it in this particular example.

$$R_1 = R_2 = 210 + 250 = 460 \text{ lbs.}$$

On the moment diagram the upper curved line (parabola with vertex at the support) under the overhanging end shows moment due to the cantilever end of the beam. The straight line under it shows moment due to the concentrated load on the extreme end. The lower slightly curved lines, *A-C* and *B-D*, represent the combined moments under the cantilever ends. This line at each point is the sum of the two moments so is a mean between the parabola and straight line.

The bending moment at the middle of the span

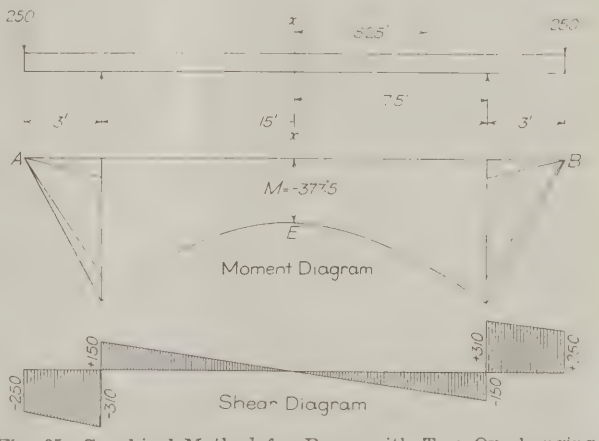


Fig. 35—Graphical Method for Beam with Two Overhanging Ends

Design of Beams, Girders and Trusses—By Ernest McCullough

and location of bending moment and shear at any point on the beam may be found by the rules previously given for cantilever beams and beams resting on two supports. Notice that the distance from either reaction to the center of gravity of the weight of the beam is equal to the distance from the other reaction to the center of gravity of the weight of between the two supports is found as follows, there being a positive and a negative moment to consider:

$$-M = 250\times10.5+(10.5\times20)\times5.25 = -3827.5 \text{ ft. lbs.}$$

$$+M = 460\times7.5 = 3450 \text{ ft. lbs.}$$

Actual

$$M = +M - M = -3827.5+3450 = -377.5 \text{ ft. lbs.}$$

This negative moment is set off at the middle of the span measuring down from the line *A-B*. The parabola *C-E-D* is drawn. The bending moment at any point is found by scaling the length

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 29 of the December issue.

intercepted between the line *A-B* and the bounding line *A-C-E-D-B* of the bending moment diagram. All lengths measured horizontally are distances and all measured vertically are forces.

When the positive moment is greater than the negative moment the point *E* is set off *above* the line *A-B*, so the parabola in such case is partly above and partly below the line. This shows both positive and negative bending moments to exist on the beam, the maximum moment being where the shear changes sign. Where the parabola crosses the horizontal line *A-B* there is no moment, this point being termed the "point of contraflexure" or "point of reverse moment."

The shear diagram requires no explanation. After drawing all the diagrams the student should check the force area on the shear diagrams right, or left, of any selected point to the reactions and show that the area of the shear diagram between such point and the reaction is equal to the moment in foot pounds on the beam at that point. From the explanations previously given it should be an easy matter to find on the beam, shown in Fig. 35, the effect of concentrated loads at various points.

Showing Other Graphical Methods

Other graphical methods will be shown in coming issues, together with methods for dealing with curved, inclined and continuous beams. The reader should now understand that moment effects are additive and the principle of the lever applies in all cases.

In the figures an arrow point indicates the center of gravity of the bearing area. The clear span is S and the length of the beam is L_1. To simplify all computations use

$$L = \frac{S + L_1}{2}$$

and instead of

$$M = \frac{w \times S \times L_1}{8}$$

use the formula

$$M = \frac{wL^2}{8}$$

the average length being used in all cases, as it is close enough for all practical purposes.

In examples involving loads concentrated at some point one side of the middle of a span the distance to the nearer support has been termed a and the distance to the farther support b. Then

$$M = \frac{Pab}{L}$$

The custom in modern text books is to use only the letter a and designate the longer distance as being the difference between the span and the distance a. Then

$$M = \frac{Pa(L - a)}{L}$$

The older method was given for the reason that it is so frequently used but the method of modern text books should be accepted by the student and used by him in his work.

Equivalent Distributed Loads

A convenient method to use in figuring bending movements, when one or more concentrated loads must be considered in addition to a uniformly distributed load, is to reduce the concentrated loads to equivalent distributed loads. That is, all loads produce a bending moment so the bending moment due to the concentratd load is first found then the uniformly distributed load which will give the same bending moment is obtained and this load used in the calculations. The sum of the bending moments is slightly in excess of the actual moment and this, of course, will call for a larger beam than would be required were the calculations made by exact methods but as commercial size beams are used the only practical effect is an increase in the factor of safety. The method is in common use and is good practice. When the concentrated loads are very large and the beam is long some slight economy may be effected by using exact methods. When a built up girder is required it is best to use the exact methods and save material.

In using the method of equivalent distributed loads the designer must remember that it applies only to bending moments. Reaction and shear must be ascertained by the exact methods. When concentrated loads affect a beam the reaction at one end may be greater than the reaction at the other end and the shear is equal to the reaction. When designing a beam to be strong in shear the maximum shear must be considered. When figuring the size of a bearing plate and the strength of a column or wall to support the reactions the exact conditions must be taken into account. Uniformly distributed loads produce equal end reactions and equal end shears. Therefore while the equivalent uniformly distributed loads give reasonably correct bending moments the shear and the reactions at the ends may be excessive at one end and deficient at the other end.

Relation Between Concentrated and Distributed Loads

Written in engineering shorthand the relations between concentrated loads and equivalent distributed loads are as follows:

$$M = \frac{Pa(L - a)}{L}; \quad W = \frac{8M}{L}$$

$$m = \frac{W}{P}; \quad x = \frac{L}{a}$$

Example. A beam weighing 200 lb. on a span of 12 ft. carries a concentrated load of 750 lb., 3 ft. from one end. What is the equivalent distributed load? What is the bending moment?

Answer:

$$M = \frac{Pa(L - a)}{L} = \frac{750 \times 3 \times 9}{12} = 1687.5 \text{ ft.-lb.}$$

$$W = \frac{8M}{L} = \frac{8 \times 1687.5}{12} = 1125 \text{ lb.}$$

$$m = \frac{W}{P} = \frac{1125}{750} = 1.5$$

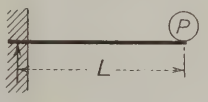
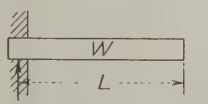
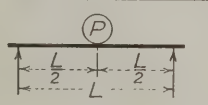
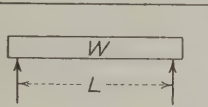
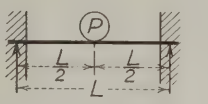
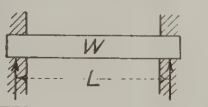
$$x = \frac{L}{a} = \frac{12}{3} = 4$$

The equivalent distributed load producing a bending moment equivalent to the bending moment produced by the concentrated load = 1125 lb. and to this must be added the weight of the beam, 200 lb. The total bending moment is

$$M = \frac{WL}{8} = \frac{1325 \times 12}{8} = 1987.5 \text{ ft.-lb.}$$

The student is advised to compute a table, following the above example, with the concentrated load assumed to be placed at various points on the beam, the table giving values of m and x, to be used in shortening labor in future work.

Such tables are in use in many offices, giving values of m and x for a dozen or more points on a beam. The following table gives these values for ten points:

Loading	Maximum Bending Moment	Relative Strength	Relative Deflection in terms of stress
	$M = PL$	$\frac{1}{8}$	3.2
	$M = \frac{WL}{2}$	$\frac{1}{4}$	2.4
	$M = \frac{PL}{4}$	$\frac{1}{2}$	0.8
	$M = \frac{WL}{8}$	1	1
	$M = \frac{PL}{8}$	1	0.4
	$M = \frac{WL}{12}$	$\frac{3}{2}$	0.2

Design of Beams, Girders and Trusses—Fig. 36—Reference Table Showing the Strength and Stiffness of Beams

When		
	$x = 2$	$m = 2$
	$x = 3$	$m = 1.78$
	$x = 4$	$m = 1.5$
	$x = 5$	$m = 1.28$
	$x = 6$	$m = 1.11$
	$x = 7$	$m = 0.98$
	$x = 8$	$m = 0.875$
	$x = 9$	$m = 0.79$
	$x = 10$	$m = 0.72$

In using the table first find the value of x by dividing the total span by the distance from the nearest support to the load. Then multiply the load by m in the table opposite the value found for x. Do this for each concentrated load in turn, add the weight of the beam and then find the bending moment for the total uniformly distributed load, not forgetting that only the exact values for reaction and shear can be used in the design of bearings and ascertaining shearing resistance of the beam.

The accompanying table of strength and stiffness of beam is valuable for daily reference in beam calculations. The subject of deflection will be taken up later. This table, Fig. 36, takes as a basis the uniformly distributed load on a beam resting freely on two supports. In the first column is shown the loading conditions. In the second column the formulas for ascertaining the bending moments. In the third column the relative loads and in the fourth column the relative deflection due to these loads. For example the cantilever beam carrying a concentrated load at one end will support only one-eighth the load the same size beam with the same span will carry when freely supported at the two ends. The deflection under this load will be 3.2 times the deflection of the freely supported beam carrying 8 times the load. The table shows also the effect of securing the ends of beams carried on two supports. The uniformly distributed load on a beam securely fastened over supports is 1.5 (3/2) times the load carried on the same beam on the same span when freely supported and the deflection is greatly lessened, being only 0.3 the deflection of the freely supported beam carrying two-thirds the load of the restrained beam. With these fundamental formulas and relations the student should be able to solve all the ordinary cases coming to him.

(To be continued.)

A Tower Apartment Hotel

A feature of the building improvements which are in progress in West 72d street, New York City—a section which a few years ago was one of the most exclusive as regards private residences in the city—is the erection of two 13-story fireproof apartment-hotels, each having a frontage of only 25 ft. and a depth of 100 ft. The buildings will be of the steel skeleton type with fireproof Hy-rib cement and steel partitions throughout and having a facade in the English Gothic style of architecture with ornamental terra cotta at the several floor levels.

According to the plans of Buchman & Fox, architects, each floor will contain four suites consisting of two rooms, foyer hall and bath. The dining room will be on the main floor with French windows opening into the yard, which will be in the design of Roman sunken gardens so that guests in hot weather may have their meals served in the dining room or in the gardens according to preference. High speed electric elevators with bronze cars of the latest type of overhead traction will be installed. These tower-like structures are being erected by Edward W. Browning, who states that his idea is to give every modern accommodation and rent the apartments at a lower price than has ever been attempted in the city for a similar class of buildings.

He has also commenced a similar structure in West 73d street and hopes to have all three ready for occupancy by the first of December.

A Country House with Clapboard Walls

A Design Where Cream and White Exterior Walls Are Relieved By Bright Red Shingles of the Roof

THE dwelling which we have taken for the subject of our colored supplemental plate this month was designed for a site having a frontage of 100 ft., and it should be so placed with its broad facade to the road as to give the impression of a larger house. The effect will be still further enhanced by setting the building back about 25 or 30 ft. from the line of the lot.

The Outside Covering

The exterior frame is covered with 1 x 9-in. hemlock sheathing boards laid diagonally, over which is placed a layer of building paper and this in turn covered with pine clapboards. The gambrel roof is covered with red cedar shingles laid 5½ in. to the weather and before laying dipped in a stain of bright red color.

All footings are of concrete 22 in. wide and 10 in. thick, the latter being the thickness also of the concrete foundation walls.

The porches are supported on 12 x 12-in. concrete piers; the concrete in all cases being mixed in the proportion of one of cement to three of sand and five of broken stone that will pass through a 2-in. ring.

The chimneys are to be started from concrete footings and constructed of brick laid up in cement mortar. All flues are to be lined with vitrified flue lining. The exterior is stucco finished.

The Framing Specifications

According to the specifications of the architect all framing timbers are of spruce, the sills to be 4 x 6 in., the girders 6 x 8 in., the floor beams 2 x 10 in. placed 16 in. on centers and stiffened with rows of 2 x 4 in. cross bridging, spaced 6 ft. apart; the rafters of the main roof are to be 2 x 8 in. placed 20 in. on centers; the ridge board 1½ x 10 in.; the corner posts 4 x 6 in., and the studding 2 x 4 in. placed 16 in. on centers. The rafters and floor beams of the porch are to be 2 x 6 in. placed 20 in. on centers.

The cellar is to extend under the rear portion of the house and contain large furnace and storerooms. The floor is to be of concrete 4 in. thick and have a cement finish.

Double flooring is to be laid on the first tier of beams, the rough flooring to be of 1 x 6 in. North Carolina pine and the finish floor in the living room, the dining room and the hall to be of ⅞ x 2½-in. maple. All other rooms on the first floor are to be finished with ⅞ x 2½-in. North Carolina pine. The second floor is to be of North Carolina pine. All floors are to be finished natural, a paste filler being used and the succeeding coats flat varnish.

The finish of the interior is of cypress except the living room, the dining room and the hall, which are to be finished in birch and stained to imitate mahogany. In all other rooms the finish is left natural so the grain of the wood can be seen, the trim being treated so as to give a flat finish.

All rooms are to be plastered two coats with a sand finish for the living room, dining room and hall. All other rooms are to have a hard finish. The bedroom walls are to be papered and the ceilings left white. In the living room, the dining room and the hall the walls will be painted with a flat waterproof paint. The walls in the bath room are to be enameled, the floor covered with white tile and finished with a sanitary base of cement.

The fireplace is to be lined with fire brick and tapestry brick is to be used for the mantels in the living and dining rooms. The hearths are to be laid with 6 x 6-in. dark red tile.

The Plumbing and Lighting

The plumbing fixtures are to be of standard make, porcelain enameled, with all fittings and exposed pipes to have nickel plated finish.

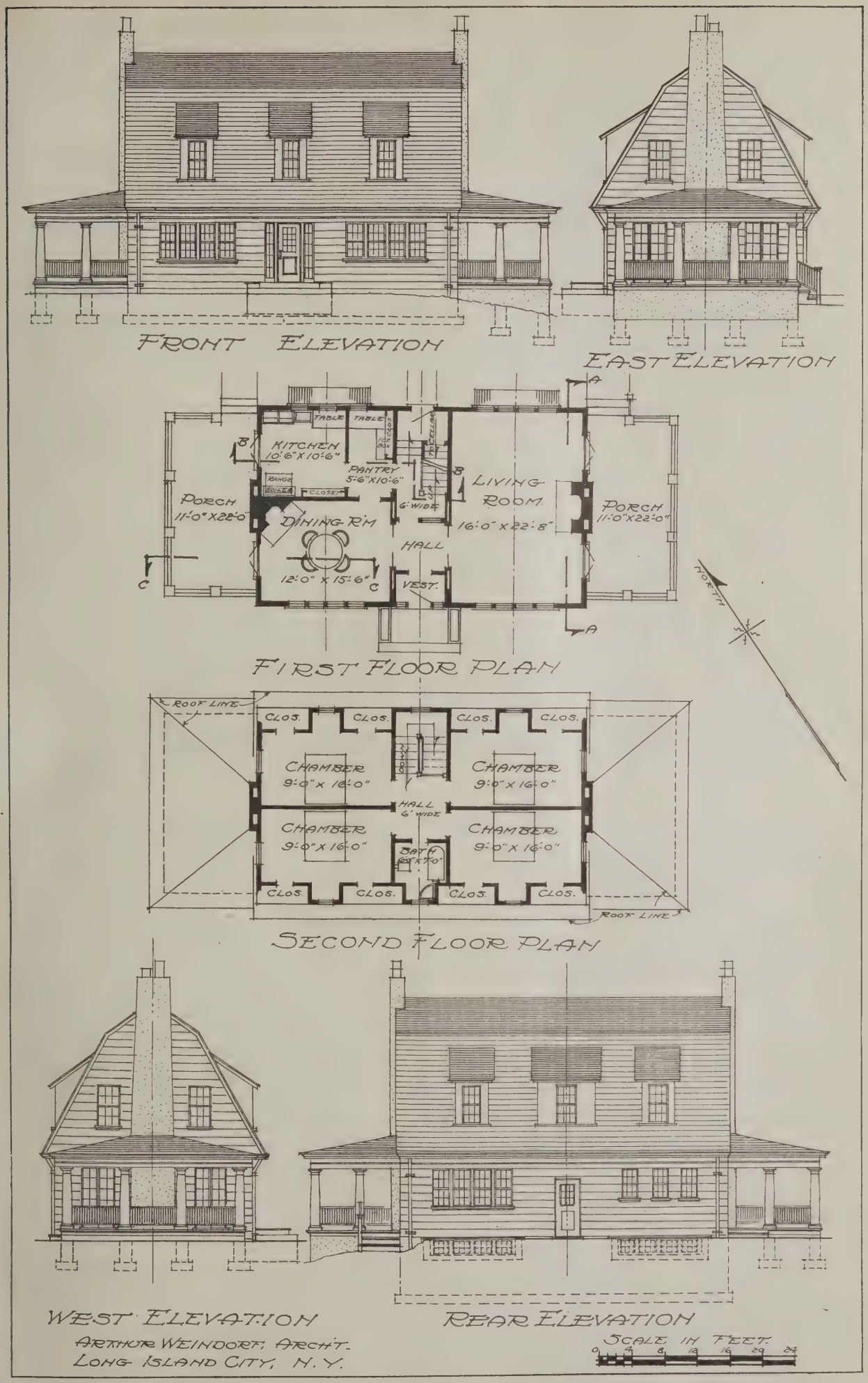
The house is piped for gas and wired for electricity. All lighting fixtures are to be of modern design and to match the hardware in finish. The living room will have two drop pendants of three lights each and two side wall outlets. The dining room will have one drop pendant and one side wall outlet. All other rooms and halls will have side wall outlets and all chambers will have additional ceiling outlets.

The hot water system should be of such size as to give a temperature of 70 deg. inside the building when the temperature registers zero outside. All rooms except the kitchen are to have radiators.

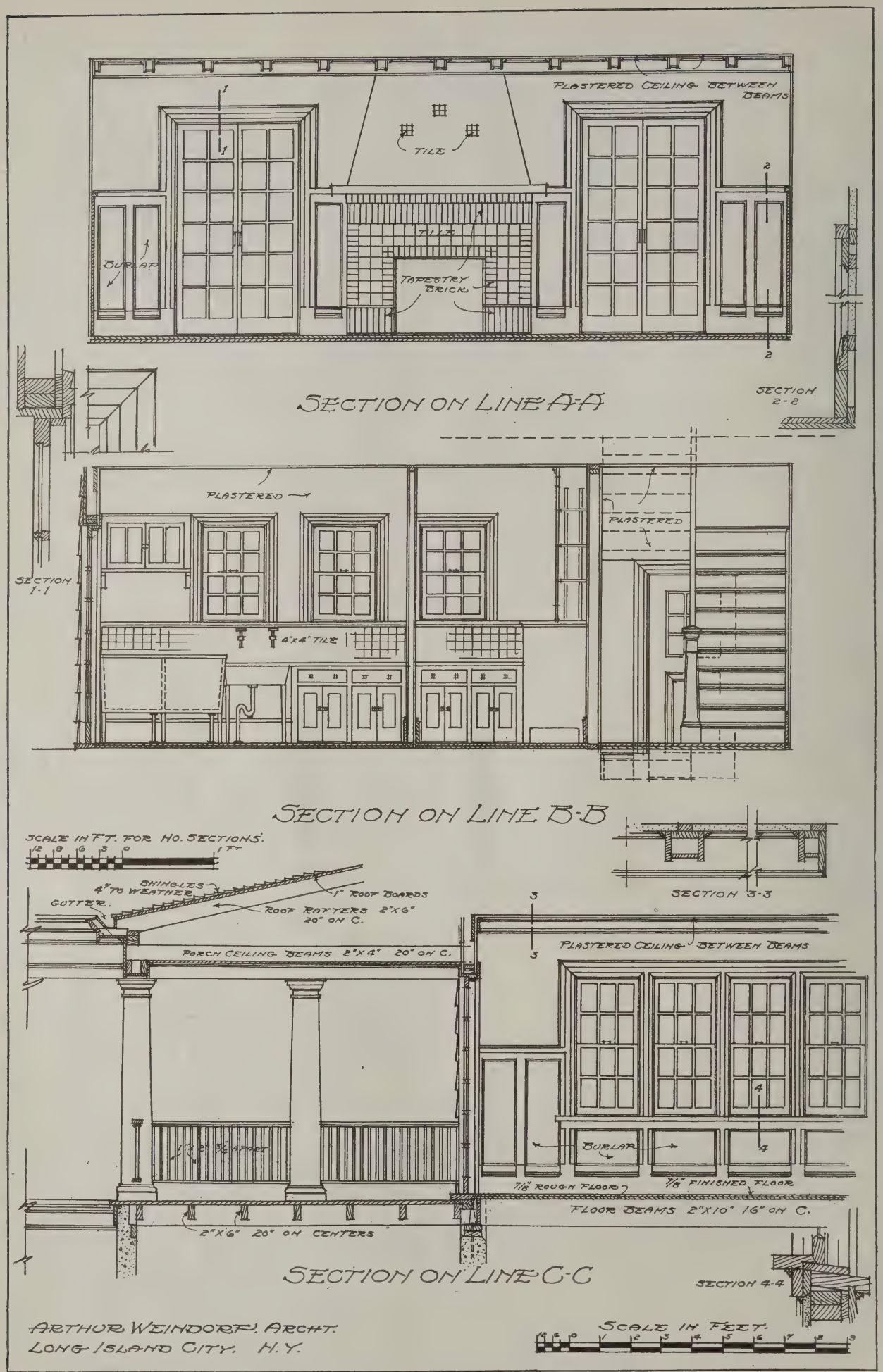
Capacity of the House

The house here shown is intended for a family of four or five people with a spare room for guest or servant. In laying out the first floor it was the aim of the architect to keep the living room separated from the dining room and kitchen, etc. This was accomplished by placing the hall between these rooms so that the utmost privacy could be attained in the dining part of the house. The stairway to the second floor chambers is conveniently placed in relation to the first floor rooms and at the same time is secluded from the living room and hall in passing from the kitchen to the second floor.

Both dining and living rooms have folding doors so that they can be closed off from the rest of the house. Both of these rooms have French casements opening on separate porches. The porch connected with the dining room can be inclosed in glass and used for dining purposes if so desired, as the food can be served directly from the kitchen. Under the staircase the entrance to the cellar has been



Plans and Elevations of House Forming Basis of Our Colored Supplemental Plate



Miscellaneous Constructive Details of House Forming Basis of Our Colored Supplemental Plate

arranged in the rear of the hall and is within easy reach from the kitchen and the outside.

The cubical contents of the house approximates 25,994 cu. ft., and figuring a price of 20 cents per cubic foot, gives an approximate cost of $5,198.80.

Estimate of Material and Labor

Classifying the various portions of the work, the estimated cost of material and labor is as follows:

Grading, excavating and masonry	$630.00
Lumber	870.00
Mill work and glass	900.00
Carpenter labor	970.00
Plastering	320.00
Tile work	60.00
Hardware	80.00
Metal work	90.00
Painting, staining and tinting	330.00
Heating	370.00
Plumbing and gas fitting	340.00
Electric wiring and bell work	70.00
Combination lighting fixtures	60.00
	$5,090.00
Allowed for extras	108.80
	$5,198.80

The above figures include the contractor's profit of 10 per cent.

The country house here shown was designed by Arthur Weindorf, architect, Long Island City, N. Y., or care of *The Building Age*, 239 West Thirty-ninth street, New York City.

Officers of American Institute of Architects

At the annual meeting of the American Institute of Architects held in Washington, D. C., early in December, the old board of officers was re-elected for the ensuing year as follows:

President.....R. Clipston Sturgis, of Boston
First Vice-President....T. R. Kimball, of Omaha
Second Vice-President.D. K. Boyd, of Philadelphia
Secretary.....Burt L. Fenner, of New York
Treasurer.....J. L. Mauran, of St. Louis

Destruction of Rheims Cathedral

In discussing the wanton destruction of the Cathedral at Rheims the London *Building News* of September 25 says: The scene of the coronations of the earlier French kings, including Charles VII in 1429, at the instance of Joan of Arc, it was also the scene of the baptism of Clovis in 496 by St. Remigius. The interior of Rheims Cathedral is 466 ft. long and 121 ft. high. There are aisles to the nave and transepts, with a triforium above. The nave is of eight bays, and there are eight chapels in the choir.

Everywhere there are statues. It is rich in exquisite 13th-century glass and tapestries dating back to the 16th century, together with other Gobelins tapestries, from designs by Raffaele, given by the French Government in 1848. Other treasures in the Treasury included several reliquaries, the chasuble of Thomas à Becket, a 12th-century chalice, called the Calice de S. Rémi, and a quantity of church plate given by Charles X at his coronation.

The great west front, with its triple portals, surmounted by the rose window, and twin towers, the southern one containing the famous bell of Rheims, which weighs 23,000 lb. The three portals were elaborately sculptured. In the "trumeau"—or stone pillar dividing the door of the central portal the Madonna had the principal place. In one of the side portals was the exquisite figure of Christ in benediction, known as Le Beau Dieu. Of this even the German art critic Lübke wrote, "Is a work of such beauty that it may be considered the most solemn plastic creation of its time. . . . There is such majesty in the mild, calm expression of the head, over which the hair falls in soft waves, that the Divine seriousness of the sublime Teacher seems glorified by truest grace."

Tall Concrete Building

There has just been completed on the water front between the terminals of the Brooklyn and Manhattan Bridges in Brooklyn, N. Y., what is said to be one of the tallest steel reinforced-concrete buildings in the world. It covers a plot 200 x 125 ft.; is 12 stories in hight and surmounted by a clock tower of four additional stories. The hight from the street level to the roof of the tower is 275 ft. The floors in the tower, each measuring 50 x 50 ft., are adapted to studio work owing to their excellent light and freedom from noise. The structure is the seventh completed by the Gair Company, who will use a portion of it and lease the remainder to manufacturers.

Inspecting Fire Hazards

The Committee on Field Practice of the National Fire Protection Association has completed its two years' work in the compilation of an inspection manual. This publication is called Field Practice to distinguish it from an ordinary fire protection handbook, from which it differs radically in function. It is not a mere compilation of fire protection standards, but a handbook designed to educate and serve the man who is undertaking inspection work, and who, possibly, has had very little previous experience. The increasing inspection of premises by uniformed members of the fire departments and by newly constituted municipal inspection bureaus has made such a handbook imperative, covering not only standard equipments, but covering what may be called points of relaxation from the standard which the inexperienced inspector does not know how to look for. This book is designed to point out the common faults in equipments and those points of deterioration difficult for inexperienced persons to discover, with methods and suggestions for their remedy. It is, in its potential usefulness, the most important publication which the National Fire Protection Association has ever compiled.

The association has published a list of its pamphlets, standards, bulletins, fire reports, etc., which will be sent on application to the Secretary, 87 Milk Street, Boston, Mass.

George W. Reed, who is said to have built the first house in Joliet, Ill., recently died at his home in Bradford, that state, aged 88 years. This first house was a log cabin and was built on the west side of the river on ground now covered by the wholesale department of the Adler meat market. Records show that this was the first house built on the site of the present city of Joliet.

Saving Money in the Laying of Brick

Results Accomplished by Use of Special Brick-Carrying Devices, etc., as Compared with the Usual Methods

ECONOMY of construction is always a prime factor with the building contractor and methods of doing the work in a way to accomplish the greatest amount with a minimum expenditure of time and labor is always a matter of deep interest to him. A concrete example of what may be accomplished by the use of special methods is found in the erection during the past summer in New England of several buildings which required in the aggregate many millions of brick.

Fig. 1—Car Alongside the Brick Unloading Platform

Fig. 2—Showing the Wooden Trays for Carrying Brick

Studies on cost saving as compared with the usual method of handling materials gave particularly gratifying results. The studies might be divided into three parts—careful cost records on two buildings erected in Connecticut with the usual hods for carrying brick and mortar; the use of special brick-carrying devices and other means of assistance to the bricklayer on a group of buildings in Maine, and finally an extension of the above studies and refining of the methods on another building in Connecticut. The work was done by the Aberthaw Construction Company, Boston, which points out that the principal effort so far has been on getting brick and mortar to the mason. Studies in the actual laying of the brick are to follow, but at present progress has been along the more fundamental question of transportation.

Fig. 3—Carrying Brick to the Job

Fig. 4—Inclined Plane Leading to the Scaffolding Which Extends Around the Building

Saving Money in the Laying of Brick—Some of the Details Which Facilitate the Work

Fig. 1 shows the railroad car alongside the brick unloading platform at Great Works, Maine. When the car has to be unloaded faster than the brick can be used on the job, the brick are thrown out into a pile as shown at the right. When, however, brick can be moved directly from the car to the job, they are loaded in the car upon wooden trays such as those shown loose in the foreground of

Fig. 1, and elsewhere in Figs. 2, 3, etc. Each of these trays has been made to hold 18 brick, there being 10 set on edge in the lower row, 6 on edge and two flat in the upper row.

At first, only two trays of brick were handled on this job, these being placed upon the wheelbarrow as shown in the first three figures. Ultimately, however, it was found possible to carry three trays or 54 brick upon each wheelbarrow, with no more fatigue on the part of the man than he experienced in the carrying of a hod of 16 brick. This means that the brick were carried more than three times as rapidly, hence three times as many brick could be moved the same distance by the same force; twice as many brick 50 per cent. farther by the same force, or such other combination of quantity and distance as might be found necessary.

The brick were carried up an inclined plane to the scaffolding around the building, as shown in Fig. 4. This proved just as easy for the man as carrying a hod up a ladder, and still retained the advantages of handling more than three times as many brick per man. In the next development of the barrow, shown in Fig. 5, the center of gravity was brought considerably lower; this shows how the three trays are loaded. Since that photograph was taken, a short length of "2 by 4" has been placed upon the barrow platform just in front of the pipe handles, thus throwing the center of gravity of the bricks farther forward, and more nearly over the wheel. This makes a better balance and eases up the work on the man.

The barrow, as will be seen from the illustrations, is an adaptation from the ordinary scoop barrow used for handling broken stone, lime, sand, etc. The handles have been made of one long piece of 1-in. wrought iron pipe, bent in five places, and fitted with the necessary braces, journals, etc.

Mortar is handled in much the same way. Fig. 6 shows a barrow with three pans of mortar being taken up an incline. This indicates the shape of barrow used in Maine for this purpose. Further study of the operation results in the Connecticut barrow shown in Fig. 6, identical with the brick barrow in Fig. 5. This has the advantage of placing the center of gravity of the mortar a little closer to the axis of the wheel. In both cases the mortar pans contain the same amount—about 80 lb. The pans are a little different in construction, those in Maine having a wooden cleat across each end for handling, while those in Connecticut have an iron handle. The latter have also a sheathing of zinc around the bottom to keep the water from leaking out.

Fig. 5—Showing How the Three Trays Are Loaded

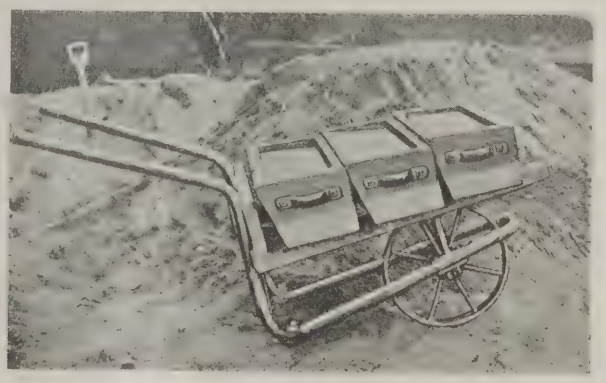
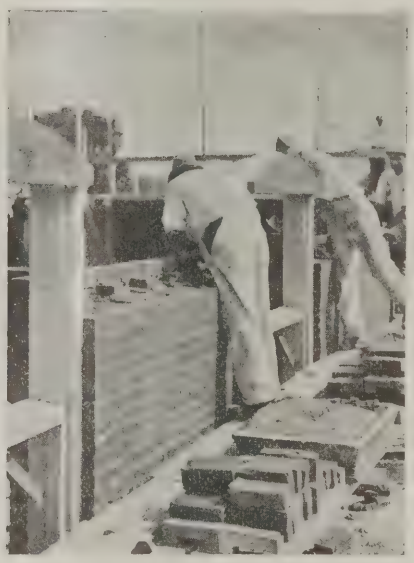


Fig. 6—Barrow with Three Pans of Mortar



Figs. 7 and 8—Views Taken on the Scaffold Which Extends About the Building Showing the Way in Which the Materials Were Wheeled to the Various Benches Located at Intervals on the Scaffolding

Saving Money in the Laying of Bricks

On the Connecticut job no inclined plane is used, all brick and mortar above foundations being sent up in special elevators located at two corners of the building. Though each elevator, operated by its own motor, can handle in one day about 40,000 brick, neither one has yet been pushed anywhere near capacity. With a speed of travel of about 50 ft. per minute, the trays or pans are carried up at intervals of 11 seconds. The man with the wheel-

barrow loads his trays upon the elevator at the bottom, while one man at the top takes them off and two other men distribute them to the masons working on the platform. By the combination of the wheelbarrows and the elevators, the same gang of eighteen masons who used eighteen helpers on the first job are now laying more brick per day with from nine to eleven helpers, depending upon the condition of the work—a clear saving of from seven to nine helpers every day.

Making due allowance for distances of travel and for quantities used, the scheme as finally worked out has resulted in a saving in labor cost of about 7 cents for each cubic foot of brick laid in the wall. This saving has been made partly by arrangements for permitting the mason to lay brick faster, but the main part of it comes from the transportation of brick. As this is more than one-quarter of the labor cost on the first of the three jobs, it is evident that the owners have benefited very greatly from this study, for all of these buildings have been erected on the "Cost-plus-profit" basis.

Figs. 7 and 8, taken on the scaffold, show the way in which the materials in Maine were wheeled around the scaffold to the benches, 15 in. high, from which the masons work, and how convenient the mortar tubs and brick trays are for the masons. One refinement of the system has been the loading of the brick upon the trays all with one side to the right. The mason, upon picking up the brick, knows exactly how it is going into the wall, without having first to turn it over and over in his hand and find the "right side up."

Many of the ideas which have been put into practice in this way have been brought out before, notably by Frank B. Gilbreth; but in very few cases have they been given so convincing an actual application on large buildings. The results have been so satisfactory to the building owners in money saved, and to the Aberthaw Construction Company in the sense of a good job well done, that the studies are being continued with the idea of making a still better showing next time.

The Open-Air School

The approximation of open-air conditions in school rooms involves the question of cost, and while it is possible to give instruction in the lower grades out of doors there are advantages that cannot be neglected in teaching advanced classes indoors. This means that more attention must be given to the provision of an abundance of pure air in school buildings. There is evidence of the public taking an interest in this question to get a better idea of what is accomplished by the modern methods of school house warming and ventilation. The public is coming to realize that it is not sufficient to erect a building, install its equipment and then put it in charge of an employee who frequently knows as little of how to care for and operate the equipment as members of the Kindergarten classes. In the criticism of school house ventilation in many cities there has been incurred the necessity of learning what equipment has been at the disposal of the more intelligent operative and what attention it received. This has brought to the public attention the fact that many old school buildings have need of being remodeled so that their out-of-date heating and ventilating systems may be replaced with such modern outfits as will enable pure, filtered and humidified air to be supplied in proportion to the expenditure made for it. Ventilating equipment is possible which will do some things that are not possible even in the open-air school in the removal of dust and bacteria and a quantity of air supplied that will make it unnecessary to go out of doors to get good wholesome air. The expense for food, blankets, extra teacher and other things will be greater than that for the installation and maintenance of a good ventilating system. There is a place and need for the open-air school but it is not so important or far-reaching in its need as is the necessity that old schools be remodeled and new schools erected for the provision of a proper supply of fresh air.

How the Amateur Describes a Skyscraper

What the magazine writer, unfamiliar as he often is with the technical features of his subject, has to say in his descriptive picture of a happening is frequently very amusing to those acquainted with the facts in the case. An instance of this kind is illustrated in a decidedly striking manner by a correspondent of the *Scientific American,* who thus quotes from and comments upon an article descriptive of a skyscraper in a monthly periodical:

"The old brick building had vanished . . . in a cloud of broken brick (cloud of brick)" and plaster. Already the muddy floor was dotted with the toadstool tents of the excavators. . . . Far down in the stifling air of the caisson" (stifled with oxygen), "the concrete roots were being planted, tied with cement and steel to the very core of the world."

"The foundations were finished and the first thin columns" (weighing possibly one ton per foot) "stretched upward. In ordered plan, the crossbeams fell into their places, and the great lattice of the substructure" (that is to say, superstructure) "shaped itself."

"On the topmost story, the derricks crouched like giant spiders, thin legs braced against post" (or was it column?) "and I-beam. Untiring, hour after hour, the derricks lifted bales of steel, and as each story was bolted down" (by the pneumatic riveters) "the derricks lifted themselves heavily to the new level. . . ."

"Like beetles, the steel workers clambered surefooted over the empty frame. Like flies, they caught the slim-spun threads of the derricks and swung up to some inaccessible" (although they did get there) "height."

"Day faded in fog and darkness. Like beacon fires the forges of the workers glowed intermittently" (showing conclusively that scab labor was being employed).

"I am thinking also of the other workers; of men who measured this tall tower on their slide rules" (and worked out the formula for long columns on their tape measures). "Engineers who foresaw each bolt and fitted so perfectly mass on mass" (without any previous experience and) "with only imagination and their books of figures to guide them . . . workers in the steel mills of the distant city who molded" (or perhaps rolled) "each beam and pillar to go together like a watch—theirs is the silent, forgotten labor!"

Let us hope (adds the correspondent) that these nocturnes by untechnical men will be as soon forgotten!

A feature of the new building operations in Brooklyn, N. Y., is the number of small dwellings which are being erected in various sections. Plans for 60 such structures have just been filed and altogether 86 will be built.

A Cottage of the Semi-Bungalow Type

A Case Where the Lady of the House Plans the Layout of the Rooms—The Cost under $3,000

IN the designing of nearly every home the woman takes some important part toward making the plan a success or disappointment, and in this little cottage the rule has not been the exception for Mrs. Ryan—the lady of the house—sketched the arrangement of rooms to meet her wants and needs.

In size the house has a frontage of 24 ft. and a depth of 44 ft. and is built with posts 10 ft. high. The basement and foundation walls are of concrete 8 in. thick built upon concrete footings, carried to a hight to give a cellar at rear portion 7 ft. 6 in. in the clear, which is full width of building, and extending 24 ft. 4 in. toward the front. The cellar provides for furnace room, laundry, store room and coal room, the floors of which are finished with 3 in. of concrete, consisting of a base course 2 in. thick made in the proportion of 1:3:5 with a top finish 1 in. thick composed of cement and sand in the proportions of 1:3.

All concrete footings and walls are mixed in the proportions of 1:3:5, local gravel being used instead of broken stone.

The wood sills of the building are secured to foundation walls with ⅝-in. x 18-in. bolts placed one at each corner and approximately 8 ft. apart set in the concrete foundation walls when building.

A Cottage of the Semi-Bungalow Type—Frank J. Grodavent, Architect, Cheyenne, Wyoming

The first story has a ceiling hight of 8 ft. 6 in., the second story 8 ft. 0 in. at level ceiling and 5 ft. 6 in. at side walls.

The framing is of balloon construction with timbers of the following sizes well spiked together. Sills 2 in. x 8 in.; first floor joists 2 in. x 8 in. placed 16 in. on centers; second floor joists 2 in. x 6 in. placed 16 in. on centers and rafters 2 in. x 6 in., also placed 16 in. on centers. The rafter ends are exposed and smooth dressed and have a dressed 2 in. x 4 in. at eaves to hold the rafters to a true line. The framing for outside walls, gables, dormers and inside partitions is with 2-in. x 4-in. studding set 16 in. on centers and doubled at all door and window openings, and all corners in rooms are built solid to prevent the lath being run from one room to another. All header and trimmer joists are doubled and spiked together, and joists are doubled under partitions which run in the same direction. Each tier of joists have 1 in. x 3 in. cross bridging.

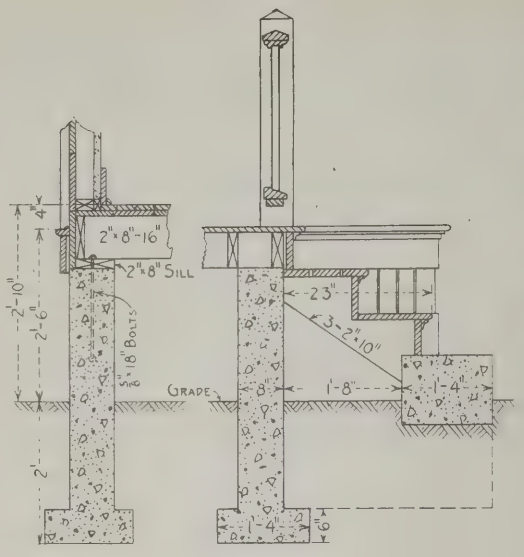
The outside walls of building, dormers and gables are covered horizontally and close with 1 in. x 8 in. square edge fir boards, surfaced one side, then covered with No. 30 Rosin sized sheathing paper, doubled at and around door and window openings, and finished up to the belt course at head of first story windows, with western white pine clapboards exposed 2½ in. to the weather.

The wall surface above the belt course, and the side walls of dormers, are covered with "Star A Star" cedar shingles laid 5 in. to the weather.

The roofs are covered with 1 in. x 6 in. square edge fir boards, surfaced one side, spaced for shingles, covered with No. 30 Rosin sized sheathing paper and with "Star A Star" cedar shingles laid 4½ in. to the weather.

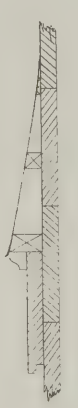
Shingles at eaves are doubled and valleys are laid open. Where roofs join walls of dormers and chimney, tin strips are laid in with each course of shingles, and counter-flashed at chimney. The open valleys are laid with IX terne plate roofing tin with locked and soldered joints.

Double floors are used throughout the house. Over the diagonal under-floor, after all plastering and inside trim had been completed, was laid a medium weight of felt carpet paper, upon which was placed the upper flooring as follows: Kitchen and bath room were covered with kiln dried tongued and grooved vertical grain yellow pine with 2½ in. face. All other rooms are covered with similar flooring with 3½ in. face. In laying the flooring the abut-



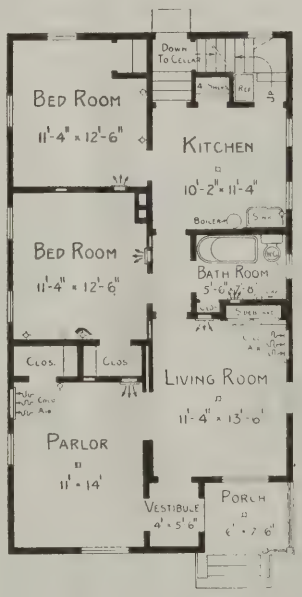
Sections Through Dwarf Wall and Front Entrance—Scale ⅜ In. to the Foot

Front Elevation—Scale ⅛ In. to the Foot

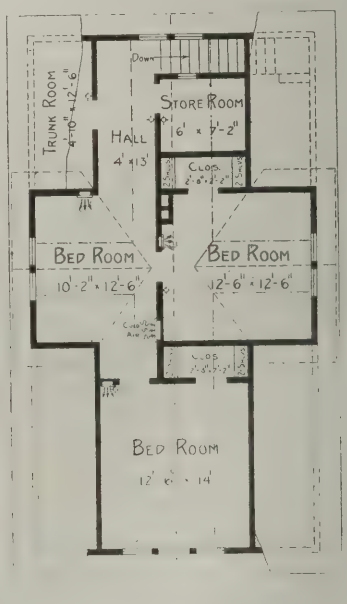


Detail of Belt Course—Scale 1 In. to the Foot

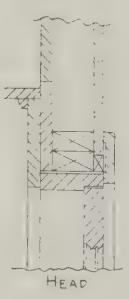
Foundation and Cellar Plan —Scale 1/16 In. to the Foot

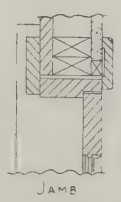


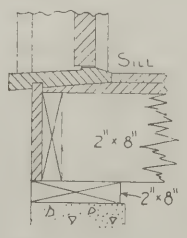
First Floor Plan—Scale 1/16 In. to the Foot



Second Floor Plan—Scale 1/16 In. to the Foot







Details of Outside Door—Scale ¾ In. to the Foot

Side Elevation—Scale 3/32 In. to the Foot

A Cottage of the Semi-Bungalow Type—Plans, Elevations and Miscellaneous Details

ting joints were cut over the joists below and the floors blind nailed. At completion the floors were smooth dressed at all uneven places.

The inside trim except in the basement, is of yellow pine selected for natural finish, with 4½ in. plain casings and 7 in. base. The base in closets and second story is 5 in. high.

A side-board is built into the recess of the living room and is provided with cupboards, drawers, and adjustable shelves above, which are enclosed with glass paneled doors.

The kitchen is provided with a small closet or pantry giving room for stores, dishes, etc.

The bed rooms and living room have good closets with shelves and hooks, and the bath room has a small closet with similar conveniences.

With main stairs placed at the rear of the kitchen and the cellar stairs directly below, provision is given for an outside grade door leading to the kitchen or to the cellar—a convenience to first story and basement without unnecessary loss of space.

Sash where not shown as casement are hung on pulleys, cords and weights, and are made of Western white pine 1⅜ in. thick.

The doors are of the five-cross-panel type with mouldings stuck on solid stiles and rails. Sliding and outside doors are 1¾ in. thick, while all other doors are 1⅜ in. thick.

The sliding door is hung on overhead steel tracks; the pocket is lined with matched boards, and the opposite jamb is made in three pieces with center portion removable for adjusting the door.

A Cottage of the Semi-Bungalow Type—From the Dining Room

The hardware for the basement is in Japanned finish; and that for the first and second stories is electroplated on cold rolled steel in brass finish. The doors are hung on Stanley's five knuckle, loose pin, ball tipped butts; 4 in. x 4 in. for front and rear entrance doors and 3½ in. x 3½ in. for inside doors. Outside doors have three tumbler mortise locks and inside doors have one tumbler locks, and are trimmed with combined rose and escutcheon plates on both sides of doors. On the front door is placed a 4½ in. nickel plated gong with plate and push outside.

The exterior of the house is painted three coats in white up to the top of the belt course at heads of windows and for trimmings, with shingles painted in tobacco brown. The exterior painting, except shingles, basement, closets and rear entrance, is in three coats of white lead and linseed oil. The interior trim, except as above specified, is finished natural, with one coat of alcohol shellac, sand papered down, and two coats of Rosenburg's "Elastica" interior varnish left in gloss finish.

The shingles are finished in two coats of lead and oil colored a tobacco brown.

Modern plumbing fixtures in white enamel on cast-iron are used, the selection having been taken from the catalogue of L. Wolff Mfg. Co., as follows: One 35-gallon galvanized steel range boiler of 200 lb. test with galvanized stand. One 20 in. x 36 in. cast-iron enameled kitchen sink with apron and 12-in. enameled deep roll back (all in one piece); supported upon two enameled sink brackets, and provided with 1½-in. polished brass P trap. The sink discharges into a cast-iron, enameled inside, grease trap 8 in. x 8 in. x 9 in. with rough brass trimmings.

A Wolff 5-ft. bath tub of first grade enameled iron "Narra" with 1½-in. roll rim, nickel-plated bath cocks with ½-in. connections, etc., is set up in the bath room. Tub wastes through a lead drum trap 4 in. x 8 in. with polished brass countersunk clean-out screw set flush with the floor, and trap vented.

There is also a roll rim "Essex" lavatory with combined bowl, apron and roll edge back (cast in one piece), set with concealed wall hangers, connected through nickel plated "Century" waste, 1¼ in. nickel plated cast brass trap with vent, and supplied with self-closing faucets connected to ½-in. nickel-plated brass supply pipes with air chambers.

The bath room has a "Laguna" Duroware siphon jet wash down water closet, with No. 16 "Bentlow" tinned copper lined low down oak tank with push button valve.

The house is heated with a No. 22 Jewel warm air furnace enclosed with galvanized steel and asbestos jacket. Cold air is taken from the parlor and living room through 10-in. x 30-in. special base registers; through an 8-in. x 12-in. base register in second story hall, and direct cold air through a 10-in. x 12-in. pipe from outside of house. All these supply connections have air tight pipes of galvanized steel and feed to the bottom of the heater.

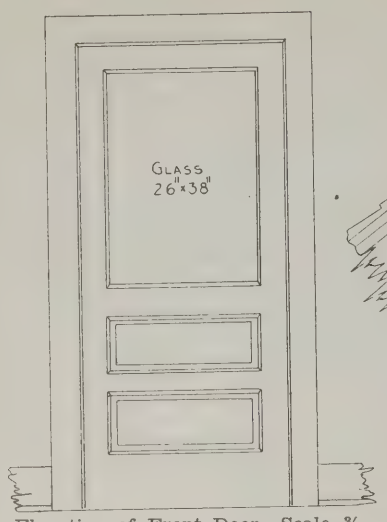
The cost of the building was as follows:

Construction with plumbing	$2,550.00
Heating	178.00
Total	$2,728.00

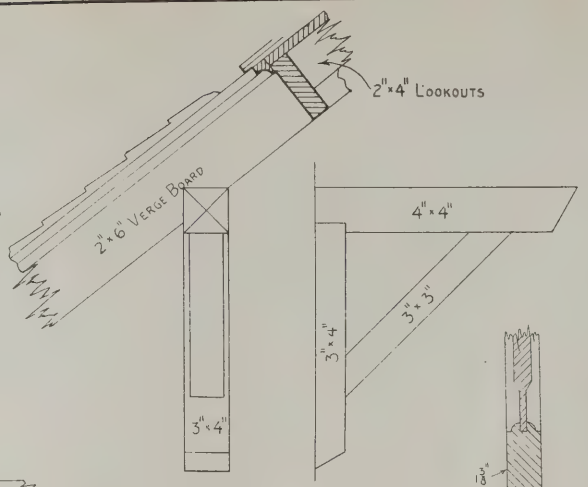
Light fixtures are not included in the above cost.

The cottage here shown is that of Andrew Ryan, Cheyenne, Wyo., and was erected for the price stated from plans drawn by Frank J. Grodavent, architect, Cheyenne, Wyo.

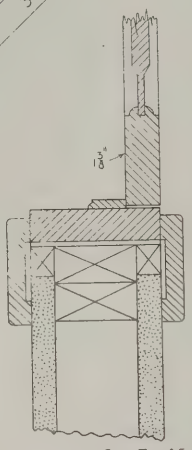
The building contractor was C. Christensen and the contractors for the heating installation were Hopper & Bartley, all of Cheyenne, Wyo.



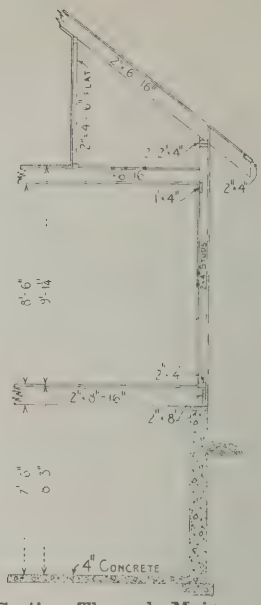
Elevation of Front Door—Scale ⅜ In. to the Foot



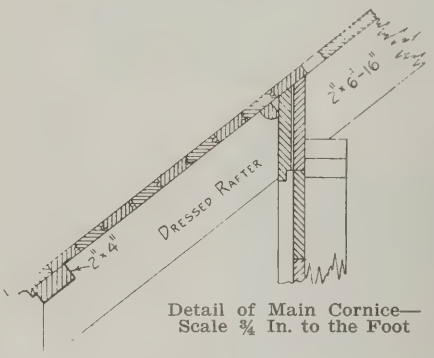
Details of Verge Board and Bracket—Scale ¾ In. to the Foot



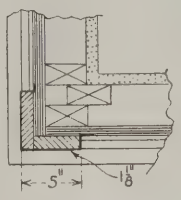
Detail of Inside Doors — Scale 1½ In. to the Foot



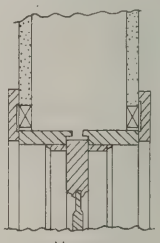
Section Through Main Wall—Scale ⅛ In. to the Foot



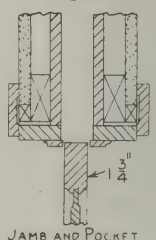
Detail of Main Cornice—Scale ¾ In. to the Foot



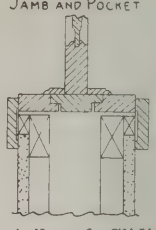
Section of Corner — Scale ¾ In. to the Foot



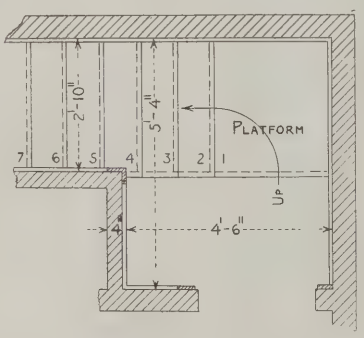
HEAD



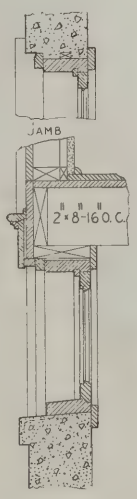
JAMB AND POCKET



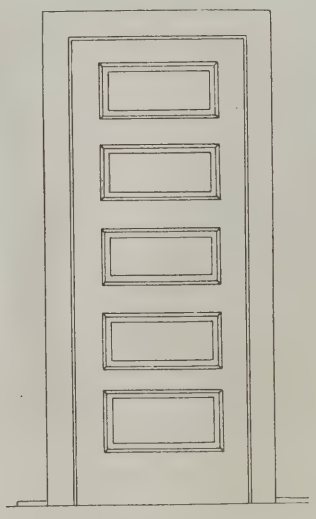
Details of Sliding Door—Scale ¾ In. to the Foot



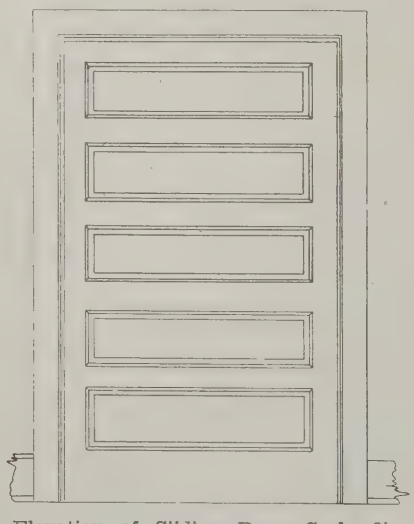
Plan of Main Stairs—Scale ¼ In. to the Foot



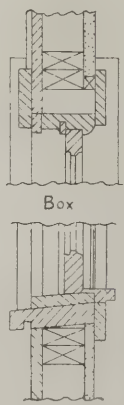
Details of Cellar Windows—Scale ½ In. to the Foot



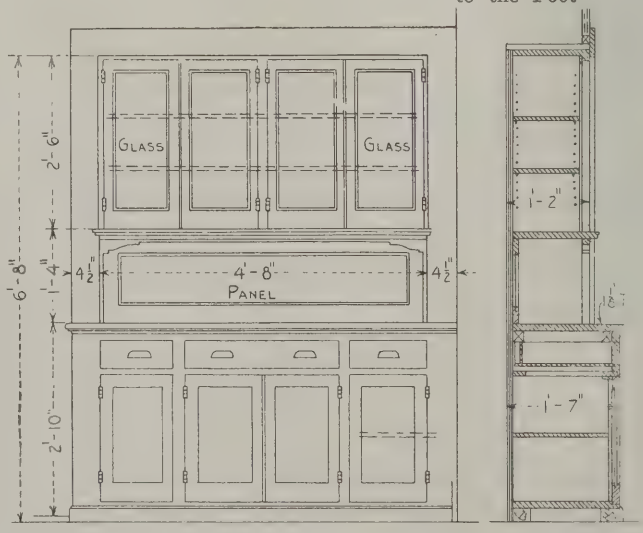
Elevation of Inside Door—Scale ⅜ In. to the Foot



Elevation of Sliding Door—Scale ⅜ In. to the Foot



Vertical and Horizontal Sections Through Box Window Frame — Scale ¾ In. to the Foot



Elevation and Section of Sideboard—Scale ⅜ In. to the Foot

A Cottage of the Semi-Bungalow Type—Miscellaneous Constructive Details

Heating a Two-Story Brick Schoolhouse

Description of a Gravity Steam System Installed in Conformity with Provisions of Proposed State Laws

THE architect, as well as the building contractor, will be interested in the following description of a gravity steam heating and ventilating system that is designed to conform with state laws for Illinois, now under consideration. The subject is a two-story brick school-house, shown in Fig. 1, and located in a small country town of 800 population, about 50 miles from the city of Chicago. The work is an excellent example of the foresight of the school board officials and the heating engineers in providing a system that would meet with the approval of the state if the proposed laws were now in force. In this connection it is well to mention that the heating engineer received the hearty co-operation of the boiler manufacturer in the preparation of detailed plans and in the various phases of plant construction. The general layout of the mains and branches, with position of the boilers, are shown in the basement plan, Fig. 3, while the location of the radiators is distinctly indicated on the floor plans, Figs. 4 and 5.

Heating a Two-Story Brick Schoolhouse—Fig. 1—General View of the Building and the Protection Afforded By Its Surroundings

The equipment is guaranteed, with proper care, to maintain an even temperature of 70 deg. F., when the outside temperature is 15 deg. below zero. The four class-rooms shown on the floor plans are provided with indirect stacks, each having a capacity of 200 ft., of indirect radiation. They are individually rated to deliver 30 cu. ft. of air per pupil per minute, which gives each pupil an allowance of 225 cu. ft. of air per minute. The efficiency of operation was demonstrated in the severe test of actual service during the past year to the satisfaction of the school board authorities and the heating engineers.

The building is about equally divided into three parts on the first and second floors. The main part of the building has two class-rooms and the extending wing is used for a hall and office. The extending wing has a north exposure. Access to the school is gained through the door provided on this wing, and the hall has two flights of stairs leading to the second floor class-rooms and office.

The battery of boilers selected, as shown in Fig. 7, are type 3-34-S, manufactured by the L. J. Mueller Furnace Co., Milwaukee, Wis.

The construction of these boilers is of cast iron; they are of modern design and excellent workmanship; and the arrangement of the parts is such that they are unaffected by expansion and contraction. Their rated capacities are conservative in proportion to their greatest efficiencies when operating with a minimum supply of coal. The firepots are made with an overhanging dome having radial arms, so that the entire heating surface will come in contact with the radiant heat of the fire. The corrugations extend round the inner surface completely, and the exceptional depth provides for large coal-carrying capacity, allowing for long periods between firing.

The combustion chamber is accurately proportioned for the complete combustion of the gases. There is provided a double dome (really two sections cast in one piece), with two water spaces and a smoke travel between. The smoke openings are all staggered.

When the gases leave the firepot they pass through the openings at the top between the radial arms, passing forward and backward through the smoke spaces between the various sections to the under surface of the double dome. Two rectangular openings are then traversed by the gases before passing back through the dome to the smoke pipe. The various sections are connected with specially constructed nipples. The grates are of the rocking

and dumping type, and the deep ashpits allow a free circulation beneath the grates.

The basement plan, Fig. 3, shows the battery of boilers set in a pit 18 in. deep. Each of the boilers has a nominal grate diameter of 34 in., and a rated capacity of 1650 sq. ft. of direct radiation. The

	DIMENSIONS			Cu. Ft.	No. of Rad.	Sq. Ft. of Radiation	High, In.	Style, Col.	Sq. Ft. Exposed Wall Surf.	Sq. Ft. Glass Surface	Indirect Radiation
	Long	Wide	High								
FIRST FLOOR:											
Class 1...	28	33.6	11 6	10,787	3	150	38	3	721	170	200
Class 2...	28	33.6	11.6	10,787	3	150	38	3	721	170	200
Hall	24.6	26.6	11 6								
Hall.....	24.6	8.6	12	10,514	4	295	38	3	1003	284	...
Hall.....	3.6	8	12								
Hall.....	3.6	8	12								
SECOND FLOOR:											
Class 3...	25	33.6	12	10,050	3	150	38	3	724	170	200
Class 4...	31.3	33.6	12	12,562	3	170	38	3	724	236	200
Office....	9.6	24 6	12	4,320	3	150	38	3	320	202	...
Office....	8	16	12								

Heating a Two-Story Brick Schoolhouse—Fig. 2—Table Giving Data Used in Designing Heating and Ventilating Plant

specifications called for boilers having a grate area of not less than 6½ sq. ft., so that the installation of this type comes well within the specified size. The boilers are connected to the chimney by means of a galvanized breeching built of No. 16 gauge iron.

Throughout the building are 19 radiators distributed as follows: three in each of the class-rooms, two in each of the first and second floor halls, and three in the office on the second floor.

The total amount of direct radiation is calculated as 1065 sq. ft. and the total indirect radiation, 800 sq. ft. The cubical contents of the building is 59,020 ft., with an exposed wall surface of 4213 sq. ft. and an aggregate glass surface of 1232 sq. ft. The indirect radiation is distributed in four units, as shown on the accompanying plans.

The table in Fig. 2 gives the dimensions of the various rooms, with their cubical contents and amount of direct and indirect radiation.

The boilers are cross-connected, with a 5-in. header for the supply mains, and a 2½-in. header for returns, with proper valve connections, as shown on the accompanying plans, so that the plant may be operated efficiently on one boiler when so desired. The basement is excavated to a depth that allows for the necessary difference between the water line and the indirect stacks. An equalizing pipe 2 in. in diameter is run between the supply and return headers.

Three supply mains, Fig. 6, are taken off the 5-in. header. The indirect stacks are located at the rear of the boilers, so that the connections from the header are very short. A 4-in. main is taken off to supply four 2-in. branches making connections to the pin radiators in the indirect stacks. These radiators have a rated capacity of 20 sq. ft., being 36 in. long and 14 in. high.

The heating and ventilation flues are built of galvanized iron, protected by a plaster partition of metal lath. This partition is built in the class-rooms only and is finished to match the rooms. All heat and vent registers measure 20 x 30 in. and 20 x 24 in. respectively. They are of plain lattice design, provided with proper vanes to control the flow of air. The fresh air ducts measure 14 x 44 in. and are supplied from the east side of the building. The fresh air openings are provided with 16 x 36-in. screens, round wire frame, of 1¼-in. mesh.

All horizontal and vertical ducts are built of No. 26 gauge galvanized iron, properly braced, soldered, riveted, and supported in place by suitable wrought iron hangers. Fig. 6, a rear view of the boilers, shows that a frame structure has also been provided to support the horizontal ducts as they make connection to the stocks. All fresh air connections are provided with hand-controlled dampers to regulate the air supply. The indirect casings are fitted with a slide at the bottom and arranged so that the air will travel over the indirect radiator the longest course possible.

All piping, both supply and return, is covered with ¾-in. air cell covering, supported at regular intervals with iron bands. The boilers are covered with a coat of plastic asbestos cement 1½ in. thick, and finished with a canvas jacket. Proper grading is made in the direction of the flow. All horizontal lines have a fall of not less than 1 in. in every

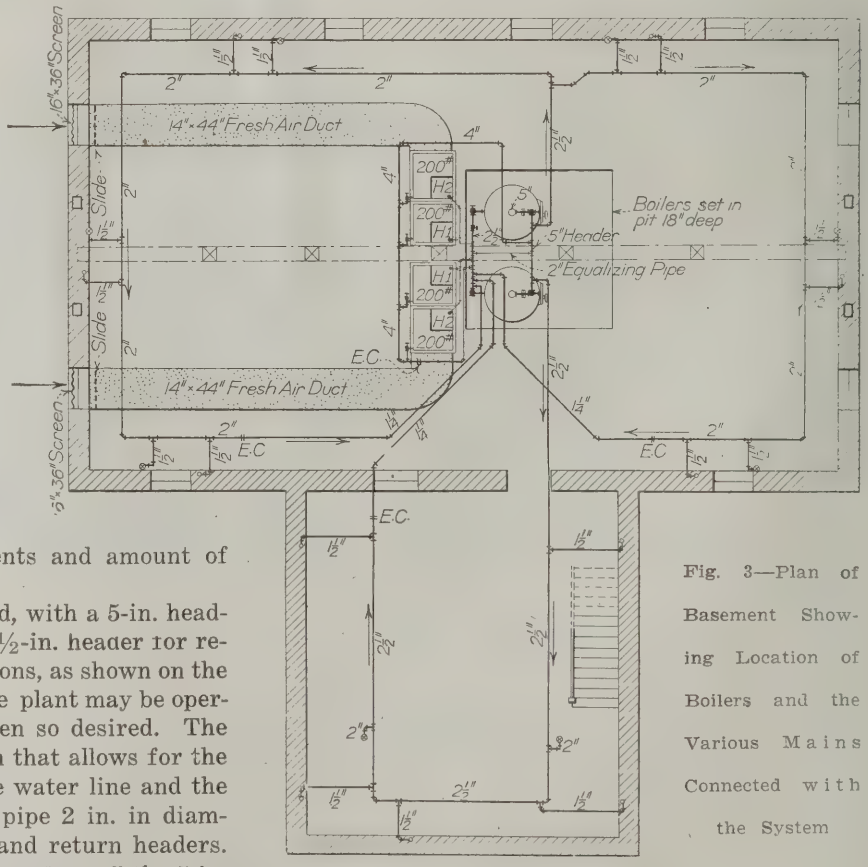


Fig. 3—Plan of Basement Showing Location of Boilers and the Various Mains Connected with the System

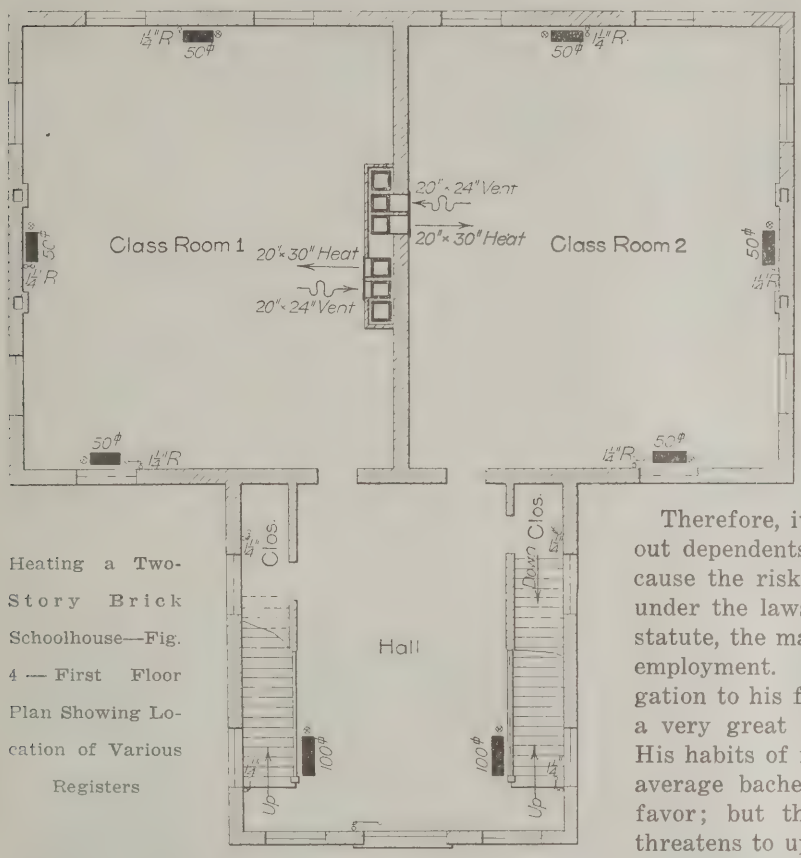
10 ft., from the point above the boiler to the extreme end of the mains, where they are connected to the return header.

Horizontal mains in the basement are supported at 10-ft. intervals with adjustable hangers securely fastened to the joists.

All pipes passing through the floor or ceilings

are provided with "Acme" insulators to prevent contact with the woodwork.

Each radiator has a disk radiator valve one size smaller than the branch supplying the radiator,



Heating a Two-Story Brick Schoolhouse—Fig. 4 — First Floor Plan Showing Location of Various Registers

with exception of the indirect stacks. The latter are provided with 2-in. gate valves and 1¼-in. swing check valves. Each radiator has also an automatic air valve, with return mains and indirect stacks fitted with expansion air valves.

The basement plan, Fig. 3, shows three supply mains taken off the 5-in. header, one for the indirect supply, and separate mains for the class rooms and halls.

A 2½-in. main is run to a point 12 ft. from the right of the battery, and two 2-in. branches are taken off and run to the right and left. Connections of 1½ in. are then made to the risers to the three radiators in the class-rooms at points designated on the accompanying plans. After all risers have been supplied, the main is reduced to 1¼ in. before making connection to the return header.

The five radiators in the first floor hall and second floor hall and office are supplied by 1½-in. branches, taken off a 2½-in. main run direct from the header. The main is reduced to 1¼ in., after serving the risers.

The installation here described was executed by Williams Bros., of Antioch, Ill., under the personal direction of W. R. Williams, in cooperation with Andrew Dease, the Chicago manager for the L. J. Mueller Furnace Co., with headquarters in the city of Milwaukee, Wis.

Compensation Laws and Married Men

From the very beginning of workmen's compensation as a substitute for employers' liability the question has been raised as to the handicap the system may put on the man of family in securing and maintaining employment. All the acts that have been framed, both abroad and in this country, have provided that compensation, in case of a fatal accident, shall be determined largely by the number of those dependent upon the victim. The single man whose earnings go only to his own support is not costly. The married man's risk to the owner is much larger. The employer must pay not only to the widow but to each of the children under a given age, usually 18 years.

Therefore, it has been argued that the man without dependents is the more desirable workman because the risk of compensation is less. However, under the laws enacted previous to the New York statute, the married man has had the preference in employment. Generally speaking, he feels the obligation to his family and establishes a home, and in a very great number of cases owns his domicile. His habits of industry are better than those of the average bachelor. The decision has been in his favor; but the recently enacted New York law threatens to upset this balance.

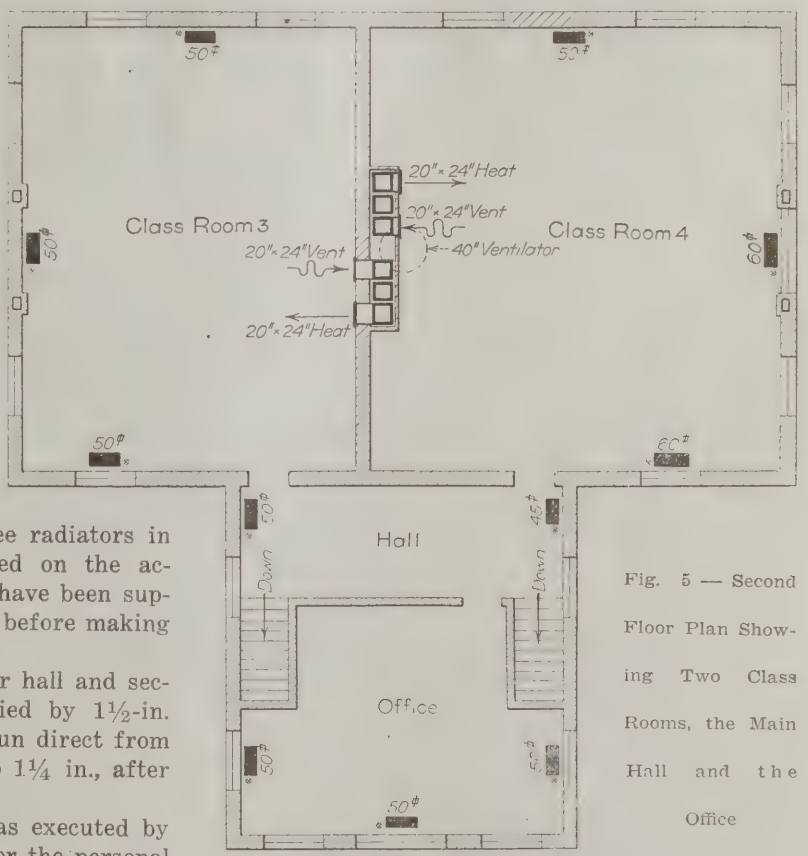


Fig. 5 — Second Floor Plan Showing Two Class Rooms, the Main Hall and the Office

The compensation acts of the States have become more and more rigorous since the system was first introduced in this country. The final extreme to date exists in the New York statute. In case of

death no real limit is placed upon the damages which must be paid the dependents of a workman. Only the death or remarriage of a widow, the death of a father or mother, or sister or brother, in case they are dependents, or coming of the children to the age of eighteen ends the period during which a stiff compensation shall be paid. To quote the digest of the New York workmen's compensation law regarding compensation for death:

> In all cases, reasonable funeral expenses, not to exceed $100, 30 per cent. of wages to wife or dependent husband during widowhood or dependency (two years extra benefits to widow upon remarriage); with 10 per cent. additional for each child under 18, until that age is reached. If no widow or dependent widower, 15 per cent. to each child. And 15 per cent. each to dependent grandchildren, brothers and sisters under 18 and to dependent parents and grandparents, subject, however, to preference of the widow or dependent widower and children, if any, for their full benefit. Total benefits limited to 66⅔ per cent. of wages. Excess of wages over $100 per month not to be reckoned in computing death benefits.

It will be noted that the clause provides no limit of damages in actual amount that may accrue. A young widow with several little children, if the children should live to 18 years and the widow to advanced years, would bring upon the employer of the husband and father a very serious burden. Take the case of an earner of small wages and presume that his average income is $600. He leaves a widow and three children, respectively one, three and five years of age. The widow, if she lived the wholly reasonable period of 35 years, would receive from the employer $6,300, which is 30 per cent. of the annual wage. The children would receive 10 per cent. for periods of 13, 15 and 17 years, amounting to $2,700. With the $100 allowed for funeral expenses the total would be $9,100. If the wage-earner were receiving the full prescribed limit of $100 a month, the total for the family would be $18,200.

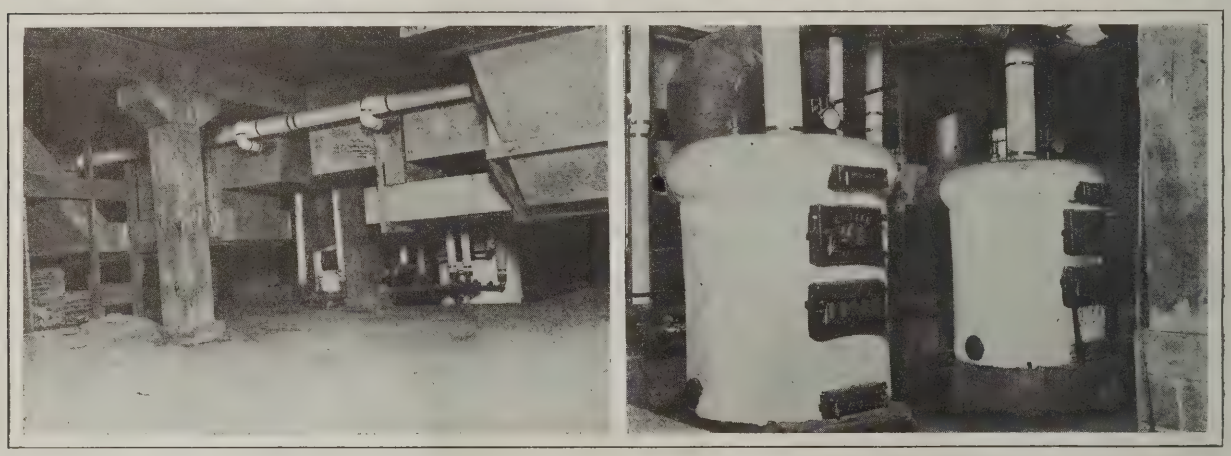
Under the compensation acts of the other States which have adopted the system, an absolute limit is fixed beyond which no compensation can be claimed. Under the Massachusetts act, in case of fatal injury, the dependents are given compensation for a period not exceeding 300 weeks. Under the Connecticut act compensation payable on account of death resulting from injuries shall in no case be more than $10, or less than $5, weekly, and shall not continue longer than 312 weeks. Under any one of the three acts, if the deceased employee leaves no dependents, the liability to the employer is limited to funeral expenses and perhaps to other obligations which are of small account as compared with the case of the married man.

Fire Test of Metal and Plaster Ceilings

For the purpose of determining the fire-resisting qualities of metal ceilings as compared with plaster ceilings, a test was conducted at the Columbia Testing Station, Brooklyn, N. Y., on November 11 by the Associated Metal Ceiling Contractors of Greater New York. The reinforced concrete structure in which tests of this kind are made had been previously put in readiness for the occasion with six different panels, of which two consisted of plaster ceilings and four of metal ceilings specified in the following manner:

Plaster on wood lath; plaster on metal lath; metal ceiling on wood furring; metal ceiling on metal-covered furring; metal ceiling on ⅞-in. wood sheathing; metal ceiling on wood furring and plaster boards nailed to wood beams.

The test lasted one hour and fifteen minutes with a heat of 1700 deg. The inspectors of the various departments having representatives present rendered tests in the order of their superiority as follows: No. 1 metal ceiling on plaster boards on wood furring; No. 2 metal ceilings on sheathing ⅞ in. thick; No. 3, plaster ceiling on wire lath; No. 4, metal ceiling on metal-covered furring; No. 5, metal ceiling on wood furring; No. 6, plaster ceiling on wood lath. The plaster ceiling on wood lath fell 12 minutes after the test was started.



Heating a Two-Story Brick School House—Figs. 6 and 7—Basement Views Showing the Arrangement of the Mains and the General Appearance of the Boilers Used in the Heating Plant

Monolithic Silo with Water Tank

At the recent Texas State Fair one of the interesting exhibits embraced a monolithic silo 53 ft. high and having a capacity of 15 tons of silage. The silo proper was 43 ft. high and 14 ft. in diameter with walls 6 in. thick. On top of the silo was a water tank having a capacity of 10,000 gal. Inside the silo was a stairway leading to the top so that the entire construction could be inspected. Adjoining the silo was a garage built with Truss-Con metal lath. There was also a concrete storm cellar, concrete benches and other concrete furniture.

CORRESPONDENCE

A Department Where Those Interested Can Discuss Trade Topics—Every Reader is Invited to Participate

The Home of a Building Contractor

From L. G. Lentz, Stuttgart, Ark.—I am very much pleased with *The Building Age* and as being of possible interest to some of the other readers I am sending photographs and rough floor plans of a house which I recently built for my own occupancy.

The foundation walls, as may be seen from the pictures, are of concrete blocks, while the frame is of yellow pine. Originally the outside of the house was covered with 6-in. drop siding, but I did not like it so I re-covered it with beveled or lap siding, which was exposed 4 in. to the weather. The gables are covered with shingles. The roof is covered with 5-in. cypress shingles laid 5½ in. to the weather.

The porch columns are of concrete blocks 20 in. square for a distance 28 in. above the floor line. Then there is a cap 24 in. square and 4 in. thick. Above this the columns are 16 in. square up to a point within 5 in. of the porch soffit, where there is a 5 x 20-in. cap.

The steps are of concrete with a concrete block buttress and cap. The ends of the buttress are 16-in. blocks with 5 x 20-in. cap.

The floors are of yellow pine throughout. The floor in the parlor is dressed and finished in dark oak stain, thus producing a very pleasing effect.

A Detail of the Front Entrance Showing the Concrete Block Foundation and Column Work

General View of the House With the Owner Shown Sprinkling the Lawn

The Home of a Building Contractor—Designed, Erected and Occupied by L. G. Lentz, Stuttgart, Ark.

The trim of the rooms on the first floor is in curly pine finished natural except the parlor, which is stained oak. The kitchen has a plain finish and is painted.

All walls are ceiled with shiplap except the parlor, which is covered with Beaver Board and paneled. The rooms upstairs are finished in yellow pine and painted white.

The space just at the rear of the sitting room contains my desk and over it is a bookcase and underneath are lockers with spaces for keeping stationery, plans, etc., etc. This is where I do all my business; in fact, it is my office.

The stairs which start from a point near the door leading from the piazza to the dining room are closed in on the first floor and have a door at the bottom of the flight as indicated. The space under the stairs is used as a closet and on the second floor the closet opens out of the front bedroom.

The ice box or refrigerator is so built that it may be iced from the rear porch, thus avoiding the necessity of entering the kitchen for the purpose.

Every room and out building is equipped with electric lights and the arrangement is such that all rooms and yard can be flooded with light from the hall on the second floor by simply turning a switch. From an inspection of the plans it will be seen that there are plenty of closets and cupboards. The house faces west, thus bringing

the dining room on the south side of the building.

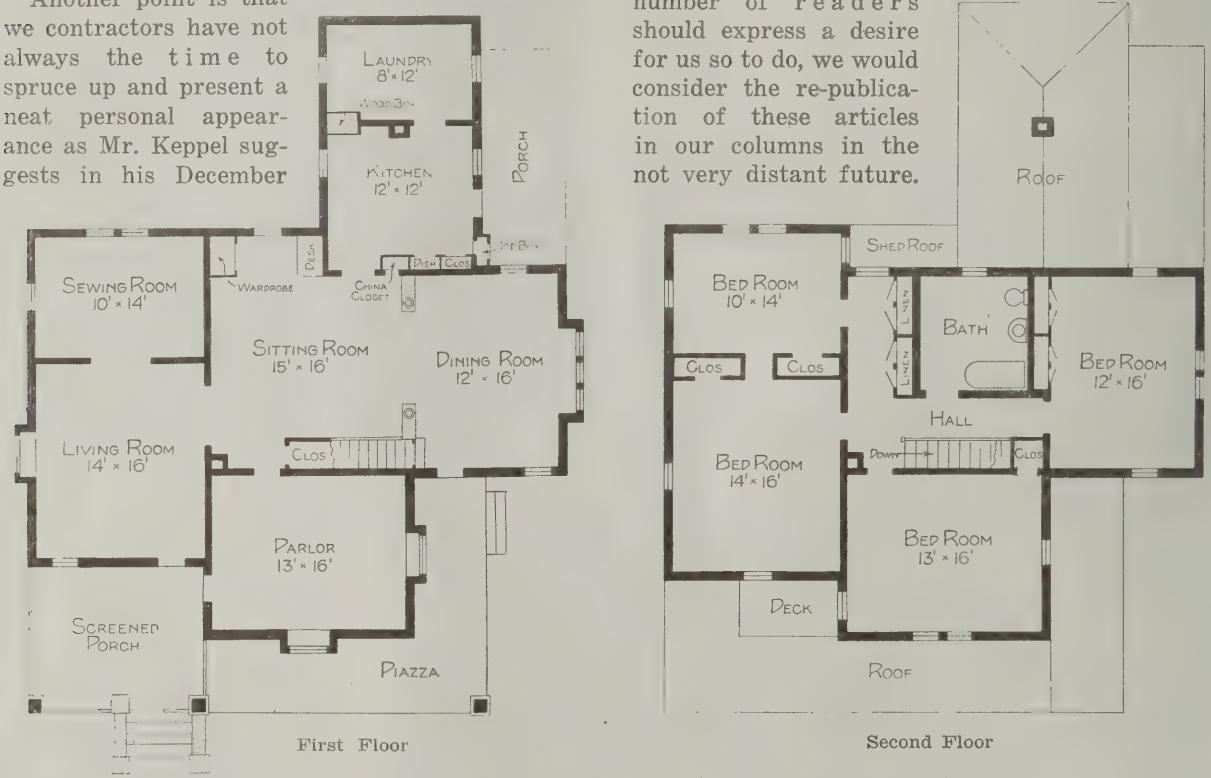
I would say that the curly pine I used for the finish I was several years in selecting and every piece I find I lay away for something nice.

Hints to Building Contractors

From W. M. J., Mansfield, Ohio.—In rebuttal of the article which appeared on page 56 of the December issue of the paper entitled "Hints to Building Contractors" I desire to say that these hints might do for building contractors in towns of 200 inhabitants or less, but the suggestions certainly make one feel disgusted, especially if he has a little backbone. My advice to the building contractor would be to let the architect ask him to figure anything he wants to if he has the time to devote to it. If not tell him so. If the architect wants you to meet him at his office and you have the time I would suggest that you do so; if not, you might ask him to meet you at your own office.

Another point is that we contractors have not always the time to spruce up and present a neat personal appearance as Mr. Keppel suggests in his December comments, for at times we may have a portion of our beards covered with lime or cement plaster, but "we get there just the same."

I have a great many good friends who are architects, but they do not require a building contractor to tip-toe into their offices or go home and change clothes every time one desires to see them.



The Home of a Building Contractor—Floor Plans—Scale 1/16 *Inch to the Foot*

What an Architect Says of *The Building Age*

From John B. Crawford, Architect, Leesburg, Va.—I have read with interest recent numbers of *The Building Age* which you have sent me and I find the journal to be one that seems to improve with age. The many interesting and instructive articles I am sure furnish all readers inestimable help in problems that arise from time to time.

The plans you publish in each issue are of an exceptionally high standard and furnish many valuable and attractive ideas.

I have often wondered why some of the many professional journals in our line of business have not published a simple and easily understood method for perspective work, as so many young draftsmen would benefit by such an article. Publications on this subject are so complicated that they get the young fellow tied up in a maze of lines where he could not find his way out in a life-time. Consequently he gives up in despair. I am sure Mr. Fellner or some other of your contributors would gladly furnish this article. Possibly you have published such an article and it has escaped my notice.

Note.—Some years ago we presented a very simple yet comprehensive series of articles on Perspective Drawing, the subject being treated in such a way as to avoid confusion of lines and enable the merest novice to follow the course step by step. If a sufficient number of readers should express a desire for us so to do, we would consider the re-publication of these articles in our columns in the not very distant future.

Remodeling an Old Stone House.

From Builder, Clinton Co., N. Y.—Referring to the problem of "V. S.," Yeagertown, Pa., the only way I can see out of his difficulty is to take down the damaged part of the wall and rebuild it. A hole may be worked through at a suitable hight and timbers run in and shored up. I would then take out the wall from the shores down; rebuild the foundation; jack up the fireplace if necessary and rebuild to the shoring. Cover the wall, then shore at the top of the damaged part and finish the wall.

What is meant by finishing the roof is vague. If the *kind* of roofing is meant then it is another question. Galvanized sheets, shingle stamped, 20 gauge, pressed standing seam would make a good roof, and so will copper or slate.

The only way "V. S." can determine the kind of porch he wants is to stroll around the streets or

drive out into the country and study porches. In this way he will probably find something that can be modified to suit his needs.

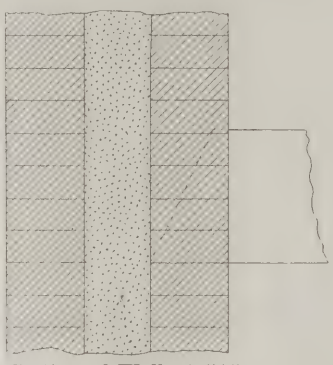
If the house were mine I should change the parlor into a kitchen, make the proposed kitchen into a parlor and set it farther to the front than is shown on the plan accompanying the letter of "V. S." I should build it to the full hight of the present house and then let the porch start from the proposed kitchen and run around the corner and across the front. If the parlor is changed to a kitchen a door may be put in the damaged part while rebuilding.

Paraffin if well worked in, or spar varnish, will prevent the plaster from absorbing and condensing moisture on the inside. If the building must be replastered 10 per cent. of Maltha mixed with the plaster will render it waterproof.

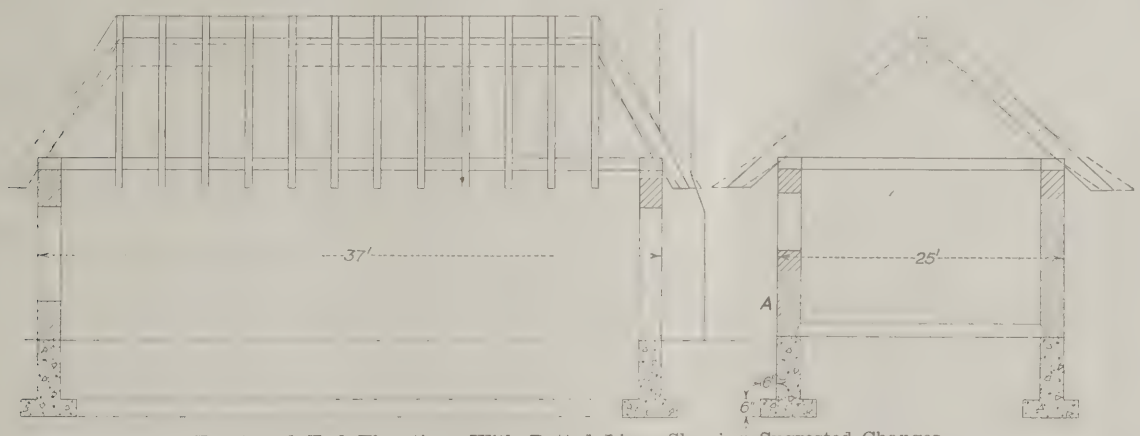
Some Questions in Bungalow Construction

From R. H. S., Brooklyn, N. Y.—I am a steady and much interested reader of *The Building Age*, and I note in a recent issue the questions in bungalow construction by "E. H. B.," of this city. As a country house specialist I offer a few suggestions which may prove of assistance.

I would say that his proposition is a delicate one, as any tampering with the length or width of any built-up structure is bound to affect the specific dimensions of various constructive parts. However, I see one alternative which may be applied without considerable cost, and beg to submit the accompanying sketches to assist in an understanding of the problem.



Vertical Cross Section of Wall at "A" of the End Elevation Showing the "Fill"



Front and End Elevations With Dotted Lines Showing Suggested Changes

Some Questions in Bungalow Construction—Contributed by "R. H. S.," of Brooklyn, N. Y.

Distribute the difference of desired width and length in the four walls by a filling between the brickwork, keeping the inner face intact and moving outward. This will allow all the floor beams, joists, etc., to maintain their original lengths. By slightly dropping the ridge rafters the lengths of these members will also be correct, but might embody some small change if there is any special construction of the eaves. The door and window frames must also be set in a correct relative position in order to give the best results.

Proportioning Throats of Fireplaces

From E. W., Fort Collins, Col.—I always derive useful hints and suggestions from *The Building Age* and in the October number of the paper there was an item on fireplaces which attracted my attention and which no doubt proved interesting to many others than myself. Right here I would like to make a suggestion and it is that some of the practical readers take up the question of throats of fireplaces, giving the exact shape and size a throat should be when a Chicago grate is used, and particularly when it is simply a brick fireplace. I am sure that practical comments on this phase of the subject would prove a great favor to persons having fireplaces with a poor draft.

Safe Construction of Church Roof Trusses

From Ernest McCullough, Chicago, Ill.—I have noted the problem of "W. J. B.," Wichita, Kan., appearing under the above heading on page 57 of the December issue and offer the following comments for his consideration:

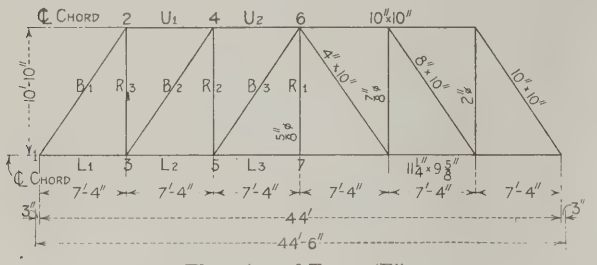
In the drawing submitted herewith I have shown how I would dimension the members of the trusses and bolt the pieces together in the lower chord. The proper method for designing such trusses and ascertaining the stresses in each member, with methods for fixing sizes and numbers of bolts will be dealt with later in the series now running in *The Building Age* under the title of "Design of Beams, Girders and Trusses."

Top chords and braces should be in one piece when it is possible to secure pieces of the proper size and length. The writer has obtained from the correspondent in a personal letter some information on the sizes of timbers obtainable in the city in which the church is to be erected and the pieces shown on the accompanying drawings are based on the information received. Experiments have proved that when columns are built up of thin

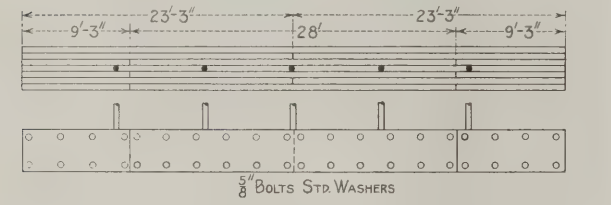
planks each plank carries its proportion of the total load and acts as a separate slender column.

The slenderness of a column fixes the carrying capacity and the ratio of slenderness of a 2-in. plank 10 ft. long is $(10 \times 12) \div 2 = 60$. The slenderness of a column 8 in. thick and 10 ft. long is $(10 \times 12) \div 8 = 15$. If the 8-in. thickness is composed of 4 planks each 2 in. thick, then each plank carries one-fourth of the total load on a column having a slenderness ratio of 60, whereas if the piece were solid the stiffness factor would be 15, the slenderness ratios fixing the relative stiffness. One-fourth the load on a column having a stiffness factor of 60 is not the same as the total load on a column having a stiffness factor of 15.

Using a common formula for the carrying capacity of studding a 2-in. x 2-in. post 10 ft. long can carry a load of 3840 lb. Four such pieces will give



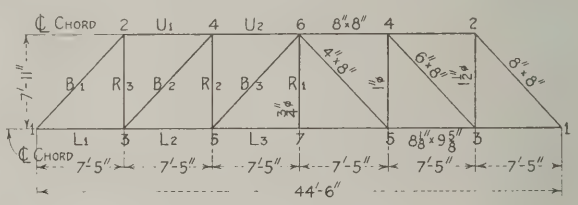
Elevation of Truss "B"



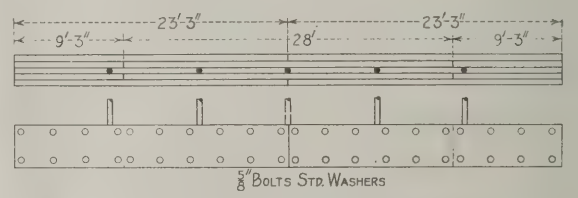
Bottom Chord of Truss "B"—Scale 1/16 Inch to the Foot

computed by the same formula, a load of 33,280 lb. This point has been emphasized because in one book printed a number of years ago the following statement appears: "As the top chord is always in compression, it is not as necessary to be as particular with the splicing and bolting as with the tie beam. For the top chord it will be better to use 3 or 4-in. planks if they can be obtained. The splices should be made near the joints, and the planks should be bolted together with 5/8 or 3/4-in. bolts, spaced from 2 ft. to 2 ft. 4 in. on centers."

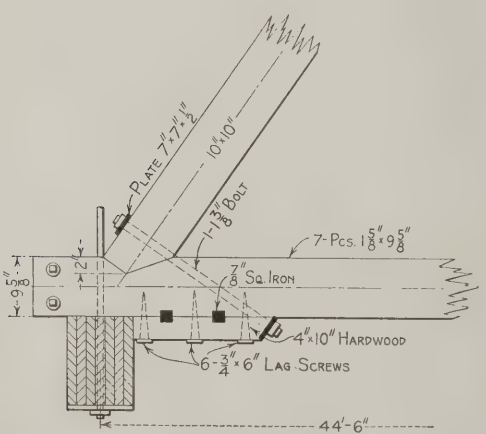
When the compression member must be built up the pieces should be as thick as possible and the bolts should be spaced in pairs at intervals equal to one-twelfth the least dimension of the piece, with 1-in. square pins between the planks about 6 in. from the bolts. These pins will bear on the ends of the fibers of each piece and thus help carry inequalities in the loading from one piece to its neighbor. The pins will be vertical and the bolts horizontal, the pins being parallel with the faces of



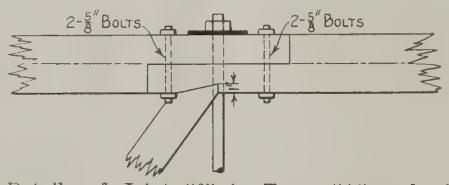
Elevation of Truss "C"



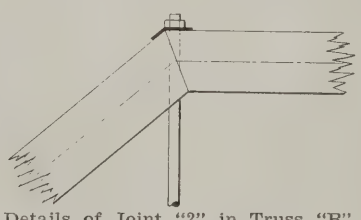
Bottom Chord of Truss "C"—Scale 1/16 Inch to the Foot



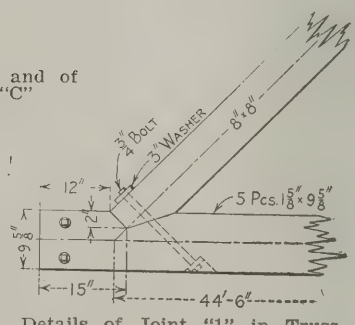
Details of Joint "1" in Truss "B"—Scale 3/8 Inch to the Foot



Details of Joint "6" in Truss "A" and of Joint "4" in Trusses "B" and "C"



Details of Joint "2" in Truss "B" and of Joint "4" in Truss "A" —Scale 3/8 Inch to the Foot



Details of Joint "1" in Truss "C"—Scale 3/8 Inch to the Foot

Safe Construction of Church Roof Trusses—Details as Suggested by Mr. McCullough

an 8-in. x 8-in. post capable of carrying about 18,000 lb. provided it is properly bolted together. By inserting pins to help carry the shear and also bolting properly we might obtain a post capable of carrying 22,000 lb.; PROVIDED, the load can be squarely distributed over the end. The trouble is that such built-up members are seldom properly bolted and not one in a hundred has shear pins inserted, consequently the total load carried on such a built-up member cannot be expected to run much over 16,000 lb.

A solid 8-in. x 8-in. post can carry, when compared with the pieces and the bolts going through the pieces.

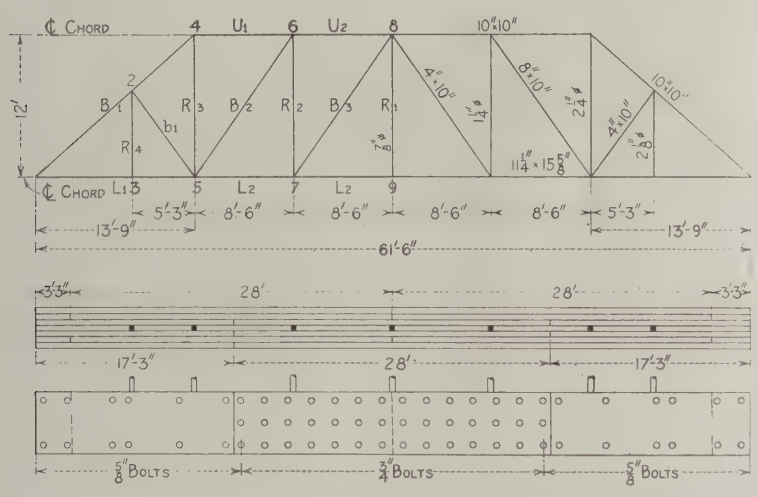
The diagonal braces should be solid, for it is usually easy to obtain solid pieces in the right lengths for braces. The lower chord is in tension throughout and so may be built up of a number of pieces, preferably an odd number, for the middle piece is hardly more than a filler between the tie rods. Of the remaining pieces one-half should have enough area to carry all the tension in the center panels. In the accompanying drawings these pieces are 28 ft. long. The other pieces carry the remainder of the stress.

The number of bolts to use depends upon the stress in the panels adjacent to the middle panels. The joints should be as long as possible in order that the bolts may be as far as possible apart. If we use 26-ft. planks for the middle panels instead of 28-ft. planks the bolts are merely spaced closer together, for the number is fixed by the stress to be carried. The bolts should be in pairs on each side of the joint and the distance from the joint depends upon the shearing stress developed by the bolts, in the case of these trusses the distance being not less than 6 in. This arrangement disposes of four bolts in each splice and the remainder of the bolts are arranged in the most convenient manner so the interval between bolts will be not less than twice the distance the first bolts are spaced from the joint.

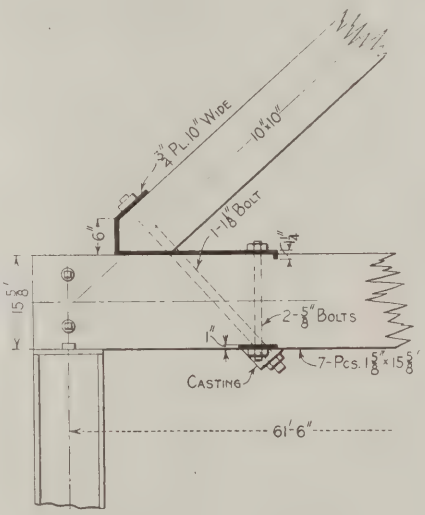
The plates at the ends of the vertical tie rods must have an area large enough to distribute the load on the rods over the surface of the wood. The plates should extend across the width of the top and bottom chord, this giving the length of each plate, the width of a plate being found by dividing the area by the length. With a small load a standard round washer may be sufficient. The end joint, No. 1, is designed so the load from the end brace will be carried into the lower chord and must be in this joint in Truss B and Truss A are proportioned for the exact load carried.

In redesigning the trusses I have used a tensile stress in the lower chord of 1500 lb. per square inch; a compressive stress in the top chords and braces of 1100 lb. per square inch; a shearing stress with the grain of 130 lb. per square inch, and a compressive stress across the grain of 250 lb. per square inch. The bolts and tie rods have been figured for 12,500 lb. tension on the area of the bolts at the roots of the threads. Owing to the fact that commercial sizes of timber are used the actual stresses are lower than those used in the re-design. The factor of safety in the joints is the same as that used in the wood and metal.

The correspondent also asked for a proper method to take care of deflection. For metal trusses the top chord is made ⅛ in. longer in each 10 ft. than the bottom chord. For wood trusses this can be ⅛ in. for each panel. The vertical rods will not be changed but the braces will. One panel can be laid off full size on a platform for the purpose of getting the braces the right length.



Elevation of Truss "A" With Details of the Bottom Chord—Scale 1/16 Inch to the Foot



Details of Joint "1" in Truss "A"—Scale ⅜ Inch to the Foot

Safe Construction of Church Roof Trusses—Details As Suggested by Mr. McCullough

far enough from the end so the shear developed by the pull in the chord will not cause a splitting of the end of the lower chord. When the load on the brace is so great that the projection of the lower chord beyond the toe of the end brace will be greater than will be convenient for the proper framing of the structure a diagonal bolt is placed through the toe of the brace. In this way part of the shear is carried on top of the lower chord by the cutting in of the seat and the remainder is carried on the lower part of the chord by the anchorage of the bolt washer. The bolt therefore must be strong enough to carry this much of the tension and convert it into shear along the grain of the wood.

In Truss C it was possible to design the joint so all the shear is carried by the end of the chord by seating the brace and tying it with an inclined bolt. The bolt may be smaller than is here shown, but as considerable stress is put into it by screwing on the nuts it is advisable to use a ¾-in. bolt. The bolts

Reinforced Concrete Cover for a Hot Well

From G. M. W., Warren, R. I.—I have a hot well practically square in shape, measuring as it does 43 by 42, and I wish to cover this with concrete but desire to know what kind of reinforcing to use. There are two 10-in. I-beams through the center resting on iron posts. The walls of the well are of concrete 12 in. thick. I want to turn the arches without making use of centers, for there is 4 ft. of hot water in the well all the time.

It is outside of any building and carries only its own weight. It is 18 in. above grade and there is one small manhole opening at the top.

Comments on Floor Construction

From D. P. B., Redford, N. Y.—Concerning the query of "H. M..," Centralia, Wash., which appeared in a recent issue, I would say that the labor of laying laminated floor such as he described will be from 3 per cent. to 5 per cent. for every ¼ in. in thickness above an inch floor of the same width. The waste will be in proportion to the cubic contents

of the floor. His specifications, however, may modify this. In fact, a synopsis of the specifications would make calculations more definite.

As to the load the floor will carry, I will work out an example from which he can compute his floor by changing the size of this piece to the size he uses and multiplying by number of pieces in floor.

Example:—What load uniformly distributed over the length of a spruce beam would be required to deflect it ½ in., the beam being 3 x 10 in. in cross-section and 10 ft. in length?

Formula.

$$U = \frac{1.6 \times F \times bd^3 \times S = D}{l^3 = \text{span} = 10^3 \text{ in this case}}$$

U = uniformly loaded.

The value of F (flexure) for spruce is 3500, although its value varies with testers. Therefore we have

$$1.6 \times .5 \times 3 \times 10^3 \times 3500 = 8{,}400{,}000.$$

And this divided by 10^3 (or l^3) = 8400, the required weight in pounds.

Another formula to find the load which will cause a deflection of 1/30 of an inch per foot of span is here given.

L = span
D = deflection
W = load
E = modulus of elasticity in pounds per sq. in.
Make D = L/30

$$W = 8/5\ (L\,bd^3 \times 4E/30L^3 \times 1728) =$$

$$5\left(\frac{L\,bd^3 \times 4\,E}{30\,L^3 \times 1728}\right)^{\frac{8}{}}$$

$$\frac{4\,E}{51{,}840} = \frac{E}{12{,}960}$$

This is represented by e

$$W = \frac{8\,bd^3\,e}{5\,L^2} = \frac{1.6\,bd^3\,e}{L^2}$$

Here b = thickness and d the width as before; 4175 is given for a 3 x 10-in. piece 10 ft. long, the actual size of which is 2¼ x 9½ in. yellow pine.

If the correspondent's specifications call for considerable nailing it will be well to add something for that and the sawing.

Laying Out Hand Rail for Spiral Stairway

From M. F. S., Windsor Locks, Conn.—I have been a subscriber to *The Building Age* for two years or more and have derived valuable information from these columns in the way of details, plans and elevation of various buildings. I have also read with much interest the discussions and criticisms on hand railing, and now come to the Correspondence columns asking if Morris Williams will present a plan and elevation of a circular or spiral stairway, showing the method of drawing the hand rail from the plan with proper explanation.

Elevations for a Store Building

From C. B., New Brighton, N. Y.—Will some reader of *The Building Age* kindly give me through the Correspondence Department front and side elevations of a building intended to be used as a confectionery store? The area of ground to be covered is 20 x 40 ft. I wish a typical rustic effect and am thinking of using rough perpendicular 1 x 12-in. stuff with ogee battens, grouped windows on the sides, plate glass for the front with veranda about 12 ft. deep the full width of the building.

It may be of interest to state that there is an exceedingly steep hill immediately back of the building site and the structure itself will be raised about 6 in. above the street level. I wish to carry out as fully as may be the rustic effect so that it will look as much as possible like a country store.

Constructing a Poultry House

From J. D. Griffen, Portsmouth, Va.—In the October issue of the paper there appeared an inquiry from "F. D.," Bronx, New York, asking for information in regard to building a chicken house of a size to accommodate nine hens and a rooster. He wanted to know more particularly as to the sanitary features of the coop and if a concrete cement floor was regarded as satisfactory for a house of this kind.

I have had some experience in the raising of poultry and I am sending for publication a few sketches with descriptive data which may prove of interest and value to him. The sketches represent a construction with which I, as well as many of my friends, have had great success. The house shown is 25 ft. long, 6 ft. wide and 8 ft. high in the front with 12 in. fall, making it 7 ft. high at the back. The ends and back are boarded up tight with tongued and grooved boards, or if not tongued and grooved then battens must be placed over the cracks, as the vital feature in this connection is to avoid any drafts on the birds. All the poultry wire used in the construction must be ¾-in. mesh. This will keep out rats as well as sparrows, as they not only eat large quantities of feed but bring lice into the house and on the birds.

The front of the house will face south if it can be so arranged, but it works well in cases where it has been constructed facing other points of the compass. The end showing the three brooder houses is so arranged as to have plenty of ventilation and light. They are 3 x 6 ft. in size and 4 ft. high in front. The top sash hinges up and the poultry wire on the inside is tacked in place. This gives ventilation if wanted when the lower sash is closed, or it can be closed when the lower sash is open. The sash covered with poultry wire in the lower section is made so that it will slide up on the inside by placing stops on each side of the frame.

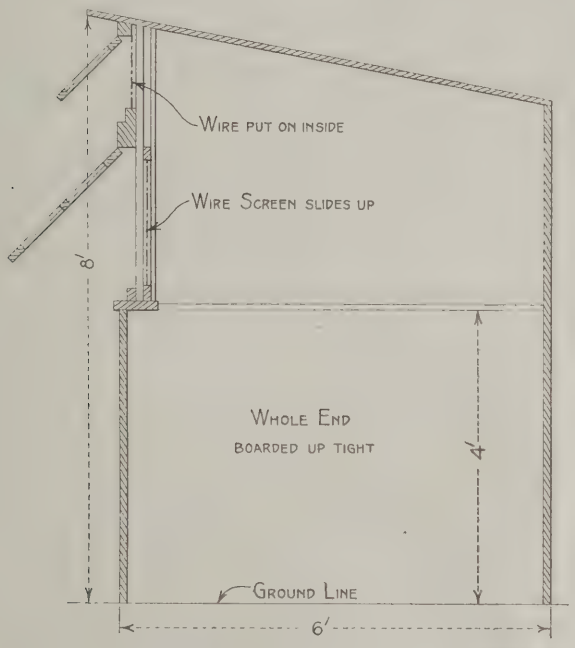
These brooders are used to set the hens in at the beginning of the season and "F. D." can allow the hen to have the chicks or he can put in a box brooder of the cold type and have the best of success and the chicks are always in a place of safety. He must always keep about 3 in. of sand on the bottom of these coops in order to get good results.

If he makes use of an incubator he can put the hatch in the first brooder when they come off and when the second hatch comes off in three weeks shift the first lot to the second coop and put the second lot in the first coop, and so on. In this way

he can make as many brooder houses as he may want and the house can be built as long as required.

The type of house shown in the sketches has from 25 to 35 hens in it at all times and I raise from 200 to 300 chicks each year. All these chicks are not raised to maturity, as many are sold or used as friers, and the old stock reduced from time to time.

For a small number of birds the coop can be reduced to two brooders and the roosting portion reduced to 5 ft. and the runway to 16 ft. This would be ample room for a dozen hens with good results. The roosting section of this plan as shown has its dropping board 2 ft. 9 in. from the ground and a door opening from the outside to clean without going inside. Directly under the dropping board is

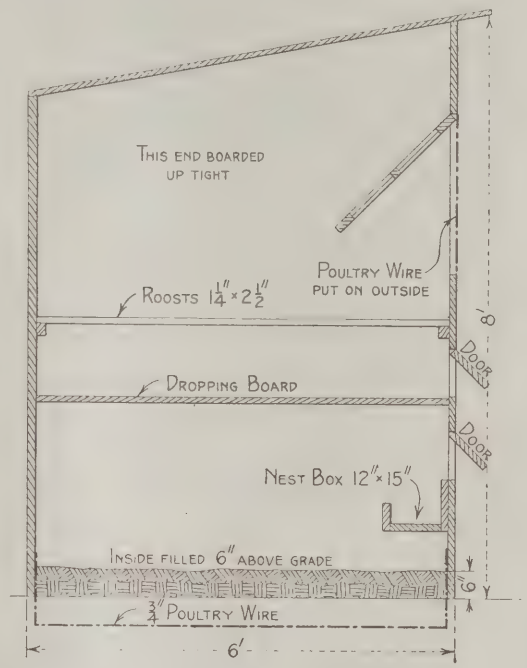


Vertical Cross Section Through the Brooder Houses—Scale ⅜ Inch to the Foot

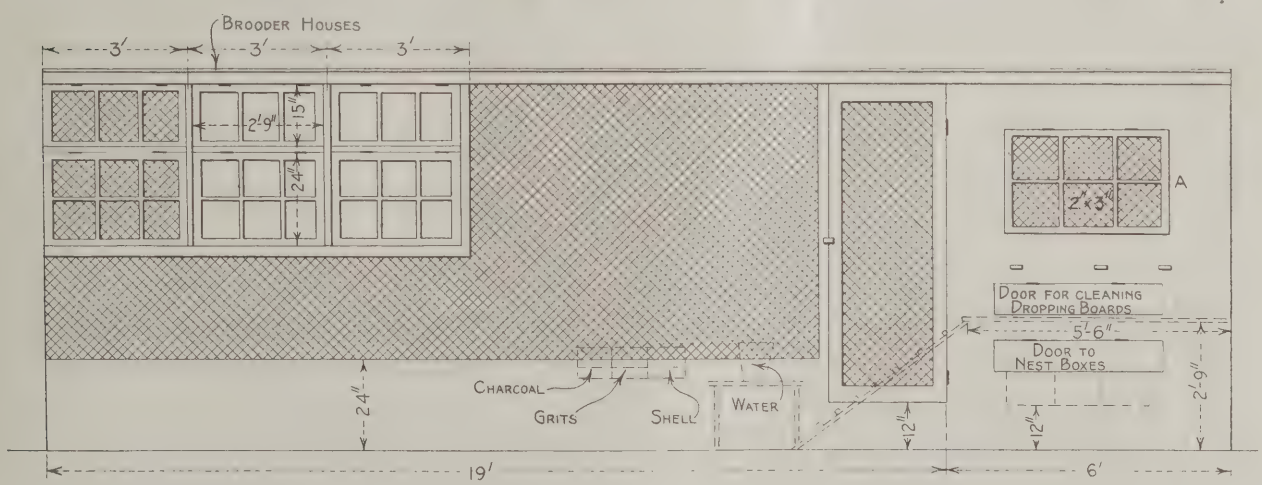
The roof should be covered with a good heavy roofing paper so as to make it water tight, as dampness must be kept out of the house.

The entire house is constructed of undressed lumber so that the whitewash will hold, and it should be kept whitewashed inside. Should the house, however, have to be painted the lumber may be dressed on one side only.

Boxes for grits, shells and charcoal should be nailed on the back of the house. The platform for the water bucket should be placed in the middle of the floor. The platform should be 12 x 24 in. in size and about 10 in. high so as to prevent the scratching of litter into the water. At all times a



Vertical Cross Section Through Nesting House at "A" of the Elevation—Scale ⅜ Inch to the Foot



Constructing a Poultry House—Front Elevation—Scale One-Quarter Inch to the Foot

located the nests which are accessible through a door from the outside. The sash is hinged to swing up on the inside and is kept open in good weather. The poultry wire is nailed on inside of frame.

The dirt from the bottom of the whole coop should be taken out for 6 in. below the ground line and ¾-in. mesh poultry wire laid all over the bottom and 10 in. up the sides. Then the dirt should be put back and filled 6 in. above the ground level. This will make the house rat-proof and keep it dry. litter of straw or leaves should be in the bottom of the house and the feed scattered in it so as to keep the birds exercising all the time, as this is the important part of keeping chickens in confinement.

In regard to the construction of the house it may be stated that all posts are 2 x 4 in. and are placed in the ground 2 ft. 6 in. All framing members are 2 x 4 in. The roof sheathing is ⅞ in. dressed on the top side. The flooring for dropping board and brooder houses is ⅞-in. tongued and grooved stuff.

Framing a Mansard Roof with Dormers

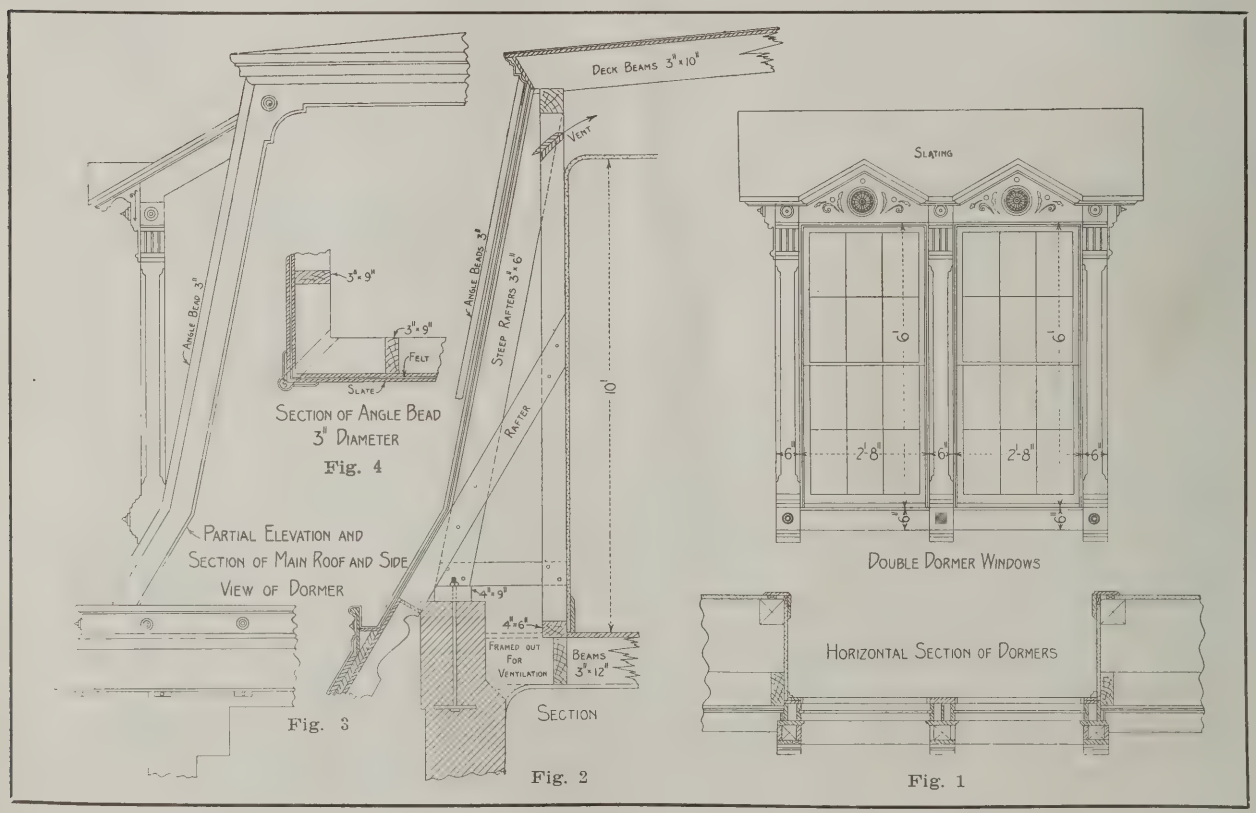
Some of the Advantages of This Form of Construction—Various Details for Doing the Work

By Owen B. Maginnis

In many sections of the country the Mansard roof is still a feature of the domestic architecture and it may not be without interest to some of the readers of the paper to describe how a roof of this nature pierced with dormer windows is laid out and framed. By way of explanation it may be stated that a "Mansard" roof—also called a "curb" roof—derives its name from Francis Mansart, a celebrated architect, who flourished in France and died in the year 1666. He was not, as is generally supposed, its originator, as the same idea had been worked out by Sangallo and Michael Angelo in Italy previous to his time, but not so extensively.

span on the wall plate line *A-C-B*. Draw *D-F-E* parallel to *A-C-B* and make *D-F* and *F-E* equal to *A-C* and *C-B*. Join *A-D* and *B-E*. Divide *D-F* and *E-F* into three equal parts and join *A-b* and *B-d*. Make *F-G* equal to *d-E*. Join *b-G* and *d-G*, thus obtaining the true geometrical form of the exterior outline of the roof.

Another way to describe this roof is shown in Fig. 6, but this resembles more the old Colonial and is called the American Curb Roof. To describe it proceed as follows: With *C* as center and *C-D* as radius, strike the semicircle *A-E-D-F-B*. Divide this semicircle into four equal parts, as at



Framing a Mansard Roof, With Dormers—Figs. 1 *to* 4, *Inclusive, Representing Various Details*

The principal reason for the adoption of this form of roof is to lessen the excessive hight of the roof without resorting to a truss, also to obtain room or attic space in the roof itself, as illustrated in Fig. 1, which represents a vertical section through the main roof of a building, the superstructure being of brick or stone. Fig. 2 represents a side view of a dormer window; Fig. 3 an elevation of double dormer windows and a section through them, and Fig. 4 a section of angle bead of 3 in. diameter.

In order to describe or lay out a true Mansard roof let *C-F* of Fig. 5 be the hight equal to half the

E, D and *F*. Now join *A-E, E-D, D-F* and *F-B*, which will give the true proportional of the roof.

From an inspection of Fig. 7 the reader may obtain an idea of the framing timbers of a Mansard roof as they will appear when in place. They consist of the usual wall plate and an upper plate, which is supported by the sloping side rafters which form the Mansard chamber or attic within. Reference to the details given herewith will make it perfectly clear to the mechanic as *A* of Fig. 7 is a wall plate; *E* the upper or Mansard plate supported by the Mansard or sloping rafter *C*, which have a slope

of 2 ft. off the perpendicular; *D* is the deck or upper rafters; *B* a tie or ceiling beam which gives good attic room. Fig. 7 shows only half the roof.

A comparison of the plan, Fig. 8, with the elevation, Fig. 9, will render perfectly clear the full construction of the roof and enable any mechanic to lay out, frame and raise roofs of this class. The elevation and plan show one end—right-hipped and the other—the left-gabled.

shape to frame the top cuts of Mansard rafters to prevent their slipping under the upper plate.

The application of the geometrical and mechanical explanation herewith given will afford a clear insight into the principles involved in the roof illustrated in Figs. 1 to 4 inclusive. The construction is not so complicated as might at first glance be supposed, if the details are considered and analyzed one by one. Each timber and detail is distinctly

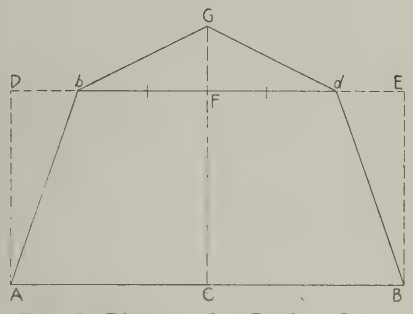


Fig. 5—Diagram for Laying Out a True Mansard Roof

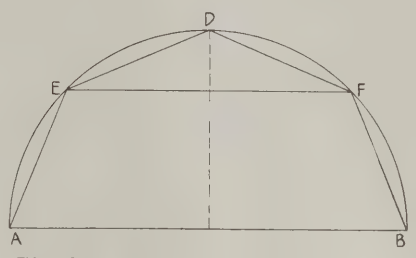


Fig. 6—Profile of What Is Known as the American "Curb" Roof

Fig. 7—The Framing Timbers of a Mansard Roof

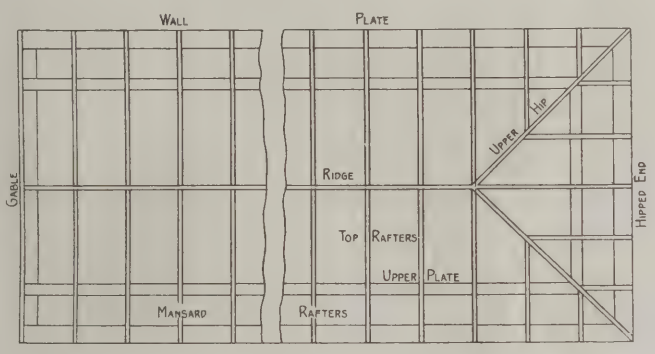


Fig. 8—Plan of Framing for a Mansard Roof

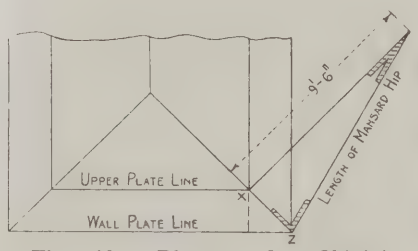


Fig. 10 — Diagram for Obtaining Length of Hip Rafter

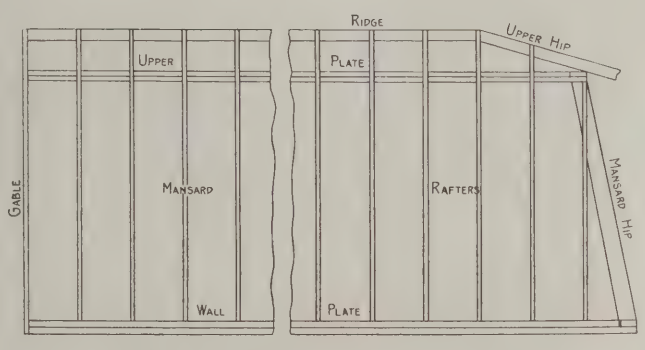


Fig. 9—Partial Elevation of Framing

Fig. 11—Shape of Top Cuts of Rafters to Prevent Slipping

Framing a Mansard Roof Pierced With Dormer Windows

In order to determine the exact length of the Mansard hip rafter the reader should carefully study Fig. 10. It is simply to raise up on the seat *X-Z* of the hip the hight of the pitch 9 ft. 6 in. and to join this hight with *Z*.

The deck or upper rafters are framed in the manner already described. Fig. 11 shows the proper

presented and measurements given so as to afford an excellent example of Mansard roof construction and at the same time is well worthy of attention because in its construction it involves the combined trades of bricklayer, framer, carpenter, slater, tinsmith and plasterer. It is presented as an example for study by the younger members of the craft.

Something About Casement Windows

A Comparison with Double Hung Windows—Features of Beauty—A Legacy from the Days of Romance

IT is curious how architectural habits prevail year after year, even when there is very little reason for their acceptance. Thus the 10,000 architects said to be practicing in the United States would find it hard to present a convincing argument in favor of the form of window in general use in America and yet its use persists, observes the New York *Sun*. This window is commonly known as the double hung or guillotine type. It is difficult and dangerous to clean. It gets out of order. It is not beautiful.

Apartment House Windows

Examine the windows of an average city residence or an apartment house. In nine cases out of ten they will be found to consist of two sashes each filled with one pane of glass, wholly without either character or beauty. The somewhat blank expression of these buildings is due, very largely, to the arrangement of their windows and to the failure of the windows to perform the full measure of their service. It must be remembered that to admit light into a room is not the sole function of a window. One of its duties is to give definite expression and character to the building in which it is placed.

To appreciate the truth of this theory one need only to examine a number of city residences, in the older part of New York, for example, where many of the houses still have small panes in their windows. The small paned windows possess a dignity and decision which is wholly lacking to their neighbors. Much of the grace of the New York City Hall is the result of very careful and architectural treatment of its many windows.

Results of a Careful Treatment of the Windows

Any one who is familiar with the manner of building abroad knows that much of the balance and dignity of the structures is the direct result of careful treatment of the windows, which are arranged not in the double hung or guillotine manner but with casements which, instead of sliding up and down, are made to open either in or out much as shutters or blinds. Whether the building examined be an Elizabethan manor house, a half timbered cottage in France, or a modern shop building, business block, apartment house or residence in London, Paris, or Vienna, it will be found to have windows arranged in casements which give attractive variety and character.

The casement possesses every advantage which is conspicuously lacking in the double hung window. The proper cleaning of such windows is extremely simple. Being hinged to the window frame, casements require no weights, chains or cords to be repaired or renewed and there is therefore no reason for the removing and defacing of the window frames to examine them.

Upon the score of beauty of effect it may be said that the casement possesses every decorative quality which the double hung window lacks. The use of leaded glass in casement windows has contributed wonderfully to their popularity.

The arrangement of casement windows renders the hanging of suitable draperies exceedingly simple. Such windows are apt to be far too beautiful architecturally to cover up or conceal beneath many curtains, and such draperies as are used are apt to be quite the reverse of elaborate.

Casement Windows as a Means of Ventilation

The casement window possesses another and a highly practical advantage over the guillotine variety which perhaps more than any one of its many excellent qualities will appeal to Americans. Who has not been driven to exasperation during the torrid days and nights to find that the windows could be opened at best no more than half way? With the casement window the case is wholly different, for by its very nature it may be entirely open—it is 100 per cent. window and represents efficiency raised to its highest power.

Windows of this type, besides fulfilling every practical purpose, are sufficiently beautiful to win ready acceptance anywhere. They are a legacy from the days of romance and the forms in which they appear today have, in many instances, been adapted from ancient and very beautiful examples, while the hinges and metal fastenings which lock them and the stays which hold them open at any desired angle are themselves studied from examples made during the golden age of craftsmanship.

A New 10 Story Commercial Building

Plans have just been filed with the Bureau of Buildings for a ten-story structure which will occupy the northwest corner of Madison Avenue and 44th Street, New York City. It will be fireproof throughout with a frontage of 85.5 ft. on the avenue and 128.4 ft. on the street. The new building has been designed for Brooks Brothers, the well-known clothiers, and according to La Farge & Morris, the architects, the building will cost $600,000. From the basement to the seventh floor the space will be devoted to sales rooms, while the floors above will be used for manufacturing.

Calgary University, at Calgary, Alta., is about erecting a $125,000 reinforced concrete building, 52 x 130 ft. in plan.

Industrial Education in the South*

The Course in Bricklaying and Plastering as Taught in the Hampton Institute Trade School at Hampton, Va.

THE course in bricklaying and plastering at the Hampton Institute Trade School consists of tasks of graduated difficulty. After having become proficient in laying a plain wall, students are given a little speed work. They are first tested, however, on their accuracy. Boys work from blueprints and complete an interesting series of practical shop exercises. They learn how to build a small corner, consisting of perhaps twelve courses; how to lay a 4-in. wall with the American bond; how to raise a wall that must be built to a given line; how to do foundation work; the trowel, the hammer, the chisel, the plumbing rule and bob, and the steel square. They learn to make the practical calculations which are required in their everyday work. They are encouraged to read the standard trade journals and textbooks. The Hampton students have excellent equipment for all their trade work.

The bricklaying and plastering department was organized in 1896. The first construction work done by the department was the building of a wing of the school laundry. The Armstrong-Slater Memorial Trade School was built in 1896 by non-stud-

Industrial Education in the South—Fig. 6—Hampton Students Laying the Foundations for the New $30,000 Two-Story Brick Y. M. C. A. Building

how to construct piers, chimneys and fireplaces; how to lay off and construct segmental, circular, and elliptical arches. The technical work which the bricklayers and plasterers do indoors is as nearly full size as possible. Indeed, the shop work, as far as it is carried, is full size and is made as practical as if it were to become permanent.

Negro and Indian tradesmen are taught how to use and care for the regular tools of their trade—

ent labor. Only one Hampton Institute bricklayer worked on it. Then, in 1898, the Domestic Science and Agricultural Building was constructed and four Hampton boys helped to build its walls. Next Cleveland Hall, containing a large school chapel and a comfortable dormitory for girls, was erected, twelve Hampton tradesmen being employed. When the school's large barn, shown in Fig. 2 in the December issue, was constructed in 1905 not a single outside man was hired to do any of the brickwork.

Other interesting building operations that have

*Continued from page 64 of the December issue.

since been carried to completion without outside labor, except that furnished by Hampton ex-students, include the remodeling of the Huntington Industrial Works and the Pierce Machine Shop into boys' dormitories, and the construction of the substantial house now occupied by the school's assistant disciplinarian, as well as the erection of Clarke Hall—the new and attractive $30,000 Young Men's Christian Association building, two views of which, showing the work in progress, are given in Figs. 6 and 7 of the illustrations. This building, the first negro student Y. M. C. A. in the country, was, with the exception of the slate roof, constructed entirely by Hampton students. Fig. 6 shows the students laying the foundations of the building, while Fig. 7 represents them putting the girders in place. The architects of Clarke Hall were Ludlow & Peabody of New York City.

The bricklaying, plastering and granolithic work of new buildings. When one of the boys' dormitories was converted from an open dormitory into one with enclosed rooms, the students in the bricklaying and plastering department rendered excellent service. Then, too, when the school decided to add another story to the Hampton Trade School, bricklayers and plasterers did their part of the work most satisfactorily.

In building Clarke Hall, for example, Hampton student bricklayers set all the stone and laid all the brick. The columns of the loggia, made of molded brick and set on seven diameters, formed a very complicated piece of work. In this structure the students had to construct flat arches and panels of various kinds. This building, indeed, has been an excellent *demonstration* of the fruit of the practical training which Hampton tradesmen received.

Builders and those who are in a position to pass expert judgment on Clarke Hall, as a specimen of

Industrial Education in the South—Fig. 7—Students at Hampton Institute Putting in Place the Iron Girders of Clarke Hall

of the institute is now done entirely by Hampton tradesmen. A few figures, giving the summary of one year's work, will be some indication of the unusual opportunity that the students have for practical training: Bricks laid, 237,816; granolithic walks constructed, 482 square yards; plastering done, 4049 sq. yd.

The students in the bricklaying and plastering department touch the life of the Hampton School at many points. They set boilers in the power house; build the bake ovens which are used in the kitchens; repair the plastering in the students' dormitories and other school buildings; keep the granolithic walks in repair; and do the necessary construction work in connection with the erection

good building activity declare that it is first class in every way.

Instruction in plastering is also given to the Hampton bricklayers. The boys begin with exercises in trowel handling and then pass on to work on plain walls and the different kinds of arches that are commonly used in modern building practice. They are taught how to use the common tools with which the average plasterer must earn his living. Here, again, the Hampton students receive a wide range of practical training in the construction and repair work done on the numerous school buildings.

The agriculture boys at Hampton receive instruction in the bricklaying and plastering department one day each week for three months. They are

taught concrete work and the building of small piers, fence posts and water troughs. They also have some elementary work in plastering. Boys who are taking the regular trade-school course in carpentry receive about twice as much work in the bricklaying and plastering department as do the agricultural boys. They are taught in the technical shop how to do plastering and how to build tiers, foundations, chimneys and fireplaces. A good idea of the method pursued in this department of work is offerded by a study of Fig. 8 of the illustrations.

The Saturday morning shop talks cover a wide range of subjects. Sometimes a boy is assigned to a subject and has to present his topic in the form of a practical demonstration before his classmates. Some of the subjects which are discussed by the instructor and the students during the Saturday morning sessions, are the methods and operations involved in brickmaking, the manufacture and use of cement, the principles of construction and the meaning of important trade and technical terms used in bricklaying and plastering.

Laying brick carefully and neatly to a given straight line, plumbing corners accurately, working with one another without friction, following blueprints exactly, tackling with enthusiasm difficult repair problems, getting ready to do things in the work-a-day world by doing practical work during school days, combining theory and good modern practice—these are some of the important lessons taught in the bricklaying and plastering course in the Hampton Institute Trade School.

The test of all Hampton's work for individual and race uplift is found in the results which can be observed on the school grounds and in the records of the graduates and former students who are winning the respect and good will of the best people throughout Virginia and the Southland. The negroes and Indians who have gone out from the Hampton Trade School since 1900 are making their way successfully as journeymen, as teachers, and as contractors. They are carrying into their everyday life the lessons of thoroughness and reliability which they learned through constant drill, careful supervision and wise counsel. They have gone forth, not only as builders of walls and chimneys, but also as builders of Christian character.

Industrial Education in the South—Fig. 8—*Students of the Class in Bricklaying at Work—This Is One of* 13 *Trades Taught Boys at Hampton Institute Trade School*

Concrete Silos Are Cyclone-Proof

In those sections of the country where tornadoes are not a rarity it is quite essential that farm and other buildings be proof against the elements, and while this unfortunately is not the case, generally speaking, there are instances where silos built of concrete have proven to be cyclone-proof. During the past summer one of the worst cyclonic storms that have visited the section in many years swept over Franklin County, Ky. leveling to the earth some 81 large barns. In one case a feed barn was scattered over a radius of 100 yd. and yet it was a well built structure and re-braced with new timbers only a year ago. All wooden silos were blown down or badly damaged, yet a monolithic concrete silo 16 x 45 ft. and built with the Polk system of silo forms showed no damage whatever and stood like a monument amid the surrounding wreckage.

New Publications

The Home Builder's Guide. By William Arthur. 186 pages. Size 5¼ x 7½ in. Numerous illustrations. Bound in illuminated board covers. Published by the David Williams Company, 231 to 241 West Thirty-ninth street, New York City. Price $1.00, postpaid.

This little volume by a well-known author on building topics will be found of special interest and value to the prospective home builder, the contractor and in fact to all who desire a thorough understanding of the value of good construction. The matter is written in the author's simple and direct style so that all may understand the why and wherefore of every operation.

The matter is comprised in 20 chapters, the first of which deals with the site after which the reader is carried along by easy stages from the planning of the home until it is finished in every particular ready for occupancy.

Hicks' Specification Blanks for Frame or Brick Buildings. By I. P. Hicks. Bound in paper covers. Published by David Williams Company, 231 to 241 West Thirty-ninth street, New York City. Price 25c. each, or $2.50 per dozen.

This, as its name indicates, is a blank form of specification and is arranged to cover all the work likely to be called for in erecting dwelling houses, churches, school houses and other small public buildings in various sections of the country. Following a statement of the General Conditions under which the work is to be done, there are specifications for the mason, the plasterer, the carpenter, the painter, the plumber, the tinsmith, the electrician, the heating contractor, and also for the hardware that is to be installed. Reference to any portion of the specifications is greatly facilitated by a comprehensive index.

Colonial Mansions of Maryland and Delaware. By John Martin Hammond. 304 pages. Size 6½ x 9¾ in. 65 illustrations. Bound in illuminated board covers. Published by J. B. Lippincott Company. Price $5.00 in a box.

This work is the fourth of a series upon the historic colonial houses of the Eastern United States, specifically of New Jersey, Virginia and of the vicinity of Philadelphia. The three books were, as is the present volume, printed in limited edition. The author has been a collector of beautiful houses and personally visited all those illustrated and described in the volume in review. The beginnings of architectural progress in this country are considered, and then the famous mansions in Annapolis, Baltimore, Howard, Talbot, Queens and many other counties are mulled over in a way that makes one long for the days of the return of the stately minuet and the saddlebow. Generation after generation lived in these homes and we see glimpses of a still, well-filled life of well-rounded pleasures and pursuits that may well give food for thought to us of the rushing, changing, highly specialized twentieth century. The book will make a wide appeal to those who love architecture for itself alone, and those who like to dream of life among the gay belles and cavaliers of other days will find in this work a guide and a delightful romance.

Masonry. By George R. Barham. Size 5 x 7½ in.; 184 pages. Illustrated with 358 sketches. Bound in board covers. Published by Longmans, Green & Co. Price, $1.00.

This little work has been prepared as an elementary text-book for students in trade schools and apprentices, yet the matter will also be found of much interest and value to those who have passed the elementary stages of masonry in so far as it relates to building construction. The author was formerly teacher of masonry and trade geometry at the Northern Polytechnic Institute, London, and is a practical mason who has had many years' experience in building work. The matter has been prepared with the object of giving the greatest amount of information to the practical student, while keeping in view the requirements of the City and Guilds Examining Authorities. Examples of stereotomy in stone cutting have been added with the hope that they will prove of service to all engaged in the craft, either as draftsmen or workmen.

Architectural Drawing. By Oscar S. Teale. 238 pages. Size 5½ x 8 in. Numerous illustrations. Bound in flexible covers with rounded corners. Published by author. Price $1.75.

This is a text book and practical guide for students in architectural draftsmanship and tells just how to do the work. The author is an instructor at the Teachers' College, Columbia University, and feeling the need of an acceptable guide for elementary work as a foundation for the work of advance students, prepared the text book under review. It is the first of a series of books on the same and kindred subjects by the author and it is his aim that they should be of great value to the student of drawing in any of its various phases, and particularly to teachers of drawing. Most of the things that the beginner does not need at the start have been omitted, but the student who aspires to higher work and is in need of fuller information will find what he should have in books which are to follow this in publication.

Death of Architect F. N. Varney

In the death of Freeman N. Varney, which occurred on November 4, the city of Detroit, Mich., lost one of its pioneer architects. He was born in Corinth, N. Y., 57 years ago and when he removed to Detroit he associated himself with his brother, A. C. Varney, and the practice of architecture was continued under the style and title of Varney & Varney. Later the firm name was changed to Varney, Winter & Varney. Individually and as a firm, many of Detroit's important buildings were planned, these including hotels, apartment houses, factory buildings, etc.

Construction of Concrete Chimneys

Method by Which Chimneys of Monolithic Concrete Can Be Easily Poured at a Minimum Cost

By Percy H. Wilson

AN examination of fire statistics would show that defective flues are the cause of a great majority of the fires that occur in dwellings. It is an old saying among architects that money put into a thoroughly good chimney is never wasted. So far as safety from fire is concerned, the chimney is the most important structural feature of a building. But almost countless fires have shown that careless workmanship, and in some cases bad design, in chimney construction prevail to an alarming extent.

A properly constructed chimney should be a seamless monolith, and in recognition of this fact builders are now using concrete. Concrete chimneys are poured in a plastic state and harden into so much solid stone. They have no joints, and

Fig. 1—Ornamental Treatment of a Concrete Chimney

Fig. 2—A Concrete Chimney in Course of Construction

Construction of Concrete Chimneys—By Percy H. Wilson

sparks or burning soot cannot come into contact with surrounding woodwork.

Small concrete chimneys can be constructed in two ways. An outer and inner wooden form, between which the concrete is poured, can be used, or the inner form may consist of a clay or concrete tile flue lining, either round or square in section. Where the tiles may be procured easily, it is a simpler operation to use them for the inner form.

All chimneys, regardless of size, should have good foundations. If the chimney is not carried down to the depth of the cellar, it should have the foundations at least below frost line. For ordinary conditions a depth of 3 ft. below ground level will suffice. The foundation consists of a concrete slab 12 or 18 in. thick and 9 in. larger on every side than the outside dimensions of the chimney. Where the house is constructed with concrete walls, the chimney is cast as an integral part of the walls, and, consequently, needs no separate foundation.

The forms necessary are simple and easily made. Fig. 2 illustrates the method of constructing forms and the manner in which they are held securely together. In this illustration will be seen the two flues which constitute the inner form. To make the depositing of the concrete and the placing of flues an easy matter, forms are built up as the work progresses. Where the chimney is hidden by interior plaster and the walls of the building, only

rough forms are required, such as are shown in Fig. 2. When roof level is reached more attention must be given to the forms in order to secure a smooth and even surface. Therefore see that the boards form tight joints and that each section of form is properly aligned.

If desired the chimney can be relieved with a simple ornamental design, such as is shown in Fig. 1. In providing for this it should be remembered that the ornamentation must be placed on the inside of the outer form and that the design will be reversed on the surface of the chimney.

Concrete for this work is proportioned one part Portland cement to two parts sand to four parts crushed stone or gravel. In mixing the concrete it is convenient to remember that one bag of Portland cement is equivalent to 1 cu. ft., so that the proportion can be stated as one bag of Portland cement to 2 cu. ft. of sand to 4 cu. ft. of stone. A bottomless measuring box of 2 cu. ft. capacity is convenient in measuring the materials. The concrete is mixed mushy wet and well tamped into the forms.

While not absolutely necessary for small chimneys, it is a wise precaution to embed vertical ⅜-in. or ½-in. steel rods in each corner of the chimney. It is often the custom to wrap the tile flue forms in one or two thicknesses of tar or building paper so as to leave a small space around the flues, thus allowing for expansion of the concrete, when heated, the purpose being to prevent cracking.

Capacity of Furnaces with Single Register

Frequently in heating a church or school building it is the practice to use but one register placed immediately above the furnace, and the size of the pipe and register is usually determined by the heating contractor in accordance with the experience he has had with such work. In order to prevent the errors which might naturally be made by the inexperienced man, the Utica Heater Co., Utica, N. Y., has presented the following advice:

"When but one register is used immediately above the furnace, the following sizes of warm-air pipes and registers are recommended, the register faces in all cases to be without valves, so that it will be impossible to shut off the outflow of air heated by the furnace and permit the furnace to be excessively heated with disastrous results.

"An 18-in. fire-pot furnace will fill one 16-in. pipe which should be connected with a 24-in. round register or an 18 x 24-in. register.

A 22-in. fire-pot furnace will fill one 20-in. pipe which should be connected with a 28-in. round register or a 24 x 27-in. register.

"A 24-in. fire-pot furnace will fill one 23-in. pipe which should be connected with a 33-in. round register or a 24 x 36-in register.

"A 26-in. fire-pot furnace will fill one 26-in. pipe which should be connected with a 36-in. round register or 26 x 36-in register.

"A 28-in. fire-pot furnace will fill one 30-in. pipe which should be connected with a 30 x 36-in register.

"A 30-in. fire-pot furnace will fill a 34-in. pipe be connected with a 38 x 42-in. register.

"When a discharge pipe is very short and runs to the first floor and no register box is used, the pipe can be made the full size of the face plate of the register used."

The capacity of furnaces increase but not regularly through each larger size, and on this basis the sizes given check up closely with the ratings commonly used whether in the cubic foot capacity or the area of pipes filled.

Wooden Houses in Europe

Wood holds its own in parts of Europe where timber is much scarcer and of higher price than in America. This is true particularly of house building in rural communities. The special measures taken by the Swedish government in recent years to promote the increase of small holdings and the widespread use of timber in the construction of houses and farm buildings in Sweden attracted attention sufficiently in England the past year to cause the sending of a committee to Scandinavia to study the subject at first hand. The committee's report brings out some interesting points regarding the universal use of timber for constructive purposes in Scandinavia. The committee found, what is often a surprise to visitors to a country where timber is a natural product, that house construction in wood is not appreciably cheaper than brick, even in Sweden. Outside the large towns first-class houses constructed entirely of wood are in great favor, and in many cases afford striking architectural studies, which the sylvan surroundings invariably blend into a charming picture. Indeed, Swedish experience affords valuable evidence of the durability of good timber construction, and Swedish architects say that timber buildings may be relied upon to last fully fifty years.

Comparatively little trouble seems to be experienced from dry rot or insects. This is largely accounted for by the fact that timber buildings are always well elevated on a stone or other foundation, which permits of free circulation of the air, and in most cases the ground is dug out over the whole or part of the site to form a cellar. Further, Stockholm tar is frequently used as a preservative. The report includes particulars in the form of specifications and priced schedules of quantities for the construction of timber houses and stone and timber farm buildings for a typical Swedish small holding.

The subject of wooden houses in England is being investigated along other lines. A writer in one of the London papers has been digging among old records in Ireland and finds that framed houses were dispatched with immigrants from London in 1613 and erected in the Diamond at Londonderry and in the Diamond at Coleraine for occupation by the English settlers. Some of these houses were in existence and tenanted up to about 1850.

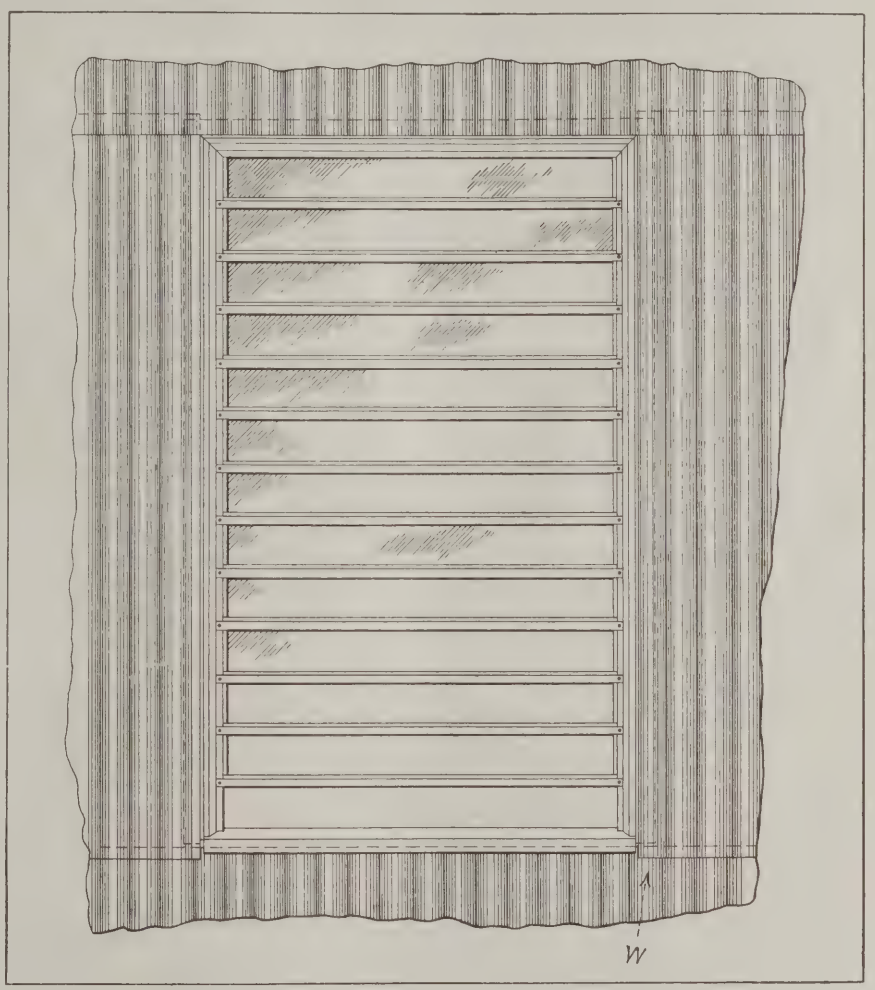
An exhibit of California redwood, which includes portions of house construction as well as mantels, water tanks, pillars, foundations, fences, etc., was one of the interesting features at the Country Life Permanent Exposition in the Grand Central Terminal, New York City. Mendocino County, California, is one of the sections of the Far West where the redwood tree grows to a great hight, some of them running up hundreds of feet, while the diameter in some instances is as large as 20 ft.

A Window Frame with Glass Louvres

Some Suggestions of Practical Value in the Laying Out and the Erection of a Rather Unusual Article in Sheet Metal

WHILE not directly concerned, perhaps, in its construction, the up-to-date builder who is always alive to opportunities for familiarizing himself with every phase of the trade, is likely to be interested in knowing how a window frame of sheet metal and having glass louvres may be made. He will therefore find much that is of suggestive value in the particulars which follow relating to a piece of work of this kind. The sheet metal window frame was provided with louvres to give ventilation to a bridge connecting two buildings, and as more or less light was desired the louvres were made mainly of glass. An idea of the frame may be acquired from Fig. 1, which represents an elevation.

The skeleton of the bridge is composed of steel members, and the exterior covered with corrugated iron, backed with terra cotta blocks which are covered on the interior with rough plaster to give a finish. The openings for the frames are bounded on all four sides by channels, as shown in Figs. 2 and 3, and to allow for irregularities in these members, as well as for boltheads and the like, the frames were made 1 in. smaller all around than the opening. When set in position the frames were held plumb and in line by small pieces of any handy material, as indicated by *A* in Fig. 2 of the accompanying illustrations. The frame was then secured to the steel work by four lag screws—one in the center of each side—and driven through a hole in the channels and into the wood fillers of the frames.



A Window Frame with Glass Louvres—Fig. 1—Elevation of the Louvre Frame, Showing the Point Where Special Care Must Be Used

In Fig. 3 is given a section of the jambs or vertical sides of the frames. The shape is such as to present no more than the ordinary difficulties for forming on either the hand brake or power drop press, which is true also of the sill and head shown in Fig. 2, and in fact is true of all other parts.

The procedure of making and erecting these frames was about in this manner. After the various parts were cut out and formed the two jambs were joined to the head and then to the sill. All joints were strongly riveted and soldered, the workmen making sure in the meantime that the frame was square and free from twist. The wood was now laid in and the slide pieces or fillers, *O* of Fig. 3 slid on. The bottom glass rests, *B* of Fig. 2, which are reinforced by light band irons, as indicated by the drawings, were then fastened to the frame by small wood screws, as shown by *P* in Fig. 3, and all soldered over.

To indicate just where to drive the screws in the frames, prick marks were made there during the cutting out of the work so that the assembler did not have to stop and lay out the spaces for the louvres on each frame.

With the frame standing first on one of its sides and then on the other, the glass slides, shown at *C* in Fig. 2, were nailed to the jambs and soldered along their top sides to the frames for additional strength and to make a water-tight joint. As for the lower glass rests, the position for these slides was indicated by prick marks made while the jambs

were being cut out. With the slides all in place the shop work was ended on the frames, except the preparation of the top glass rests *T X* of Fig. 2, the erecting or setting of the frames being done as described in the foregoing. It is to be understood, of course, that the setting of the frames was done before the corrugated iron or terra cotta blocks were in position.

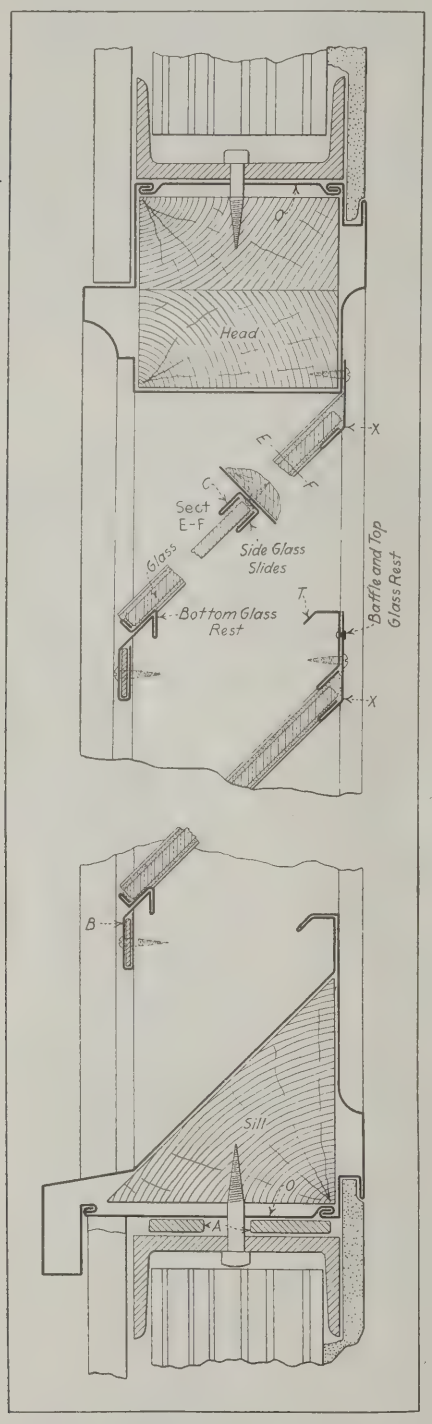


Fig. 2—Vertical Section Through Sill

When the frames were set the glass was laid in by first running putty along the bottom glass rests and into the slides. Then the long strips of glass were carefully forced down through the slides and into the bottom glass rests. The back or top glass rests were then filled with putty and forced onto the glass, a wood screw only at each end, designated *D* in Fig. 3, holding them in place, for in case of breakage of the glass it would be necessary to remove the top glass rest; hence the advisability of having these parts strongly fastened though still so as to be removed easily. The parts labeled *X* in Fig. 2 are made of 18-gauge material and the baffle *T* of the same gauge as the rest of the parts of the frame which is 24 gauge.

It will be noticed that the corrugated iron just laps onto the jambs and the head, but that the sill covers the corrugated iron by a sort of pocket, all of which is in conformity with modern practice of doing away as much as possible with pockets which complicate matters so much as to offset their good features. By erecting the corrugated iron as shown in Fig. 1 and seeing to it that it hugs tight to the frame, there will be no leakage. Special care must be used, however, at point *W*, Fig. 1, the usual custom being to slip a small flashing piece of sheet metal between the upper and lower sheets of corrugated iron at that point. This flashing piece is bent back and under the sill and need not be soldered to it, although it would be added precaution to do so, and then water finding its way behind the corrugated iron and flowing down the jamb will be guided over and to the outside of the lower sheet of corrugated iron.

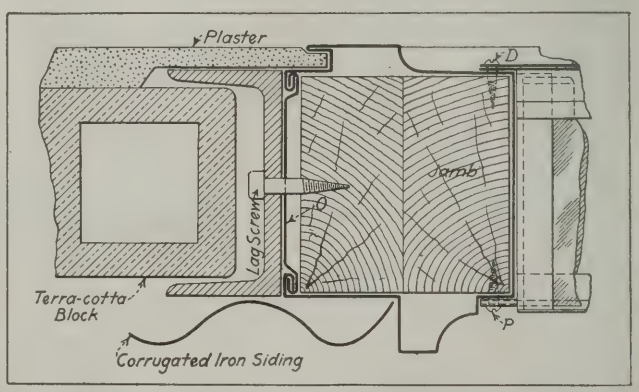


Fig. 3—Horizontal Section Through the Frame

A Window Frame with Glass Louvres

Dwelling House Construction in Newark, N. J.

A considerable amount of improvement work in the way of dwelling house construction is in progress in the outskirts of Newark, N. J., and vicinity on what is known as the Old Asylum Tract on South Orange Avenue. Sixty-two frame houses designed for occupancy by three and six families are about being erected and in addition 60 frame and stucco two-family houses are about being commenced in Norwood Manor, north of South Orange Avenue. The two operations involve an estimated outlay of something like $650,000. Between 50 and 75 houses are going up in the Weequahic Park section and in the Forest Hill and Woodside sections. There are also 15 two-families under way in South 15th Street. The statement is made that in what is known as the Western Section of Newark more than 300 houses for occupancy by one, two, three and six families are in course of erection or about to be commenced. There is sufficient work in progress to keep labor in various branches of the trade fairly busy for some little time.

Current News of Builders' Exchanges

Various Happenings of Interest to the Members of Exchanges in All Parts of the Country

New Exchange at Neenah, Wis.

THE Twin City Builders' and Traders' Exchange has just been organized at Neenah, Wis., by the builders, contractors and others connected with the allied trades in that city and Menasha. The officers for the ensuing year are as follows:

President.....Henry F. Krueger
Vice-President.....Anton Nielson
Secretary and treasurer.....D. T. Leisk

The directors include George A. Loescher, A. H. Wickert and F. J. Oberweisser. Appropriate quarters are being secured and the organization will be duly incorporated.

Meeting of the Minnesota State Association of Builders' Exchanges

In accordance with its previously announced program the Minnesota State Association of Builders' Exchanges held its fourteenth annual convention in St. Paul on Wednesday, December 9, there being present delegates representing 15 cities. Many topics relating to the building business were discussed, including industrial education, co-operation of exchanges, the workman's compensation law as well as other legal enactments effecting employers and employees. As a result of the discussions a special legislative committee was appointed with full power to act for the association.

One of the very interesting features of the convention was the luncheon given to the visiting delegates at the Commercial Club by the members of the St. Paul Builders' Exchange. Retiring president F. H. Romer of the St. Paul Exchange was master of ceremonies and in happy vein welcomed the delegates. The menu was in the form of a blue print "specification" and was the basis of much humorous comment during the progress of the feast.

The reports which were presented by the various officials and committees showed the organization to be in a flourishing condition and the delegates were highly pleased with the work which had been accomplished during the past year and were much encouraged at the outlook for the future. The officers elected for the ensuing year were as follows:

President. Emil J. Zauft, of Duluth.
Vice-Pres. M. W. Nelson, of Minneapolis;
H. E. Osgood, of St. Paul;
O. H. Olson, of Stillwater;
J. B. Nelson, of Mankato;
John Lauritzen, of Fergus Falls.
Secy.-Treas J. H. Cooke, of Duluth.

The executive committee for the ensuing year consists of J. L. Robinson, of Minneapolis; J. A. Seeger, of St. Paul; E. E. Barnes, of Duluth; James O'Neill, of Faribault and W. H. Jackson, of Stillwater.

Banquet of Norfolk Builders' Exchange

The members of The Builders' Exchange of Norfolk, Va., held their annual banquet at the Monticello Hotel on the Evening of Saturday, December 5, and it was a most enjoyable affair in many respects. Not only were good things to eat and drink provided, but there were interesting speeches by well-known men and vocal and instrumental music. President Augustus Williams of the exchange was toastmaster and introduced various speakers of the evening, which included Barton Myers, president of the Chamber of Commerce; Guy Webb, president of the Board of Trade, and E. B. Johnson, all of whom spoke briefly along general lines. They were followed by H. L. Lewman of Louisville, president of the National Association of Builders' Exchanges, and Vice-President John Trainor of Baltimore, who spoke of the work of that body, while I. Herbert Scates, secretary of the Baltimore Builders' Exchange and General Commissioner of the National Association of Builders' Exchanges, spoke most interestingly on the subject of a building code—a topic which is commanding a great deal of attention at the present time in various parts of the country.

Secretary George L. Wadsworth of the Norfolk Exchange presented a report covering the workings of that organization and in discussing building operations during the first eleven months of the year said, "It is true that building operations have decreased in Norfolk this year owing to the difficulty in obtaining funds for important operations, together with a general desire to pursue a more conservative course until the situation assumes a more normal aspect. For the first eleven months of this year there were 651 permits issued for building operations, amounting to $1,951,571, while for the pervious year the 721 permits issued totaled $2,369,627—a decrease for 1914 of $418,056."

Associated Builders' Exchanges of Michigan

At the second annual convention of the Associated Builders' Exchanges of Michigan, recently held in Kalamazoo, one of the most important topics considered was that of the relations between builders and architects. President H. L. Lewman, of the National Association of Builders' Exchanges, spoke on this subject, explaining what has been done to improve the relations between the two bodies, and referred to the movement to accurately define and standardize plans and specifications in order to eliminate unnecessary hazards and uncertainties in construction contracts and bring about other changes calculated to place the business of the builder and the architect upon a more satisfactory basis.

The officers elected for the ensuing year were:

President.....W. F. Wiselogel, of Muskegon.
1st Vice-President....Chas. Bryan, of Detroit.
2d Vice-President.David Little, of Kalamazoo.
3d Vice-President...A. J. Nichols, of Lansing.
Secy.-Treas....A. H. Shank, of Grand Rapids.

It was decided to hold the next convention of the Association in Muskegon.

Meeting of Omaha Builders' Exchange

A very interesting meeting of The Builders' Exchange of Omaha, Neb., was held at the headquarters in the Barker Block on Tuesday evening, December 8, when the new workmen's compensation law and mutual insurance under that law were discussed. The speaker of the evening was J. W. Steinhart of Nebraska, vice-president of the New Mutual Casualty Company, organized by the manufacturers of the state. The subject is one that is of great interest to building-contractors, and, in fact, to all employers of labor, especially of a class of labor in which accidents are more or less frequent.

At this meeting of The Builders' Exchange nominations were made for officers and directors for the ensuing year.

New Home for Minneapolis Builders' Exchange

Officials of the Builders' Exchange at Minneapolis, Minn., have taken up the question of a future home for the Exchange but for a time at least they will occupy their present quarters in Sixth street. They are

making some improvements in these quarters, removing partitions to give enlarged space and carrying out alterations to meet their growing needs.

Early in the winter the members of the Builders' Exchange of Minneapolis, formed a League for the purpose of inaugurating bowling contests, meetings being held regularly every week. These meetings which are held at Schneider's opposite the headquarters of the Exchange, are proving a great success and there is much friendly rivalry among representatives of various branches of the building industry as represented in the membership as to which will roll the highest score.

Across the river the members of the St. Paul Builders' Exchange have a bowling club and they meet weekly with results which are somewhat astonishing in the scores rolled up.

A New Exchange at Jackson, Miss.

The leading contractors in the various branches of the building and allied industries in Jackson, Miss., have completed the organization of a Builders' Exchange and have secured commodious quarters in the Merchants & Manufacturers Building.

Government of the Birmingham Builders' Exchange

The committee appointed last spring by the Builders' Exchange of Birmingham, Ala., to revise the Constitution and By-Laws had in mind making it an organization to be governed by its members and for all its members, and for that reason embodied in Article VI of the Constitution a clause providing for the election of a representative on the Board of Directors from each craft, thereby insuring that the interest of that craft would be conserved at all times. The committee has called attention to the fact that it is now incumbent upon the members of each craft, whether organized into a working body or not, to notify the Nominating Committee of the membership, so that the committee can select a man or men to serve as Director.

Springfield Builders' Exchange Reorganized

The Builders' Exchange of Springfield, Ill., has recently been reorganized and has opened offices and reading rooms in the Unity Building. Officers are: D. A. Debares, president; A. W. Rogerson, secretary, and D. M. Stewart, treasurer.

At a special meeting of the Board of Directors of the Builders' Exchange of Memphis, Tenn., Noble Crawford was elected secretary of the Exchange to fill the vacancy caused by the sudden death of the late T. H. Gothard.

The Standard Arcade

Some time ago reference was made in these columns to the demolition of the Tower Building in Lower Broadway, which was the first business structure erected in the city in which steel frame work instead of brick walls supported the floors. Since this building and the one adjoining it was torn down it has been decided to utilize the site for an arcade which will be three stories in hight and cost about $225,000. It will be known as the Standard Arcade and it is expected to be ready for occupancy about the first of April, 1915. The plans were recently filed by Severance & Van Allen, as architects for the Standard Oil Company. The characteristic feature of the building will be the wide arcade, with booths and stores on each side, extending through from Broadway to New Street.

A $125,000 building is being erected in Havana, Cuba, for the Young Men's Christian Association.

The Building Situation and Outlook

The reports which reach us from leading centers of the country covering building operations for November indicate growing conservatism on the part of building contractors, there having been a shrinkage in nearly 100 cities of about 20 per cent. as compared with November 1913. This is a little better showing than we were able to report for October. The comparatively few increases are confined to cities of the second magnitude, the only exceptions being Cleveland and Pittsburgh. Here and there among the smaller places heavy percentages of increase are indicated, but the amount of capital involved is small. In Oklahoma, for example, building operations projected in November 1913 amounted to $8,615, while in November 1914 the total was $1,509,915, but this was due altogether to the permit for the State House to cost $1,500,000. Another notable increase is found in Tacoma, where, in November 1913 the estimated cost of improvements was $63,520 and in November 1914 the improvements projected were placed at $270,655.

Locally the building situation shows no improvement over recent months. The estimated cost of buildings for which permits were filed in November was 50 per cent. less in the Borough of Manhattan and 30 per cent. less in Brooklyn than was the case in November 1913. Some idea of the new work projected in Manhattan may be gathered from the fact that there were only 4 buildings for which plans were filed to cost $100,000 or more each. These consisted of a 16-story loft building to cost $400,000, a 12 story and a 6 story apartment house costing $400,000 and $300,000 respectively, and a 12 story hotel to cost $165,000. The Borough of the Bronx showed a slight increase, the figures being $416,614 in November 1913 and $448,013 in November last. In the Borough of Queens where a great deal of activity has prevailed in the way of dwelling house and factory construction there was little change in the two periods, November 1914 showing an increase of one per cent. over the same month the year before.

Taking the country over the figures for the eleven months ending November 30 were only a trifle under those of the corresponding period of 1913. While the outlook for the new year is decidedly mixed at the present time nevertheless a large amount of work has been projected and architects and builders express a growing confidence that the ensuing twelve months will show a fair total. Much, of course, will depend upon the financial situation and the ability of those undertaking important building projects to secure the capital necessary to carry them to completion. At present such funds appear to be in somewhat better supply than was the case a few months ago.

A handsome granite residence is about being erected in Detroit, Mich., for W. O. Briggs from plans prepared by Chittenden & Kotting, Ford Building, Detroit, Mich. We understand that about 7000 ft. of granite will be required and the contract for the stone has been given to the Plymouth Seam Face Granite Company, 101 Park Avenue, New York.

According to the president of the Royal Institute of British Architects there are fully 1000 members of that profession serving with the colors.

JUST OUT— THE NEW— SMITH MIXERETTE

$246.00

F.O.B. Milwaukee, Wis.

A brand new Smith Mixer of the non-tilting type—the mixer that answers the demand for a light, portable and inexpensive machine for the small concrete work.

Read over these partial specifications and see just what this dandy little mixer is—then you will realize what a wonderful money making and labor saving machine has been produced for your use.

Enclosed Gear Ring— Big drum ring and driving pinion enclosed and protected against dirt and dust. This ring fits snugly into casing, the machined surfaces forming a perfectly true sliding bearing.

No Main Roller, Shafts or Boxes— Gear casing forms pedestals which are securely fastened to truck frame.

Rope-Less Power Charger—Loading skip is operated by a series of gears eliminating hoisting cables, sheaves and drums. Lifts easily and smoothly, without the twisting, jerking motion common to pivot type loaders.

Low Feed Level Batch Hopper — This hopper is only 3 feet 10¼ inches above ground. With its low flaring opening it can be loaded with ease.

Truck—4-inch steel channel sills, 2-inch square steel axles, 20-inch and 26-inch wheels.

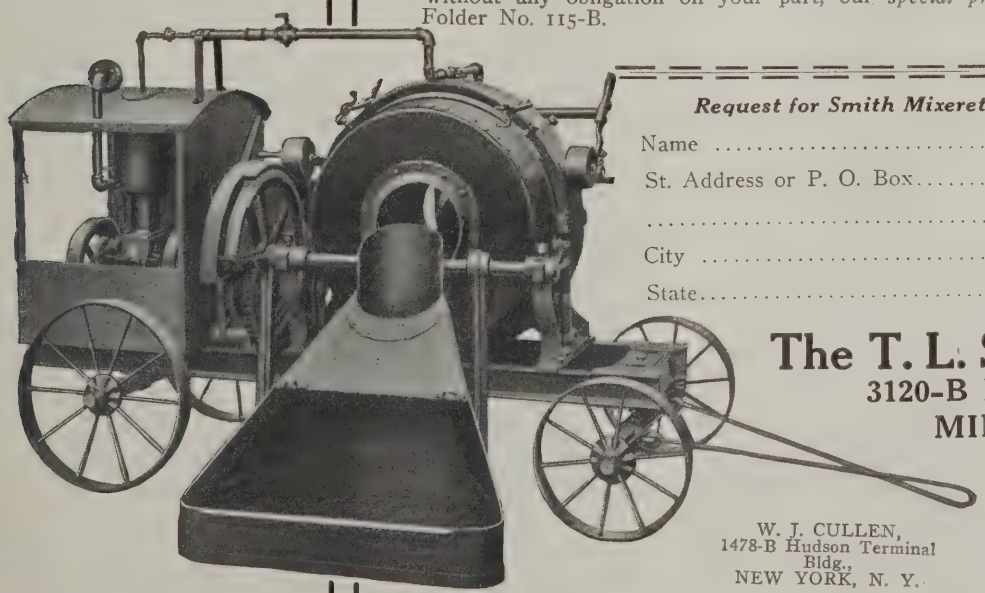
Capacity—5 cu. ft. loose material, 3 cu. ft. mixed concrete per batch, 5 cu. yds. per hour.

Price— On truck with power charger and high-grade vertical gas engine enclosed in steel house (as illustrated), $315.00. With low feed level gated batch hopper in place of power charger, $246.00.

These aren't all the good features. We haven't space to give the whole story, so fill out the coupon at the bottom and mail it to us. We'll send you, without any obligation on your part, our *special proposal* and Mixerette Folder No. 115-B.

$315.00

F.O.B. Milwaukee, Wis.



Request for Smith Mixerette Folder No. 115-B

Name .....

St. Address or P. O. Box.....

.....

City .....

State.....

The T. L. SMITH CO.

3120-B Hadley St.
MILWAUKEE, WIS.

1341-B Old Colony Bldg.
CHICAGO, ILL.

W. J. CULLEN,
1478-B Hudson Terminal Bldg.,
NEW YORK, N. Y.

J. J. SHANNON & CO.,
Dept. NB., 1744 Market St.
PHILADELPHIA, PA.

PERKINS & CO.,
1120-B Oliver Bldg.,
BOSTON, MASS.

ROSS HUNTER,
150-B South Pryor St.
ATLANTA, GA.

J. E. KING,
636-B Germania Savings Bank Bldg.
PITTSBURG, PA.

Fiberlic Building Board

FOR INTERIOR CONSTRUCTION

Pride and Profit in a Good Job

You, the men who specify FIBERLIC BUILDING BOARD for walls and ceilings, and you who put it up, have mighty sound reasons for entire satisfaction.

FIBERLIC is denser, stronger, more durable and has a wider range of usefulness than ground wood wall boards. It is adaptable to use in any building. Has plenty of body and will not split or crack.

FIBERLIC is cut with a saw and is as easily handled as fine lumber—no warping or bulging. It's up to stay as a monument to your good judgment and skill.

A better interior finish than old methods. Ask those who have tried it. None other is made from tough, long-fibred, exclusively controlled roots. None other is made in three good workable thicknesses—⅛, ¼ and ½ inches. None other is chemically treated to destroy all possibility of vermin. None other will take such beautiful and durable finishes. None other is so effective an insulator against heat, cold, sound and vibration. None other is naturally reinforced.

Send for free samples of FIBERLIC.

Write your name and address on the margin of this page, also name and address of your local building material dealer. Tear out the page and mail promptly. We will gladly send also any further information from our Builders' Department that you may wish concerning FIBERLIC and its many uses.

If you are a dealer, our exclusive agency proposition will interest you.

The Fiberlic Company

Camden **New Jersey**

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Soft Pine in Building Construction

Under the title "An Architectural Aid" there has just been issued in the interests of the Arkansas Soft Pine Manufacturers a most attractive *brochure* illustrated by means of halftone engravings showing the manner in which the logs are taken from the forest and turned into lumber, also various views showing the

Soft Pine in Building Construction—Fig. 1—Use of the Material for Exterior Work

practical application of the material for interior trim as well as for exterior woodwork. Fig. 1 of the illustrations represents an end view along a broad veranda of a summer home where Arkansas soft pine has been used for siding, porch columns, porch floors, etc., the claim being made that this wood has the distinct advantages of being easy to work and of holding paint. In Fig. 2 is presented an interior of an attractive home in which the trim, columns and stairs serve to emphasize the great value of Arkansas soft pine for interior woodwork. Its value for this purpose is said to lie in the high quality of the wood, to which is added the figure and grain. The variation in color and texture is such

Fig. 2—Soft Pine as Used for Interior Trim, Stairs, Columns

as to afford a pleasing assortment of effects, thus adapting it to a wide range of requirements. For exterior woodwork it is said to be of exceptional value as it is virtually free of pitch and therefore will take paint or stain in a satisfactory manner. An interesting feature of the closing pages of the publication in question is found in eight panels representing Arkansas soft pine variously finished, the panels being in colors to represent the actual appearance of the work.

Jennings' "Little Wonder" Tool Kit

There has just been placed on the market by C. E. Jennings & Co., 71 and 73 Murray Street, New York City, what is known as the "Little Wonder" tool kit No. 60, a view of which with the tools exposed is presented in Fig. 3. This kit is something of a departure from the regular line of outfits of this character and has a removable tray with a wire handle and spaces for nails, screws, tools, etc., the idea being to carry the tray from place to place as the work may require. This is a rather unique and at the same time desirable feature and one which cannot fail to be appreciated by the practical mechanic. The handle of the tray also acts as a handle for the chest which is made of handsomely finished seasoned lumber. The chest is of convenient size measuring as it does 17 in. in length by 8 in. in width and stands 6-⅞ in. high. When filled with the 22 useful and fully warranted tools

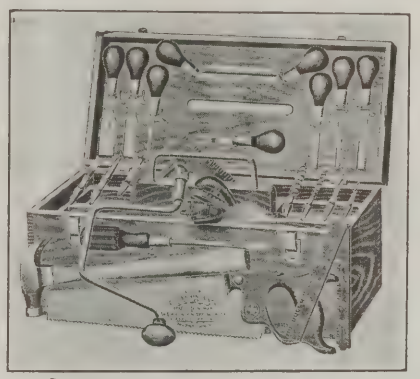


Fig. 3—The "Little Wonder" Tool Kit No. 60

comprising the outfit, it weighs about 11 lb. The chest has strong strap hinges and suitcase bolts and is lock-cornered. In shipping the handle may be pushed down flush with the lid. It is made in such form that it is carried like a suitcase.

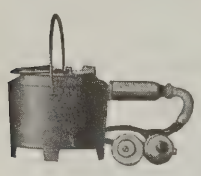
Something About "Aladdin" Houses

There has just been issued from the press a most attractive publication of 96 pages illustrated by means of numerous half tone engravings and relating to what is known as "Aladdin" houses as made by the North American Construction Company, Bay City, Mich. The work in question is the third edition of catalog No. 25 and the houses are of such a character that they are referred to by the company as capable of being "Built in a Day." The early pages of the catalog are devoted to an interesting description of the "Aladdin" system of construction and emphasis is laid upon the point that the material is furnished directly from the forest to the home. The company states that when one buys an "Aladdin" house it means all lumber cut to fit accurately from foundation to peak, and that all inside

and outside trim, hardware, nails, paint for two coats inside and out, putty, plaster board, or lath and plaster for lining the house inside, and in fact everything that is necessary to render the building immediately habitable. The lumber used is described and emphasis is laid upon the fact that waste is eliminated. The company has mills in Michigan, Texas, Oregon, Florida and Missouri, so that it is in a position to meet requirements in all sections of the country. The illustrations relate to houses which have been erected in accordance with the "Aladdin" system and the half tone views are accompanied by floor plans showing the layout of the rooms together with very brief specifications and figures of cost. The entire work is arranged in a way to render it most attractive to the builder and prospective house owner and those readers of *The Building Age* who are interested can readily secure a copy of the book by making application to the address given above.

Portable Glue Pots and Cookers

One portion of the equipment of the up-to-date carpenter's and cabinet-maker's shop which does not always receive the attention which its merits demand is the glue pot. It is a well known fact that success of a piece of cabinet work depends in some measure at least upon the quality of the glue that is used and the manner in which the work is done. Even heat of the proper



Portable Glue Pots and Cookers
Fig. 4—Cast Iron Pot

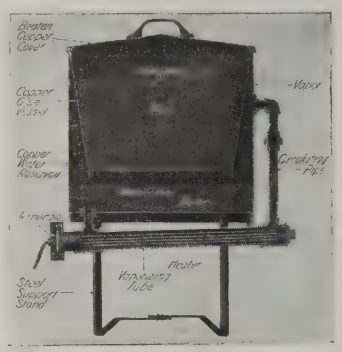


Fig. 5—Vertical Cross-Section Through a Westinghouse Glue Cooker

intensity is necessary for the best results, and in order that these may be accomplished the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa, has placed on the market a line of portable glue pots and glue cookers which cannot fail to command the attention of every carpenter and cabinet-maker who is alive to his opportunities. In placing these goods upon the market the company calls attention to the fact that electric heating combined with a water bath gives the best and always uniform results besides being more convenient to install and use. Wherever there is an electric circuit little expense is involved in using electrically heated glue pots. Steam and gas

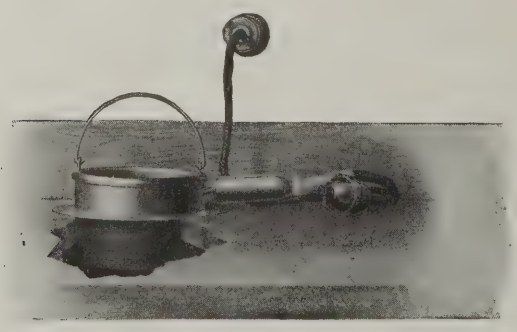


Fig. 6—Glue Pot for Bench Use

lines are eliminated; there is no fire risk, no flame and no smoke. In Fig. 4 of the illustrations we show a general view of a cast iron portable glue pot which can be connected to any lamp socket and used wherever desired. It is furnished in seamless drawn copper or galvanized cast iron and is very strongly made so as to stand rough usage. In Fig. 6 we show a glue pot for use on the bench. This is similar to the copper portable glue pot, the heaters and vessels being interchangeable. Where quantities of glue are required it is essential to make use of glue cookers and in Fig. 5 we show a section through a Westinghouse glue cooker. This is made of copper and is provided with circulation type of immersion heater. The glue is heated only by the water vapor. The heater is of sufficient capacity to melt the glue in approximately one hour and give the necessary heat control. An illustrated folder sent out by the company shows the capacity of the various sizes manufactured, also the price of each and the amount of electricity required.

Exhibit at the Panama-Pacific Exposition of the Universal Portland Cement Co.

Portland cement made from blast furnace slag is to be shown in its various stages of manufacture in the exhibit which has been installed in the Universal Portland Cement Company at the Panama-Pacific International Exposition. The completion of the exhibit so far in advance of the actual opening is but typical of what the builders of the Exposition have constantly maintained, that a new note in the handling of expositions had been struck and that when opening day occurs February 20, 1915, everything will have been made ready and in its place. The extraordinary growth of the reinforced concrete industry in the past few years has brought the making of cement into great prominence. Through the conversion of slag, which has hitherto been practically a waste product, into a valuable building material, another step has been taken in the elimination of waste in manufacturing. The Universal company is a subsidiary company of the United States Steel Corporation, which is one of the largest single exhibitors at the Exposition. This exhibit, while a part of the parent company's section, is distinct and occupies a commanding position in the southern portion of the building. The architecture is that of a series of concrete arches in the background. The front of the central part of the section is built to resemble the entrance to a factory, all done in concrete. Beautiful floral decorations in concrete troughs appear above the arches. Cement posts with tubular railings mark the boundary lines of the exhibit.

The exhibit is intended to typify the uses of cement on the farm, also in the erection of factories, residences and bridges, the laying of streets, roads, walks, etc. In the archways to either side of the central portion of the exhibit are fine oil paintings illustrating varied uses to which cement may be put and suggestive uses for architects.

The first sight to greet the eye on entering the section is a large-sized *replica* of the company's factory near Pittsburgh, Pa. and is an exact reproduction. It is a mechanical contrivance called a scenograph and is electrically operated. Trains of cars are seen moving back and forth in the foreground, slag cars are run out to the dumps and a large crane of the traveling bridge type is seen in action in the background. Everything in the scene is designed to give the appearance of active operation. The lighting effects have been well executed. Daytime and sunset effects appear and with the scenic background used, give a realistic touch to the view. As the sunset effects gradually appear in the sky, the interiors of the buildings are lighted up and the huge roller mills are seen in operation.

A large case shows Universal cement in its various stages of manufacture. The quarrying of the limestone is first shown. Then calcite which is the limestone after it has gone through the crushing process. The slag, which is granulated, is then mixed with the calcite in tube mills. This mixture is calcined in rotary kilns at a temperature of 2500 to 2800 degrees Fahrenheit. Thence it goes to the clinker storage pits and then to the finishing mills where are the automatic samplers, testing laboratories and where the sacks are filled and loaded into cars for shipment. Samples of the cement as it appears in the different processes of manufacture are shown.

Other features of interest in the exhibit are a reinforced concrete silo as it is built for use on the farm;

(Continued on page 82)

QUICKER SERVICE— BIGGER PROFITS— BETTER GOODS—

Make Me Prove It!

I WANT to show you how you can increase **your profits.** All I want you to do, Mr. Contractor, Mr. Carpenter, Mr. Builder, is to send me the coupon—or a post card—for our Catalog. I will send it to you—anywhere—and write you at the same time. The fact that

WE SERVE 10,000 Contractors Carpenters and Builders Regularly

demonstrates that our service and material is **right** and that we are making money for them. We are. And we can make it for you, too. Make me deliver the proof. I can.

Satisfaction or Money Back

Remember, every single one of the entire 5,000 items in our catalog is sold under our famous legal-binding guarantee. We guarantee our quality to be the very highest. We guarantee prompt and safe delivery to you—anywhere; it makes no difference where you live. And we guarantee absolute satisfaction or refund your money. You are the sole judge. There is no argument. Our estimates are "Guaranteed Right." Try us for the proof.

We Ship to You Anywhere

No matter where you live, we guarantee safe and prompt delivery. We have customers everywhere. Our plant is the largest in the world. We sell everywhere on earth. Our own architectural staff will work up your plans from your own rough sketches. The cost is but a fraction of what you would have to pay locally. For every nickle in freight, we will save you dollars on the bill. I want to tell you more about this when I write you.

5000 Building Bargain

Get Catalog Use Coupon FREE

Here are a few pages from our 132 page color-illustrated catalog of 5,000 Extraordinary Bargains in Building Material. Lumber at a saving of $100 to $300 a car. Millwork in special designs for immediate shipment. No waits. Roofing, Builders' Hardware, Paints, Wall Board, Everything! Crammed from cover to cover with money-savers. A veritable Builders' Encyclopedia. The book that creates low prices. Free on request. I want to send it to you. Will you use the coupon? Or a post card? I have started 10,000 others to greater profits by sending it to them. Let me start you. Today! Now!

WM. RIORDON,
Mgr. Contractors Dept.

Gordon-Van Tine Company

74 FEDERAL STREET, DAVENPORT, IOWA

GORDON-VAN TINE CO.,
746 Federal St., DAVENPORT, IOWA.

Gentlemen—Please send the books checked below.

☐ Millwork ☐ Plan Book

☐ Roofing ☐ Circular & Samples ☐ Lumber

Name .....

Address .....

Occupation .....

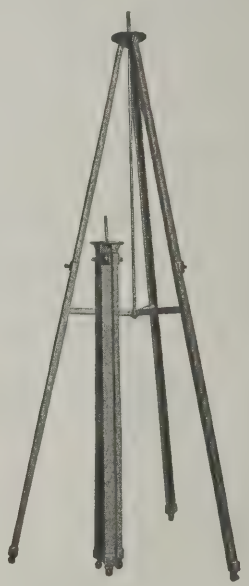
In sending for Plan Book, enclose 10 cents for postage and mailing. You will receive the books by return mail.

a 7 story building of fire-proof construction and showing a concrete fire escape, and a relief map of the United States showing the location of the company's plants and distributing stations. The furniture used in the exhibit is all of steel construction.

The exhibit, which shows careful planning throughout, has been installed by J. A. Race of the Universal company and under the supervision of Harry V. Jamison, director of exhibits for the United States Steel Corporation at the Panama-Pacific Exposition.

All-Steel Adjustable Scaffolding

In a 10-page catalogue just issued by H. B. Fuller, 186-190 West Third street, St. Paul, Minn., his high-grade all-steel adjustable scaffolding is described as



All-Steel Adjustable Scaffolding—Fig. 7—The Trestle in Place and Also As It Appears when Folded

being composed in the main of two parts—the trestles and beams. These are of sheet steel, and the trestles, or standards, are manufactured in the form of telescoping and folding tripods which support the beams and platform planks. The beams are telescoping shells. The feature of adjustment makes it possible to use the scaffolding under all conditions. When set up the trestles have the appearance of a photographic tripod, and may be folded up the same way. The trestles may be equipped with roller bearing casters to facilitate the moving of platforms when the floor is free from ob-

Fig. 8—The Scaffolding in Practical Use

struction. The trestles and the beams are galvanized. The latter offer a wide r nge in platform areas and are a rigid support for planks. They are made 10 ft. long in pairs, one part sliding inside the other. A lap of 2 ft. is required for safety, so that one pair of beams may be extended 10 to 18 ft. as desired. Three beams may be used to cover a span of 26 ft. and may be extended indefinitely with trestle supports at various intervals. The equipment can be assembled in a very

(*Continued on page* 84)

short time, and its construction makes it convenient to handle and it does not take up much space in the shop or wagon. They are made in three sizes—for sidewall and ceiling work from the floor to 12-ft. ceilings and also to 17 or 18 ft. and 16 to 26 ft. Fig. 1 shows the general appearance of the parts while Fig. 2 indicates one of its many uses. Special trestles varying from the list are made to order.

The Gage Self-Setting Plane

For some little time past it has been the practice of the Gage Tool Company, Vineland, N. J., to issue certificates which are good for One Dollar each, which it will honor in cases where the purchaser of a self-setting plane does not find the tool satisfactory. The company allows the return of the plane at its own expense within thirty days and will refund the amount of the money order sent together with One Dollar additional to pay for the purchaser's trouble, etc. The certificate is in effect a premium good for One Dollar in case the carpenter or builder does not find the Gage plane all that the makers claim for it. The company states that two years ago only two planes were returned for the extra Dollar; last year only two were returned and this year only three. The policy of the company shows its confidence in the planes which it manufactures and among the thousands sold each year it is certainly a striking testimonial of the merits of the plane to have only a nominal number of purchasers feel that they are not satisfied with the tool which they have bought.

More Work For the Winter

Contractors have their busy and dull seasons. During the spring, summer and fall, when people spend a great deal of their time out of doors, attention is directed to the necessity or advisability of making repairs and improvements. To this class of work is added a new building and between the two the popular contractor is often at his wit's ends to meet demands. It was with a realization of this condition that the manufacturers of maple flooring proposed a winter campaign, having for its primary object the installation of maple, beech and birch flooring. It is argued in the forceful book now being distributed to contractors, that putting in a maple, beech or birch floor is a mere incident of the work that can be done in winter to better advantage than at any other time.

A very graphic idea of the change which the adoption of the plan of the Maple Flooring Manufacturers Association, Stock Exchange Building, Chicago, Ill., will bring about is shown in the book entitled "More Work for the Winter." In the event readers of this paper have not sent for or have not been supplied with a copy of "More Work for the Winter," they can obtain one from the address named and there they can apply the principle expounded. There actually exists no reason why contractors should not develop business with the suggestion and aid the Maple Flooring Manufacturers Association is giving and with it any wide-awake contractor should find it an easy matter to build up a good winter business.

The "Standard" Low Charging Concrete Mixer Earns Bonus for Its Owners

A striking example of the merits of the "Standard" low charging concrete mixer is found in connection with the work of installation of weighing equipment for the government of Uruguay at the Port of Montevido. The specification provided that the furnishers of the weighing equipment should make delivery and have all equipment erected within three months. The contract also contained a provision that a bonus of $5 per day per weighing device was to be paid in which the specified date of completion was anticipated and a like penalty be forfeited for every day beyond the specified date for completion of contract. When it is considered that it required about six weeks to transport the equipment together with the mixer, that materials had to be assembled, pits dug and foundations laid before any of the weighing equipment could be installed, it will be seen that much depended upon the "Stan-

(*Continued on page* 86)

dard." When the mixer arrived on the job it was ready for work, owing to the fact that the mixers are simple in design and are completely assembled ready for operation when they leave the factory. Another important feature of the mixer is that it is built so low—the point of charging being only 24 in. above the ground—that direct charging from the barrows avoids the need of a loading skip.

By means of the "Standard" the contractors were able to finish their work ahead of time and earned several thousands of dollars as a bonus.

Millers Falls Bench Drill Press No. 208

The attractive bench drill press of moderate cost shown in general view in Fig. 9 and known as No. 208 has just been put on the market by the Millers Falls Company, Millers Falls, Mass. It is made in accordance with the usual standards of these well-known manufacturers and will be found of special use for cabinet makers and other wood workers. The finish of the standard is gray with red edging, and such parts as chuck and crank are nickeled. The chuck has a capacity of 0 to ¼ inch for round shank drills, and

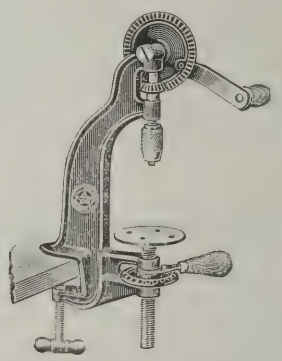


Fig. 9—Millers Falls Bench Drill Press

is of the popular Star pattern with three jaws operated by springs that are protected from injury and guaranteed not to get out of order. The small gear is of steel and the tool is equipped with ball bearings. The chuck is held rigidly close to the main frame and feed is obtained by raising the table with a ratchet lever. The table is provided with holes for the insertion of pins or screws to act as stops or rests for the work. The height over all is 18 in.; the maximum distance from chuck to table, 4½ in.; the speed of the gears, 3½ to 1, and the weight, 7½ lbs.

Berger's "Multiplex" Steel Plate in Building Construction

A most interesting example of the use of "Multiplex" steel plate made by the Berger Mfg. Company, Canton, Ohio, is found in the construction of the main floor of the power house of the new smelter recently completed at Clifton, Arizona, by the Arizona Copper Company. The "Multiplex" Steel Plate were laid on steel I-beams covered with concrete, the latter being reinforced with ½ and ¼ in. rods. The "Multiplex" plates were simply laid on the beams and not fastened thereto. The rods were laid in the concrete at right angles to the grooves of the plate to control temperature changes. The floor slab is 5 in. thick from the bottom of the corrugations of the "Multiplex" plates to the top of the finished floor. These plates were also used in the construction of the roof and here they were fastened to the purlins with No. 10 wire. The concrete was then filled in and troweled smooth and when dried out was waterproofed with a composition of tar, cement and coal oil followed by a coating of hot naptha into which was imbedded a layer of three ply roofing poper. The under-side of the "Multiplex" plate used in the roof was painted with white lead and linseed oil in a manner similar to the under side of the floor plate. It may not be without interest to state that the total cost of the new buildings of the smelter plant in question was $2,105,020.

(*Continued on page 88*)

Farm Barn Construction and Equipment

Farm barn construction and equipment are never-ending sources of interest on the part of builders operating in agricultural and other sections of the country, and anything pertaining to methods by which economy of cost is combined with maximum efficiency always commands studied attention. An attractively illustrated volume which affords much valuable information along these lines is the 256 page catalog just issued by the James Manufacturing Company, Fort Atkinson, Wis. In it is decribed what is known as "The James Way" of building and equiping a practical up-to-date dairy barn. Mr. James tells how to render barn work easy of execution and points out the advantages of a properly designed and arranged barn as well as how to make machinery do much of the work that formerly was performed by manual labor. Naturally, emphasis is laid upon the merits of the James equipment, which it is pointed out saves time and this to the owner is the same as money whether it be his own time or the time of his hired help. In fact it is claimed to save work at every turn—as for example when putting the cows in the barn and when turning them out; when feeding and watering; when milking; when caring for the calves and it saves an enormous amount of time when cleaning out the barn and grooming the cows. Some of the many features to which special reference is made are the James Alignment device; the self-cleaning manger; the watering buckets; the pens; the litter carrier; the milk can carrier; the feed truck; the stanchions; the stalls, etc. etc. The volume is illustrated by well executed half tone engravings made direct from photographs showing just how the various devices operate and the advantages of which are apparent at a glance.

The closing portion of the volume is devoted to pictures and descriptions of the plant of the company, a partial list of users of James equipment and finally there is a chapter on "Building a Dairy Barn." This is illustrated by blue print drawings of plans, elevations, cross sections and miscellaneous details together with pictures of a number of barns designed by the company. The entire make-up of the catalog gives evidence of careful attention to details and the volume cannot fail to prove a valuable addition to the trade library of every architect and builder interested in farm or dairy barn construction and equipment.

Building Material Manufacturers' Association

Every maker of standard building materials as well as of fire protective and extinguishing devices of proven quality will be interested in the recently organized Standard Building Material Manufacturers' Association the purpose of which is to promote their business interests by an highly efficient publicity and educational campaign.

The New York offices of the association at 366 Fifth Avenue will be made an inviting headquarters for visiting architects and builders; and will constitute a permanent source of information regarding fireproofing materials and protective devices. Here, located in the heart of the architectural center of the city, a permanent exhibition will be maintained for the purpose of demonstrating products of the best manufacturers. Every kind of fireproof material and protective device will be installed as in actual use and its peculiar and proven qualities explained by experts to visiting architects, builders and others directly interested in the art of fireproof building construction.

Catalog of the Silver Manufacturing Company

In the 88 page catalog of the wood-working machines, carriage makers' and blacksmiths' tools which has just been issued from the press by the Silver Manufacturing Company, Salem, Ohio, there is presented a vast amount of interesting information relative to the special goods made by this concern. Among the machines which appeal perhaps most strongly to the readers of *The Building Age* are improved power hand saws in great variety, also combination foot and belt power

(*Continued on page* 90)

hand saws, jointers, saw tables and swing cut-off saws. The goods are clearly illustrated and carefully described so that the prospective purchaser can gleam from the catalog the salient features. Not the least interesting portion of the catalog is that devoted to tables of repair parts, which give the number of the casting, the price and size of machines to which it belongs. Accompanying the catalog is a pamphlet devoted to Silver's mechanical blowers and steel forges.

Something About Oak Flooring

Readers of *The Building Age* who are discriminating purchasers when quality in material is demanded are likely to be interested in the oak flooring made by Paul O. Moratz, 402 First National Bank Building, Bloomington, Ill. His plant is equipped with modern machinery and has exceptionally large dry kiln capacity. The flooring is 3⅛ in. in thickness, and is supplied in three widths: 1¼, 1½ and 2 in. Each size is of the tongue and groove type of flooring, and is so designed that it can be laid easily without the necessity of hammering. The tongue is unusually strong on account of the design. Special care is given to the seasoning of all lumber, and in the large warehouse where this material is kept an even temperature is maintained at all times throughout the year. Mr. Moratz is a graduate architect, though not practicing at present, and he has the keen delight as a member of this fraternity for well executed and beautiful work. The raw material chosen is most carefully selected. He has sufficient facilities whereby a large stock is carried, which enables him to promptly fill all orders with which he may be entrusted.

Dixon's Boiler Graphite

A rather interesting novelty in the form of a mailing card is being sent out by the Joseph Dixon Crucible Company, Jersey City, N. J., for the purpose of intro-

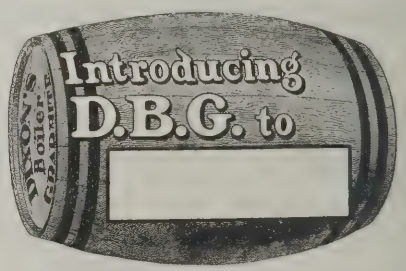


Fig. 10—A Barrel of Dixon's Boiler Graphite

ducing Dixon's Boiler Graphite to engineers and others interested in cleaner boilers. The mailing card is in the form of a barrel of the Graphite in question, as shown in Fig. 10 is printed in two colors and on the inside calls attention to the fact that for nearly four score years and ten the company has had at its command all forms and grades of Graphite and "therefore has no incentive to use or recommend other than the correct grade of Dixon's Boiler Graphite." D. B. G. as it is called is said to reduce fuel consumption, prevent the hardening of scale, give to the surface of the boilers a smooth polish, prevent pitting, and render the removal of scale easy by a gentle mechanical action. The reverse fold forms a return card bearing an invitation to write for the Dixon booklet "Graphite for the Boiler."

Stanley's "55" Plane and How to Use It

Under the above title the Stanley Rule & Level Company, New Britain, Conn., has just issued from the press a booklet of 24 pages profusely illustrated and setting forth the merits of the tool in question. While the device itself has been on the market for some time it has never before been so exhaustively treated in a literary sense and the carpenter who receives a copy of this little work cannot fail to thoroughly understand the merits of the tool and gain an excellent idea

(*Continued on page* 92)

of the great variety of work which can be accomplished by means of it. The plane is in fact a universal tool in that it is a plow, dado, rabbet, fillister and match plane; a beading and center beading plane, a sash plane and a slitting plane. It is also referred to as a superior molding plane and will accommodate cutters of almost any shape and size. The company points out that combining as it does all the so-called "fancy" planes its scope of work is practically unlimited, thus making the Stanley "55" literally a "planing mill within itself." With the 52 cutters furnished with the plane the workman can produce all the moldings generally used. A further line of 41 cutters is regularly carried in stock and in addition cutters to work special forms of moldings can be made from blanks by the mechanic himself, or if so desired, they may be obtained from the factory from sketch. The plane is nickel plated, is 10 in. long and weighs 7¾ lb. Full directions for using the tool are given and by the aid of reference letters in profusion the merest novice can quickly comprehend its salient features and the multifarious uses for which it is readily adaptable.

The Witte Gas and Gasoline Engines

Those of our readers who have occasion to make use of motive power for operating concrete mixers, portable saw rigs, small wood-working establishments, or any one of the many other purposes for which gas, gasoline, kerosene and distillate engines are so admirably adapted, will find much to command their attention in a handsome catalog which is being sent out by the Witte Iron Works Company, 3199 Oakland avenue,

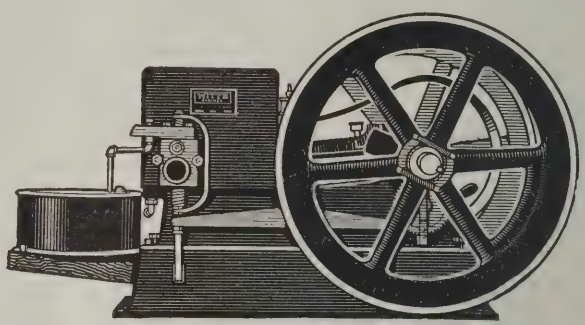


Fig. 11—Side View of One Style of Witte Engine Mounted on its Base

Kansas City, Mo., The title of this interesting publication is "How to Judge Engines," and within its covers are set forth the merits of the various lines manufactured, which by the way range from 2 to 22 h.p., and are of the stationary, portable, skidded, or saw rig styles. One of the outstanding features is the very moderate prices which are quoted resulting, it is claimed, in an appreciable saving to the purchaser, depending of course on the size and style of engine that may be selected. The 60 day free trial plan is also explained in connection with the liberal 5 year guarantee which Mr. Witte makes very definite and broad. It is interesting to note that Mr. Witte has been engaged for many years in building engines, and his factory is referred to as one of three which were the first to engage exclusively in the manufacture of gasoline engines, selling only direct to the user. In Fig. 11 we show a general view of one of the engines made by the company in question. Mr. Witte points out that in selling only direct from factory to user he has arranged for easy payments so that a Witte engine can earn its own cost while the user is paying for it. This easy payment plan is fully explained in the literature the company is sending to those making the request.

Large Contract for Pipe Insulation

Among the important contracts recently secured by the H. W. Johns-Manville Company, Forty-first street and Madison avenue, New York City, is that of the pipe insulation for the new Utah State Capital at Salt Lake City of which James C. Stewart Company were the contractors. The high pressure pipes will be protected with

(*Continued on page* 94)

J-M Asbesto-Sponge felted pipe covering which is a product made up of laminations of felt composed of asbestos and finely ground sponge. The heating pipes will be protected with J-M Asbestocel pipe covering which is built up on the arch principle. Sealed air channels run around the pipe instead of parallel with it, thus preventing the circulation of air and consequent heat radiation.

New Officers of Clifton Porcelain Tile Co.

At a recent meeting of the Board of Directors of the Clifton Porcelain Tile Company, 51 Clifton street, Newark, N. J., M. Tscherner resigned as president, and Harry A. Pike was elected a member of the board and president of the company. Mr. Tscherner remains as a director. The Clifton Porcelain Tile Company has begun the manufacture of porcelain faced wall tile and vitrified floor tile in all colors, using the Stegmeyer process which eliminates the use of lead glazing, and makes a non-crazing product at a price considerably below that of the so-called flint tile.

Gilt Edge Boilers

An illustrated folder setting forth the merits of the Gilt Edge heating boilers which are made in sizes adapted to meet varying requirements is being distributed by R. J. Schwab & Sons Company, Milwaukee, Wis. The point is made that the water backs are placed above the top of the fuel and not in the fire. Therefore they do not interfere with firing or combustion, neither do they reduce fire pot capacity. The firing doors are protected against excessive heat and consequent warping by a perforated cast iron liner, while the narrow water ways allow the smallest accumulation of water in the boiler, resulting in quickest heating. The grate bars are shaken from one point only and at no point except the doors can heat be radiated without first having heated the water of the boiler. There are no lost surfaces and maximum efficiency is secured by means of long fire travel over unusually large heat absorbing surfaces. The Gilt Edge boilers are made in the round sectional, and square sectional types for hot water and steam heating. The steam boilers are made in capacities ranging from 325 ft. to 5475 ft. and the hot water boilers from 550 to 9000 ft.

TRADE NOTES

Some pertinent comments for the man handling and using Richards-Wilcox barn door hangers are found in the December issue of *DooR-Ways*, the house organ of the Richards-Wilcox Mfg. Company, Aurora, Ill. Reference is made to fire and warehouse fixtures; also to the R-W accordion door hangers and to the advantages of other specialties made by the concern.

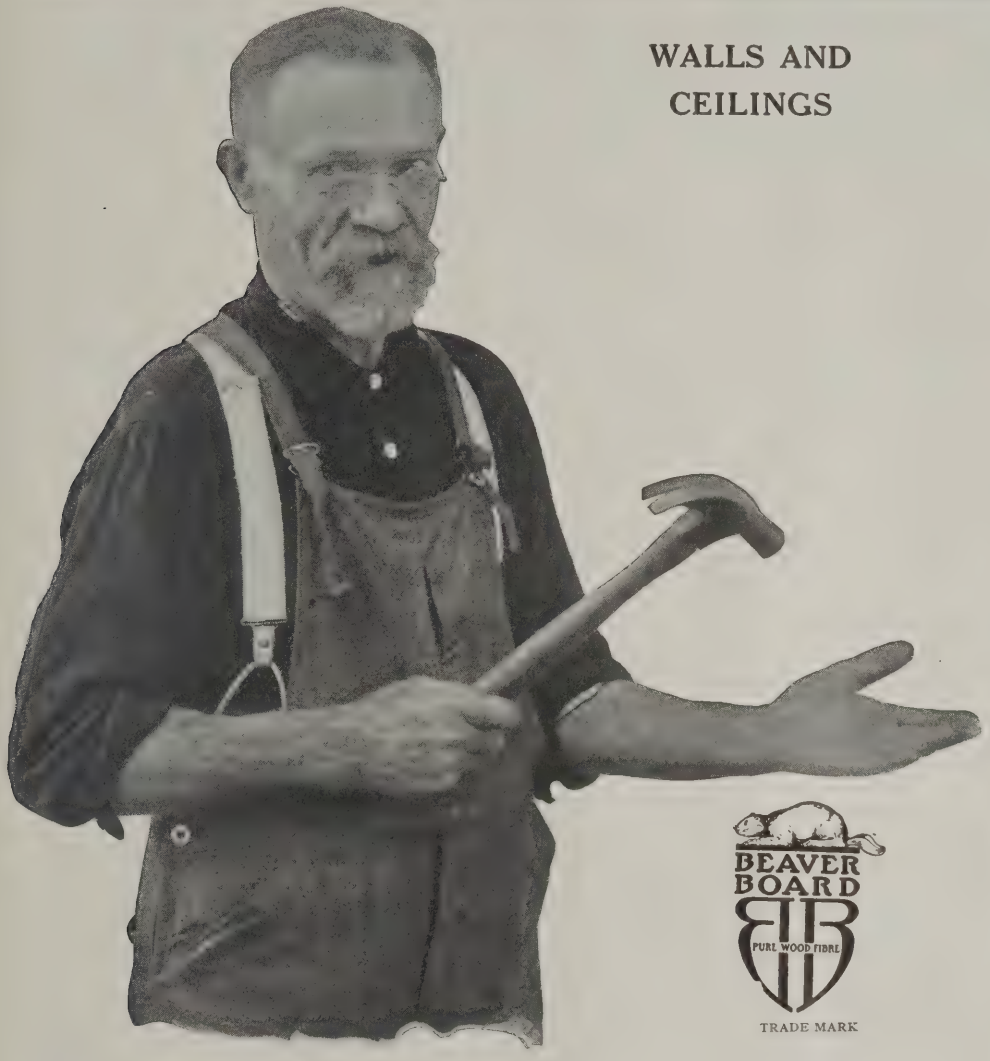
The Hoggson Magazine, published quarterly by Hoggson Bros., 7 East Forty-fourth street, New York City in the interest "of harmony, efficiency and economy in building," contains much interesting matter along the lines indicated. It is illustrated with numerous half-tone engravings showing some of the work which the concern in question has executed under the Hoggson single contract. By this is meant that the organization plans, decorates, furnishes and equips residences, banks, libraries, churches, etc., under a single contract. It is pointed out that through the magazine it is expected to arouse interest in the Hoggson single contract method of building which assumes the entire responsibility for the complete operations. This method is said to be simpler, more thorough, speedier and more economical than the usual scheme of building which necessitates many contracts and a divided responsibility.

There is rather more than the usual amount of interesting reading in the December number of *Graphite*, the house organ of the Joseph Dixon Crucible Company, Jersey City, N. J. The front page is embellished with an excellent view of Maidstone Apartment Build-

(*Continued on page* 96)

BEAVER BOARD

WALLS AND CEILINGS



BEAVER BOARD
PURE WOOD FIBRE
TRADE MARK

There's Real Satisfaction in Jobs Like This

"When Mrs. Thatcher down here on Pearl Street suggested that I use BEAVER BOARD for remodeling her living room, I was almost afraid to tackle it. You see, I had never used the stuff and was a little bit leery of how the job would look.

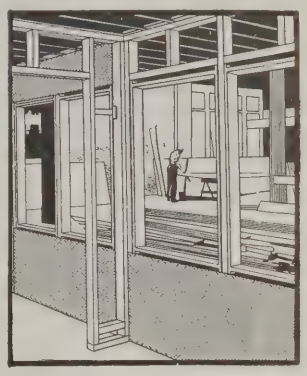
"But she persuaded me to try it, and now I'm glad I did. The board was easy to put up, nice to work with, and the room's a beauty. Everybody admires it, and it's been the means of getting me more BEAVER BOARD jobs.

"That's been five years now, and the old lady has never had a cent's worth of repairs. You see, BEAVER BOARD can't crack, and that's more than you can say about plaster when a job settles.

"Take it from me, there's good money in BEAVER BOARD jobs. I'd advise you to write to the company—they'll tell you all about it, without putting you under obligation. Just send 'em your name and address."

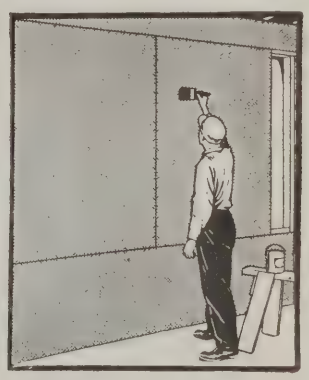
The Beaver Board Companies

United States: 190 Beaver Road, Buffalo, N. Y.
Canada: 390 Wall St., Beaverdale, Ottawa.
Great Britain: 4 Southampton Row, London, W.C.
Branches in sixteen cities



Headers should be placed where needed for nailing top and bottom of panels, top of baseboard, etc.

Start at top and nail to intermediate studding, before nailing edges. Use fine wire brads.



Painting is done before decorative strips are nailed over the edge of the panels

Decorative strips are stained or primed before they are nailed over edges.

ing in Philadelphia, of which Henry L. Reinhold was the architect. Another picture is one of the Marconi Wireless Masts erected at New Brunswick, N. J., and all of which are protected with silica-graphite paint. Other pages are devoted to matter bearing upon the products of the company.

The Fox Machine Company, 655 Front avenue, N. W., Grand Rapids, Mich., calls attention to the advantages resulting in the use of the Fox "Universal Trimmer" for fitting interior finish. Not only are perfect joints obtainable but time is saved in doing the work.

Harry E. Reimer and George W. Herlin have just formed a partnership under the style and title of Reimer & Herlin for the practice of architecture, with offices in the First National Bank Building, Marshalltown, Iowa.

The Oak Flooring Bureau, 895 Hammond Building, Detroit, Mich., is distributing among its friends in the trade a celluloid novelty in the way of a memorandum pad, which will be found very convenient to carry in the vest pocket. The novelty consists of two celluloid cards measuring 2⅜ in. in width by 3¾ in. in length and are bound together by a front and back finished in imitation of a piece of oak flooring. The writing upon the pad is erasable by rubber or water, so that the pad can be used indefinitely. The binding covers bear the suggestion "Specify oak flooring everywhere."

J. Martyn Haenke Co., Inc., architects and master builders, etc., has just been incorporated at Albany, N. Y., with a capital of $100,000. The incorporators are J. Martyn Haenke, Los Angeles; R. U. Sherman, 1100 Sunset Avenue, Utica; David H. Howard, 364 Genesee street, Utica.

William Henry Crisson, a practical builder of Turks Islands, British West Indies, desires to secure manufacturers' catalogues and samples of mill work and other building materials.

The Gum Lumber Manufacturers' Association, Memphis, Tenn., has distributed a rather unique invitation to attend the first annual meeting of the organization which will be held on January 16 in the city named. The invitation consists of a thin veneer of gum wood measuring 8½ in. in length and 3½ in. in width and bearing the inscription in black letters enclosed in a border of red. A cord is provided for hanging it where it may readily be seen.

G. P. Blackiston, for the past five years advertising manager of the Berger Mfg. Company and the Stark Rolling Mill Company, Canton, Ohio, tendered his resignation December 1 and will devote his entire attention to the Advertising Laboratories, Canton, Ohio.

The card calender for December sent out by the Richards-Wilcox Mfg. Company, Aurora, Ill., is embellished with a most interesting panel picture bearing the caption "Ownership." Just what sort of ownership this is can best be understood from an examination of the picture itself, but upon the other side of the calender the term "Ownership" relates to specialties made by the company in question.

O. F. Cole has just opened offices at 1419 Lane street, Falls City, Neb., for the practice of architecture and is desirous of securing samples and catalogs of manufacturers of building materials.

Universal Portland Cement Company, Chicago, Ill., is including among the extensive literature which it is distributing over the country a large poster bound on top and bottom with metal strips and provided with an eye for display purposes. It calls special attention to the advantages of a concrete feeding floor for hog houses and the poster is embellished with a mammoth sketch of a healthy looking "porker" munching ears of corn.

THE BUILDING AGE

NEW YORK, FEBRUARY, 1915

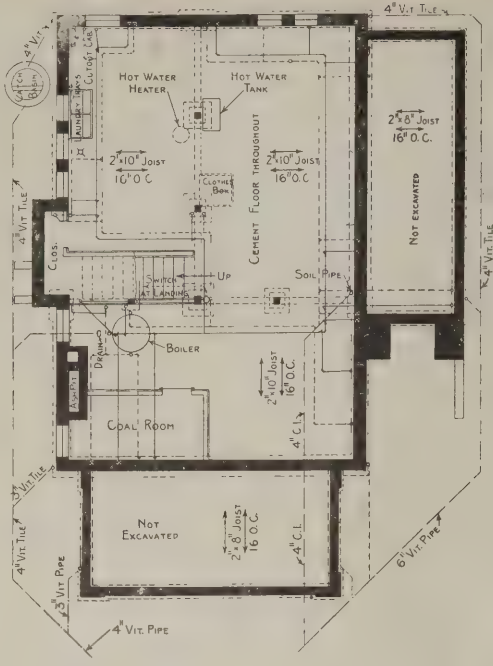
An Attractive Home for the Suburbs

The Sun Parlor, the Sleeping Porches and an Unusual Amount of Window Area Are Noticeable Features

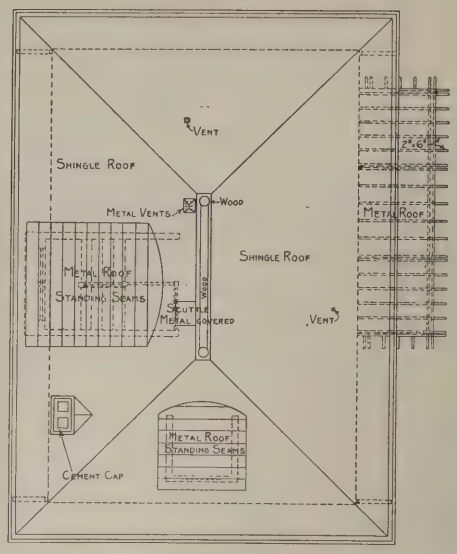
ASIDE from the architectural features embodied in the suburban residence forming the basis of this article one of the chief considerations in presenting it to the readers of *The Building Age* is to illustrate effectively how a home of medium proportions can be provided with an excellent distribution of light throughout. The visitor to this home is at once impressed with the excellent lighting facilities, whether in the hall, on the staircase or in the basement, all of which are in striking contrast to the gloomy atmosphere that often prevails in these portions of the average residence. This advantageous arrangement is brought about by the provision of nearly one hundred exterior windows, and though the owner considers that so much exposed glass surface tends to increase the coal bill somewhat materially, it is contended that the apparent advantages of increased light and ventilation are proportionate to the extra expense involved.

A reference to the picture representing a front view of the exterior reveals the introduction of a feature not usually included in a residence erected on an inside lot—a main side entrance of an unusually attractive nature. The purpose of this was to give such an arrangement that the door would lead directly to a reception hall or room. The owner of the residence, Dr. Nathaniel H. Adams, occasionally finds it convenient to receive patients at his home, and for this reason plans were made accordingly. The picture also shows the extremely large enclosed porch opening from the living room, the roof of which will be used in summer as a sleeping porch. The roof of the reception hall or room and of the enclosed porch at the side is spacious enough to be

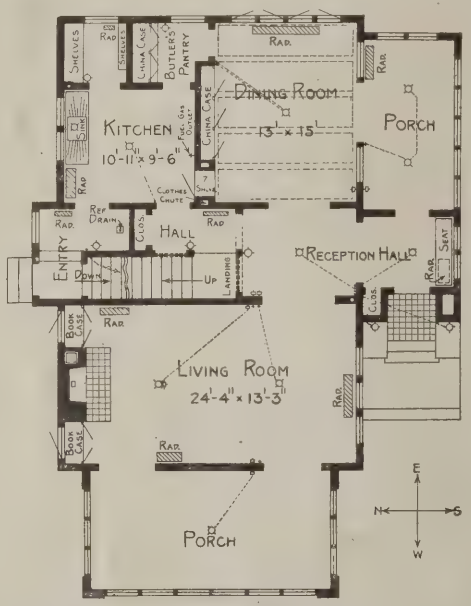
An Attractive Home for the Suburbs—The Residence of Dr. N. H. Adams, Oak Park, Ill—Architect Perry W. Swern, of the Same Place



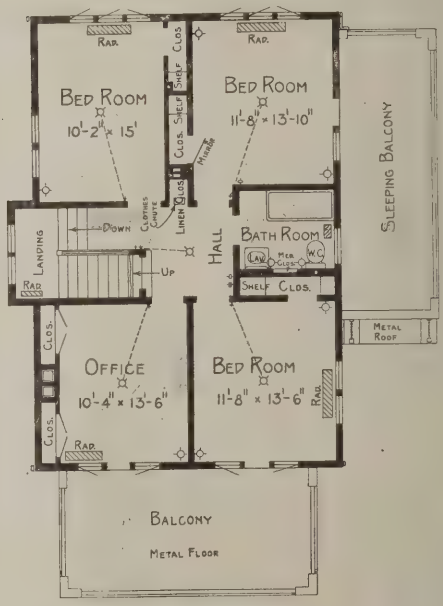
Foundation—Scale 1/16 In. to the Foot



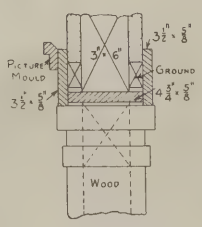
Roof Plan—Scale 1/16 In. to the Foot



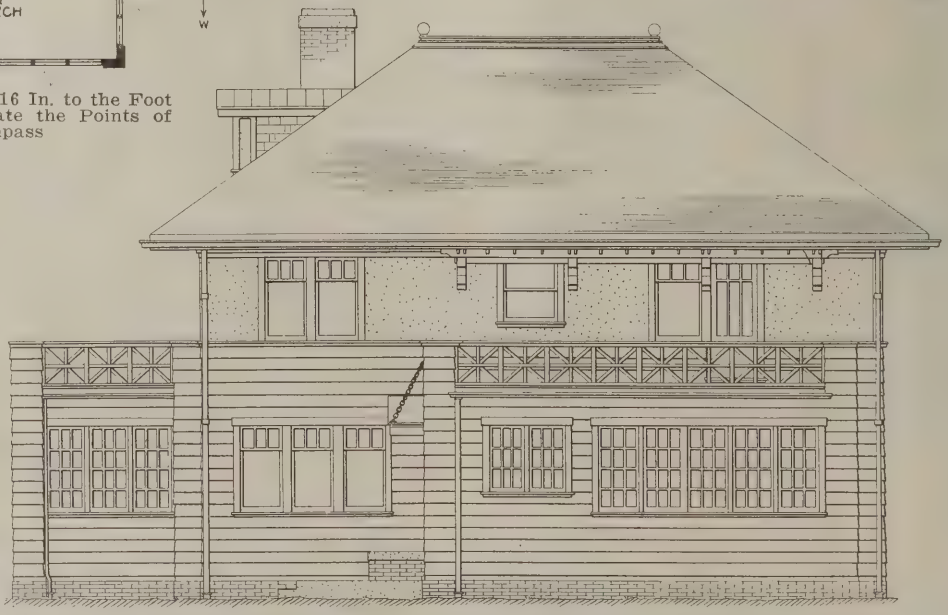
First Floor—Scale 1/16 In. to the Foot —The Arrows Indicate the Points of the Compass



Second Floor—Scale 1/16 In. to the Foot



Section Through Framing Over Door of Closet at the Right of the Main Stairs—Scale 1 In. to the Foot



Right Side or South Elevation—Scale 3/32 In. to the Foot

An Attractive Home for the Suburbs—Plans, Elevation and Constructive Detail

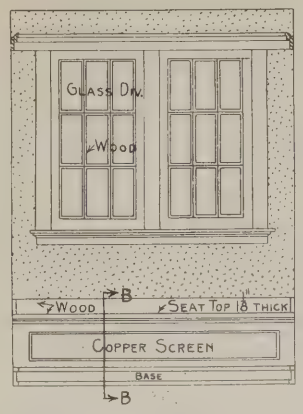
used for a like purpose, and the canopy above should provide ample means for attaching screens. The house has a west frontage, and consequently the full benefit of the afternoon sun will be enjoyed. An excellent idea of the main entrance is afforded by the picture on page 21 of this article.

It is interesting to note in the specifications that this house that the employment of this material will effectively hold the cement and retain it for an indefinite period without cracking.

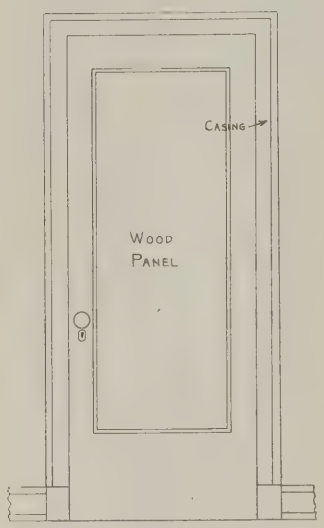
The residence measures approximately 50 x 25 ft. and the noticeable feature of the first floor is the large living room, having dimensions of 25 ft. x 13 ft. 6 in., communicating by French doors to

An Attractive Home for the Suburbs—A Detail of the Main Entrance of the House

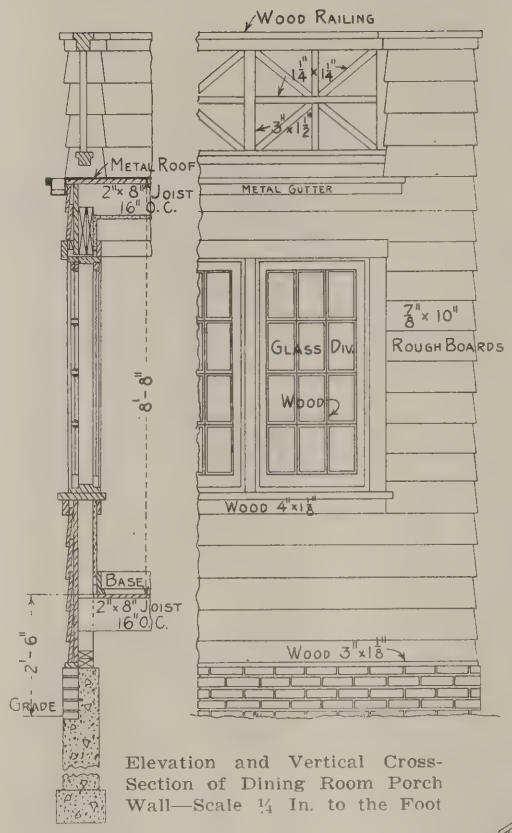
to produce a stucco effect having an even and unbroken surface the exterior lath used was No. 18 steel wire mesh, ⅜ x ¾ in., heavily galvanized, securely stapled at each bearing. It has been the experience of the architect drawing the plans for the front porch, 20 x 10 ft. In the living room an artistic brick fireplace with tile hearth is flanked by two large bookcases, while from the ceiling are suspended two most artistic inverted domes for indirect lighting.



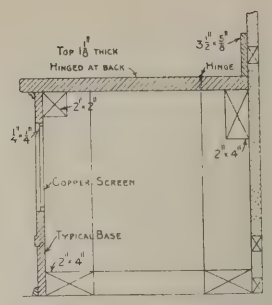
Elevation of Reception Hall Looking Toward the South—Scale ¼ In. to the Foot



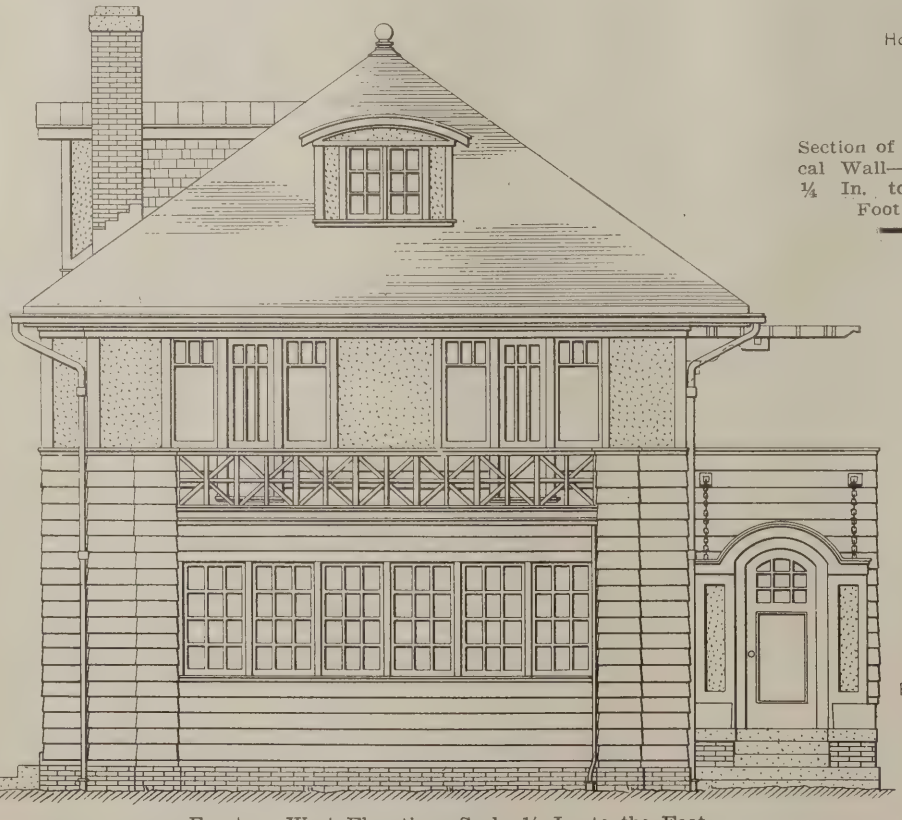
Elevation of Typical Door—Scale ⅜ In. to the Foot



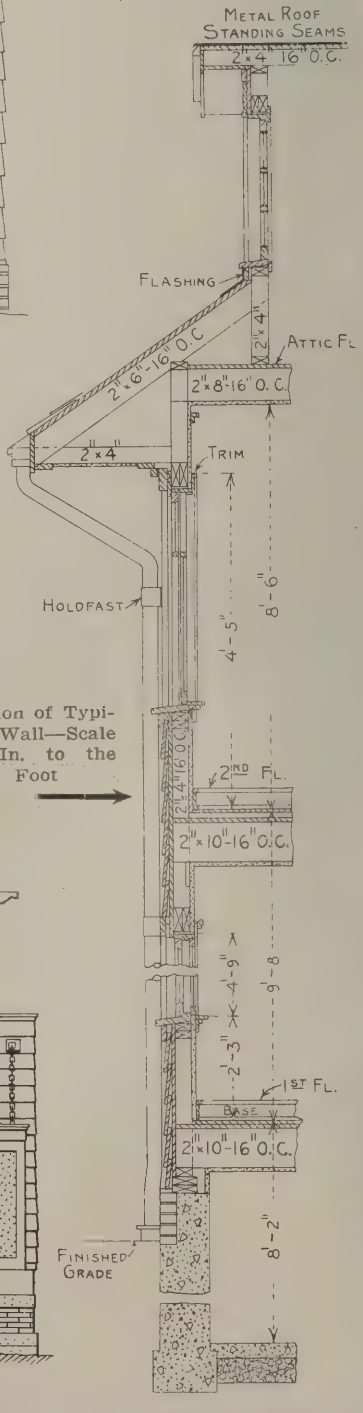
Elevation and Vertical Cross-Section of Dining Room Porch Wall—Scale ¼ In. to the Foot



Section Through Seat in Reception Hall Taken on Line B-B of the Elevation—Scale ¾ In. to the Foot



Front or West Elevation—Scale ⅛ In. to the Foot



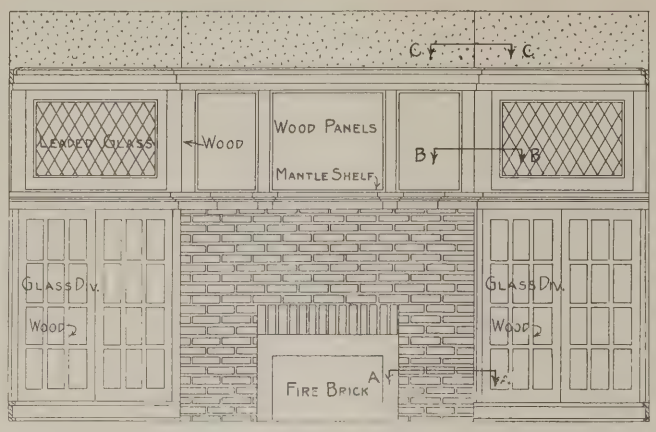
Section of Typical Wall—Scale ¼ In. to the Foot

An Attractive Home for the Suburbs—Elevation and Miscellaneous Constructive Details

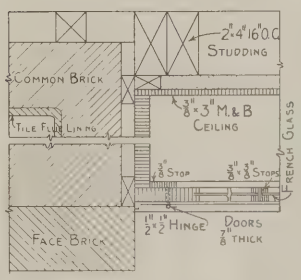
The halftone picture of the dining room shows the provisions made for the china case. It will be noticed that there are two doors, one on each side of the case. That to the right leads directly to the butler's pantry, while the door at the left gives served from the dining room. It is well to note that all odors from cooking in the kitchen are effectively cut off from the dining room by the two doors in the butler's pantry, leading to the dining room and kitchen respectively. Both the butler's

An Attractive Home for the Suburbs—A View in the Reception Hall, with Living Room Beyond at the Left as Seen from the Main Entrance

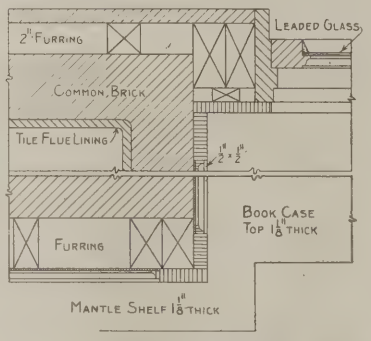
access to a serving cabinet that has seven adjustable shelves. By this means food can be prepared and placed in this cabinet from the kitchen and and general pantries are well provided with cases, shelves and drawers, and an abundance of light is possible from the exposed sides of the house



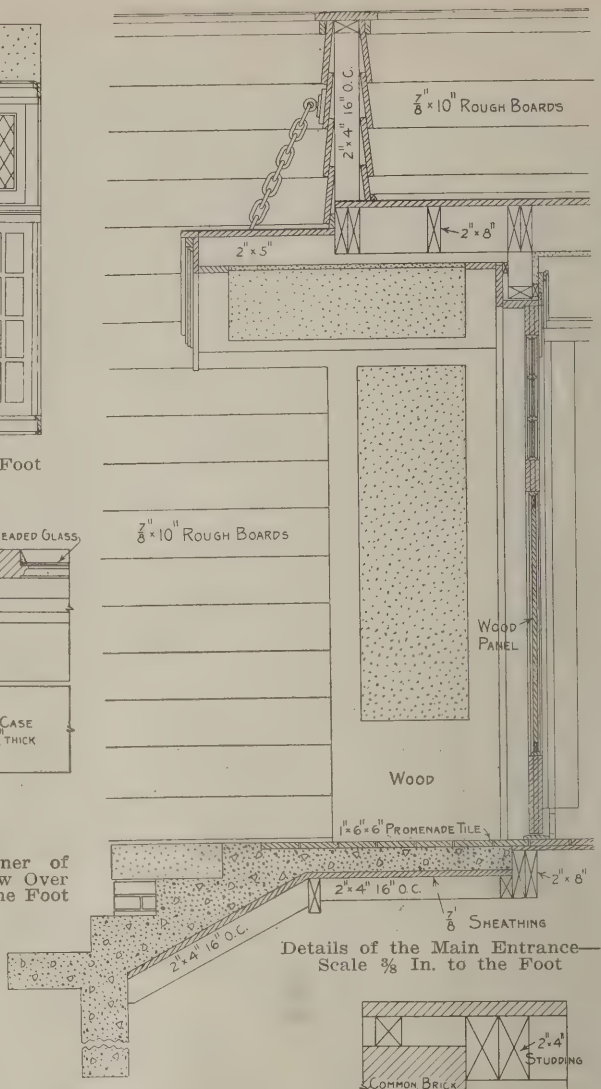
Elevation of Fire Place and Book Cases—Scale ¼ In. to the Foot



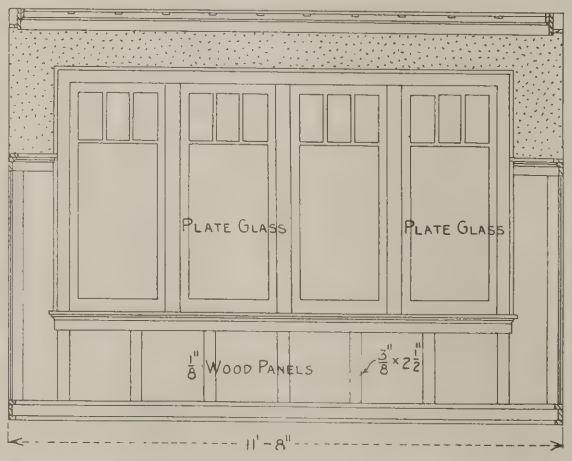
Partial Section Through Fireplace and Book Cases on Line A-A of the Elevation—Scale 1 In. to the Foot



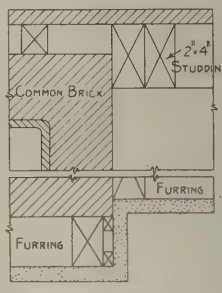
Section B-B Through Corner of Chimney Breast and Window Over Book Case—Scale 1 In. to the Foot



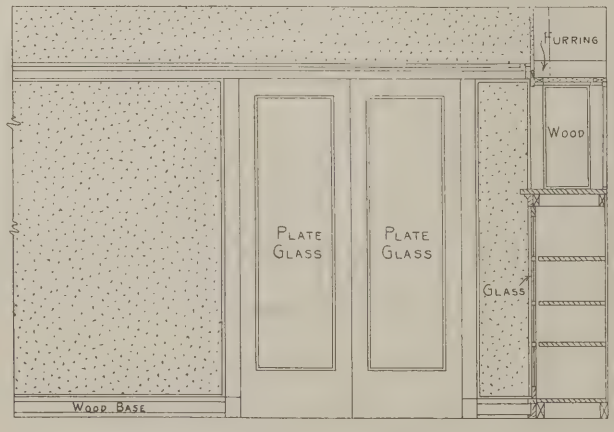
Details of the Main Entrance—Scale ⅜ In. to the Foot



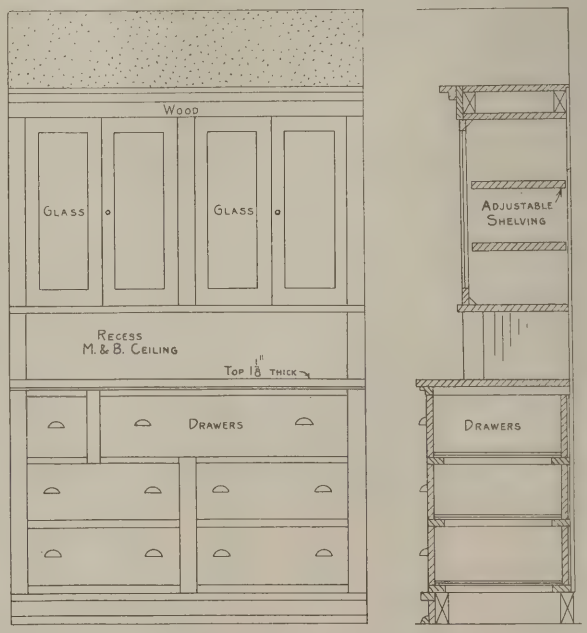
Elevation of Dining Room Looking East—Scale ¼ In. to the Foot



Detail at the Right Is a Section on Line C-C Through the Chimney Breast Above the Window—Scale 1 In. to the Foot



Elevation of Doors from Living Room to Porch with Section Through Bookcase—Scale ¼ In. to the Foot



Elevation and Section of Case in Butler's Pantry—Scale ⅜ In. to the Foot

An Attractive Home for the Suburbs—Miscellaneous Constructive Details

which are so largely made up of glass surface.

In the reception hall umbrella and clothes closets form part of the arrangement, and beneath the seat shown in the reception hall on the plan a radiator is concealed.

On the second floor three bedrooms and an office, or "den," are almost of equal size, each provided with spacious closets. The bathroom is also commodious, and the medicine closet is of unusual size, extending from the floor to the ceiling and having ten large shelves. In the hall on this floor a roomy linen closet is equipped with six shelves, and in the floor is a trap to the clothes chute.

Ten-inch foundation walls of concrete were laid consisting of a 1:3:5 mixture of "Universal" Portland cement, clean, sharp, coarse sand and limestone small enough to pass through a ½-in. ring. The footings for all piers, posts and chimney are also composed of the same ingredients in the proportions of 1:2:4.

Where the foundation walls came in contact with the earth they were plastered with a ½-in. coat of cement mortar, extending to the top of the footings with an unbroken surface. Before backfilling was done the exterior surfaces of all walls from footings to grade were given one coat of R. I. W. waterproofing paint made by Toch Brothers.

Over the entire basement is a concrete floor consisting of a 1:2:4 mixture resting on 6 in. of cinders, well watertamped in place. A finishing coat composed of one part of Portland cement and two parts of Torpedo sand was then applied, and the floor given a generous pitch to the floor drains.

All girders and posts throughout are of No. 1 dressed yellow pine, and all joists, studs and rafters are of the same material, mill sized, placed 16 in. on centers. Headers and trimmers are tripled round the stair wells, chimney and hearth, and doubled round the basement windows.

The outside walls and roofs are sheathed with 1 x 6-in. yellow pine, well nailed at each joint and bearing. The building paper used to cover the walls and sides of dormers was black "Neponsit," and one layer of the same material is used between the double floors in the principal rooms of the first and second stories. This same waterproofing paper is lapped 12 in. on the roof. The roof and sides of dormers are covered with No. 1 red cedar shingles laid 6 in. to the weather. Before laying they were dipped in a selected color of "Cabots" creosote stain. From the brick underpinning up to the sills of the second story windows the exterior walls are covered with clapboards or siding as it is known in some localities.

An Attractive Home for the Suburbs—Dining Room in Residence of Dr. Adams as Viewed from the Enclosed Porch, Showing China Case with Doors at Right and Left Leading to Kitchen and Pantry

Where the cement plaster is shown between second story window sills and the cornice the sheathing paper is covered with ⅝ x 1½-in. furring strips placed 12 in. on centers. This stripping was cut in lengths of not over 4 ft. and put on vertically and staggard with about 3-in. laps so as to produce no long vertical lines.

The joists of the first, second and attic floors are covered with 1 x 6-in. No. 1 yellow pine rough floors laid diagonally and run close to the exterior

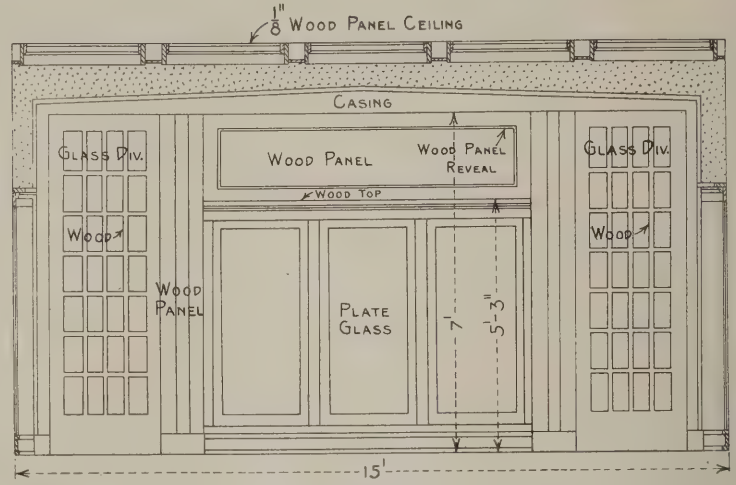
sheathing. Counter-flooring is placed beneath the tile hearth, under the entrance and bathroom floors, set on 1 x 3-in. strips securely spiked to the joists.

All outside millwork is of class "A" cypress, and 10 x 7/8-in. rough No. 1 cypress boards are used for siding.

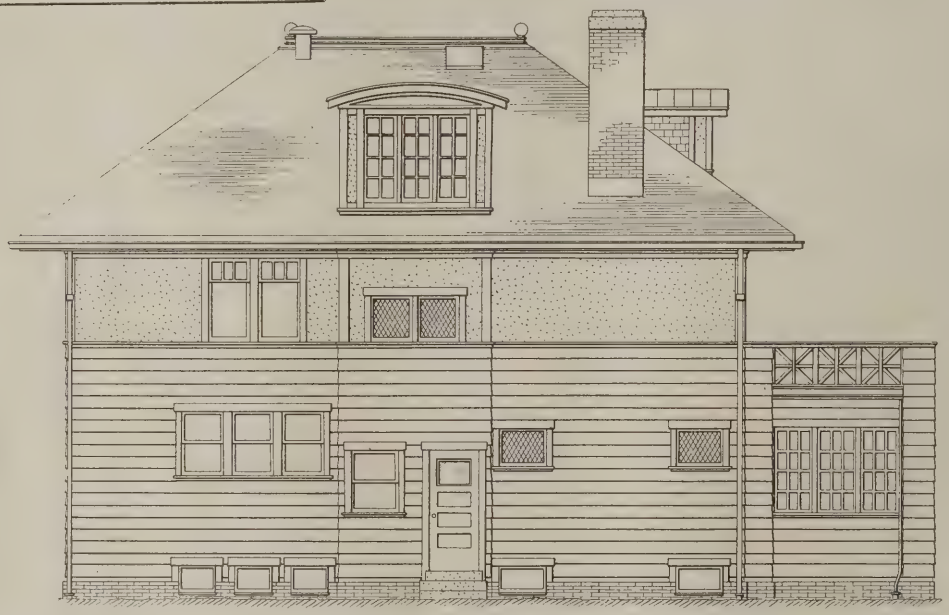
The window and door frames are of yellow pine. All heads and jambs of casement windows are 1 3/8 in. thick, rabbeted; all heads of double-hung windows 1 1/8 in. thick, and pulley stiles, parting strips, etc., 7/8 in. thick. All outside door frames are 1 3/4 in. thick, and sills are cut from 2-in. material. The sashes are of white pine 1 3/8 in. thick.

The face brick at the base of the building and round the entrance steps is well laid in cement mortar, horizontal and vertical joints being 3/8 in. and 1/4 in., respectively. The

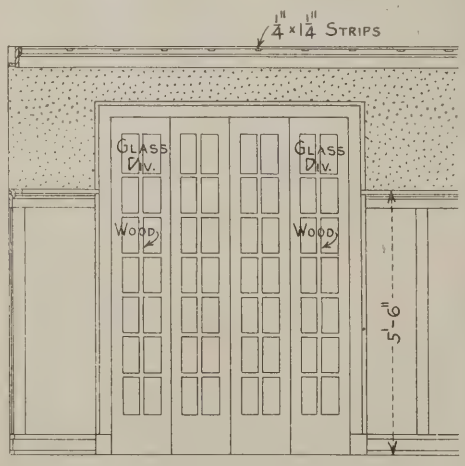
provided with cast-iron ash drop in floor and wrought-iron damper in throat. The back, sides, throat and floor are lined with a good quality fire brick, and a good quality of flue linings are well



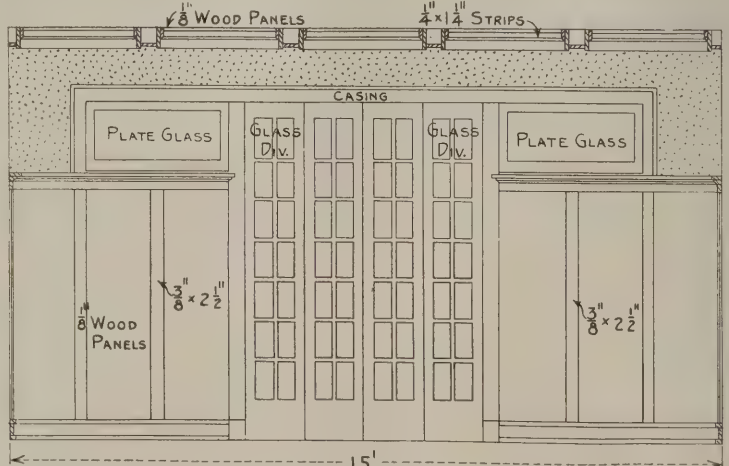
Elevation of Dining Room Looking Toward the China Closet—Scale 1/4 In. to the Foot



Left Side or North Elevation—Scale 3/32 In. to the Foot



Elevation in Dining Room Looking Toward Reception Hall—Scale 1/4 In. to the Foot



Elevation in Dining Room Looking Toward the Porch—Scale 1/4 In. to the Foot

An Attractive Home for the Suburbs—Elevation and Miscellaneous Constructive Details

brick is "K2 Round-Edged Paver" supplied by the Thomas Moulding Company, Chicago, Ill. The fireplace is built according to specified details, and is set so as to form a uniform surface throughout.

On the tile hearth and entrance floors 6 x 6 x 1 in. "Promenade" tile, manufactured by the Ludo-

wici-Celadon Company, Chicago, Ill., are set on concrete bases. The tile is laid true to form and is bedded in Portland cement grout composed of one part cement and two parts sand. In the bathroom ¾ in. x ¾-in. white unglazed tile was laid level, with all joints in straight lines.

The dining and living rooms on the first floor have oak floors and trim, the former having a wood paneled ceiling and wainscot. The kitchen and pantries have floors of maple and trim of birch. Each of the bedrooms has oak floor, birch trim and mahogany veneered doors. The finish floors are ⅞ x 2¼ in., and those for the porches are of 1⅛ x 2¼ clear white pine on the first floor only, those for the second story being of the same material measuring ⅞ x 2¼ in. The ceiling was made according to detail, with a top 1⅛ in. thick and adjustable shelves ⅞ in. thick.

The floors of both second story porches, roof on entrance, dormers, chimney saddle and scuttle are covered with N. & G. Taylor's Company's "Target and Arrow" roofing tin securely fastened with soldered joints, all material being given a coat of lead and oil paint on the underside before laying. The flashing and counter-flashing round chimney, gutters, etc., are of No. 26 galvanized iron. Metal ridges were installed of the same material as indicated on the accompanying details. Metal gutters with double bottoms were provided, the lower one set level and the inner gutter pitched to the downspouts. These gutters were run at least 9 in. under the shingle roofing. The downspouts are ap-

An Attractive Home for the Suburbs—Living Room in Residence of Dr. Adams Showing the Open Fireplace and Book Cases at the Right and Door Leading to the West Porch in the Left Background

of the dining room consists of ⅛-in. three-ply wood panels.

Interior doors throughout are 1¾ in. thick and exterior doors 2¼ in. thick. The bedroom doors on the second floor are veneered with African mahogany on the inside to match the trim on the outside.

The treads of the stairs are 1⅜ in. thick and the risers ⅞ in. thick. The stairs and railings are of the same finish as the stair halls. All oak flooring is clear selected red oak and maple flooring is of a clear white. The thresholds for all doors are 3 x 1½ in. of the same material as the floors.

The bookcases shown in the interior view of the living room are of the same material as the trim. The tops are 1⅛ in. thick, with doors having wood stops ½ in. and ⅜ in. for glass. In the china case provided in the dining room the work proximately 4 in. square of the same material specified for the general sheet metal work.

All interior lathing used is No. 1 white pine, securely nailed at each joint. The ceiling over the boiler is on metal lath, all corners and angles of plaster walls and ceiling having a 12-in. strip of "Kno-Burn" metal lath made by the Northwestern Expanded Metal Company securely fastened to the wood lath.

The plastering throughout is two-coat work, all rooms with the exception of the dining room, kitchen and bathroom wainscot having a hard white finish. The dining room has a sand finish, and the walls and ceiling of the kitchen and bathroom wainscot have a cement plaster application. It is Best Brothers Keene's plastering, well mixed and applied according to directions. Where indicated the exterior walls are lathed with No. 18 steel-

wire mesh ⅜ x ¾ in., with a heavy coat of galvanize, the lath being securely stapled at each bearing. The lath is run horizontally and stretched tight. The exterior plastering is three-coat work, the first being composed of lime, hair and sand in proper proportions with 20 per cent. of "Universal" Portland cement added. The second coat is composed of one part "Universal" Portland cement and two parts of clean sharp sand. The final coat is composed of the same cement and clean crushed limestone screenings of uniform size.

In painting both interior and exterior pure white lead and linseed oil was used of selected colors. The metal work was painted inside and out with one coat of mineral paint and two coats of lead and oil paint. All exterior work was given two coats of selected colors. On interior finish all oak trim was given one coat of paste wood filler, then one coat of white shellac, and finally one coat of Pratt & Lambert's "Dulkote." The birch trim, excepting bedrooms and bathroom, was first treated with one coat acid stain, one coat white shellac, with a last coat of "Dulkote." The bedrooms and bathroom finish was given one coat lead and oil paint, two coats Pratt & Lambert's "Enamel Undercoating," and one final coat of "Vitralite Enamel."

All mahogany doors were first treated with a selected stain, and after an application of one coat of white shellac the following and final three coats of piano varnish were applied.

The Plumbing Fixtures

The plumbing fixtures are installed as indicated on the floor plans, and it is well to note that a closet has been provided on the basement floor. Refrigerator drain has been provided and connected with a 2-in. pipe to the sewer by means of a small bell trap set in the basement floor. The standard fixtures in the specifications called for Trenton Pottery Company's vitreous china "Siwelco" noiseless syphon jet closets; "New Monarch" bath tub, 5 ft. 6 in. long, and a "Columbia" 28 x 22 in. lavatory with 7 in. high integral back. In the kitchen one of the L. Wolff Manufacturing Company's 34-in. "Monarch" kitchen sinks with ¾-in. Fuller faucets and standard connections is installed. The basement is furnished with 26-in. laundry trays of the L. Wolff Manufacturing Company's "Columbian" ware roll rim fixture with enameled-iron legs and secure wall supports.

The hot-water heater in the basement is a "Herbert Jr.," manufactured by the Herbert Boiler Company, Chicago, Ill., and proper connections are made to a 150-gal. steel pressure tank.

The heating system is of the two-pipe hot-water type, having low-pressure gravity, open-expansion tank, with supply and return mains in the basement. The boiler supplied is the American Radiator Company's "Arco No. 128 W." The expansion tank provided measures 14 x 30 in., equipped with a ½-in. vent and 1-in. overflow pipe connected to the proper drain. Regular types of radiators are installed throughout the building.

The house is piped to supply gas to the range in the kitchen and to a combination fixture suspended from the kitchen ceiling. Proper electric lights have been installed in each room, and mains are run in the east wall of the building from the basement to the attic, all distributing wires being on the two-wire system.

The house here described was built for Dr. Nathaniel H. Adams, of Augusta and East avenues, Oak Park, Ill., at a cost of approximately $6,000, from plans prepared by Perry W. Swern, architect, Oak Park, Ill.

The general contract was in the hands of Julius Linder, of Austin, Ill.

A House of Porcelain Tile

Until comparatively recent times houses were built either of wood or brick. Buildings in the suburbs and rural districts were of frame and those in the city brick. Stucco was introduced a few years ago, and on the heels of that came concrete, reinforced concrete, hollow tile and concrete blocks. If a scheme that has had the attention of a man for many years materializes, and he says it will, houses built of porcelain will be the next seen in the suburbs of New York This man is in the porcelain business and is of a family of porcelain makers and has had such a building in mind for forty years.

After years of experimenting he succeeded in making a porcelain tile strong enough for building purposes and soon will erect a house of porcelain. The tile will be built around the skeleton frame of a skyscraper. In other words, the house will have a skeleton frame of steel and the tile will be nothing more than a finish.

The tile will be an inch thick and of strength not expected of such brittle material as porcelain. It is a composition which has taken years to find, and the maker proposes to guard his secret. Besides strength and remarkable wearing qualities the porcelain house will be waterproof and steam proof. Except for the steel frame it will be porcelain. The walls, floors, ceilings, halls, stairs and everything else found in a well constructed dwelling will be porcelain.

It would be possible to wash down such a house with a hose every day if necessary. Not only will it be the most perfect houses from a sanitary point, but it is said that it can be built cheaper and quicker than any other type of house at the present time.

An Unusual Piece of Granite Work

A most interesting piece of granite work has recently been completed at the stone quarries at Crotch Island, Stonington, Maine, where a block of granite 22 x 22 x 5¼ ft. and weighing approximately 225 tons was taken out. The block was used for the production of a huge fountain bowl which when completed was 20 ft. 8 in. in diameter and the thickness of the stone at the bottom of the bowl was 3 ft. 3⅜ in. The weight was approximately 50 tons. After the block was split out at the quarry it was removed a distance of 600 ft. for the purpose of dressing into its completed form. The work was done by the John L. Goss Corporation, Boston, Mass., and the bowl was transported to Pocantico Hills, N. Y., and placed in position on the estate of J. D. Rockefeller.

Concrete Buildings in Mexico

Conditions the Contractor Will Encounter in Entering the Reinforced Concrete Building Field in Mexico

FROM the contractor's point of view, reinforced concrete building in the Republic of Mexico is in its infancy, for it is only within the past five years that concrete building has made any great strides as compared with other classes of building in the country. The few concrete buildings that have already been erected have been less expensive than any other class of structure. From every point of view the results to the owners have been not merely satisfactory, but gratifying. There are only four or five contractors in the entire republic engaged in this particular line of work, hence the field is practically untouched.

Conditions Likely to be Encountered

It seems especially worth while to consider the conditions the contractor will encounter in entering the field.

The adobe building predominates in the greater portion of the country. This type of construction consists of blocks of ordinary clay, which after being mixed with a little straw are baked in the sun until they become sufficiently hard to be handled. Since these blocks are made in moulds 3 x 10 x 14 in. they give a minimum wall thickness of 10 in.; but in many cases two and three blocks are used, so that 2 and 3-ft. walls are common. The mortar used to set these blocks is made from the same clay, and the building is finished off with ordinary lime plaster, some of which is smooth, some rough cast and decorated with gay colors.

Materials Most Used

Besides adobe, brick, stone and structural steel are used extensively. The brick is of rather poor quality, and does not come up to the poorest common brick made in the United States. Sand lime brick is used to some extent in the northern part of the republic. Faced brick is neither made nor used in the country. Stone is used mostly for the foundation and occasionally for the superstructure, but its use varies in different parts of the country. Structural steel is used only in the larger buildings, such as factories, warehouses, and the like. The steel is rather expensive, since there is only one foundry in the country. The majority of the heavy structural steel is imported from Belgium, and the rest from the United States. Regardless of the material used, the style is practically the same for all buildings. Especially is this true of residences, which are usually one story in hight.

Ten years ago the greatest portion of the cement used was imported, and most of this came from Germany. Since then two cement factories have been built, one in the northern part of the republic and one in the southern part. These two factories now supply about 90 per cent. of the cement used. This product, says J. F. Abbey in the "Wisconsin Engineer," is equal to our best brands and passes the tests of both the American and European Societies for Testing Materials. The price of cement at the present time is $4 per barrel. It is put up in cloth or jute sacks weighing 95 lb. and 50 kg. respectively. One company sells its product by the barrel and the other by the metric ton.

Steel for Reinforcement

The steel used for reinforcement is made in the republic. The types of bars made are: the Johnson corrugated, the square twisted and the plain round. The price averages about $75 per metric ton.

For lumber in the form work, both the native product and that imported from the southern part of the United States are used. While the native lumber is cheaper, the southern yellow and white pines are far superior in both quality and strength. Imported lumber costs from $30 to $40 per 1000 board feet, while the native is about $5 cheaper.

Both gravel and crushed stone are used in the concrete work. The quality of both is good. Due to the lack of quarries and crushers, gravel is more extensively used than stone. This is the river gravel, well screened and well graded. Its price averages about $1 per cubic meter, while the stone is usually delivered in carload lots, selling at from $2 to $3 per metric ton. Good coarse sand is scarce in the country. All that is available is rather fine, but free from loam or foreign vegetable matter. On some parts of the coast a good clean coarse sea sand is abundant. One may expect to pay about 75 cents per cubic meter for his sand.

All Machinery Is Imported

All machinery and other plant equipment for building purposes has to be imported, since none is manufactured in Mexico. The majority of this material, especially of the higher grade, comes from the United States; and since the duty is usually high, one can count on it costing 20 per cent. more than in the States. Aside from the materials actually used in the concrete work, the other materials required for the completion of a first-class building are also generally imported. This applies to plumbing and electrical fixtures, ornamental plaster, metal lath, glass, finished hardware, elevators, mosaic tile flooring and paints. The greater part of this material, also, comes from the United States.

Contrary to the general impression, labor is the least of the contractor's worries. This is entirely due to the absence of organized labor unions in the republic. These is little difference between skilled

and the unskilled labor. While the common laborer receives 75 cents for ten hours' work, he is the equal of any laborer in the United States who receives three to four times as much. The carpenters and masons get $1.50 for ten hours' work; and while they are not equal to our skilled workmen, they are certainly willing and conscientious and very anxious to learn. Both skilled and unskilled laborers use the old methods taught by and inherited from the Spaniards and the Indians. The laborer is often seen carrying heavy loads on his head; the carpenter saws his board away from him; and the plasterer uses a small hawk, holding but a few handfuls, and throws his plaster carelessly on the wall. The Mexicans seem to accomplish more by piece work, and hence, with a few exceptions like "form" work, which is comparatively new to them, the most of the work is done in this way.

First Reinforced Concrete Building Erected

The writer was in charge of a four-story reinforced concrete bank building in Torreon, a northern town of 40,000 inhabitants. It was the first structure of the type erected in the town, and some little difficulty was experienced in securing skilled labor. The carpenters had never done any "form" work and so required close watching to prevent their filling the boards with nails. The laborers were willing and good workers, and, owing to the scarcity of rubber boots, were often seen wading barefooted in the soft concrete. It was rather amusing at first to watch the laborers handling the concrete, which was all spouted by gravity.

The building in question was a skeleton of the beam and girder type, with reinforced concrete floors and roof. The façades were of cut ornamental stone, backed with common brick. All the work was done by Mexicans, with the exception of the plastering, which was done by Americans especially imported for this work. The work of the natives on stone cutting was remarkable.

One of the Difficulties Is Prejudice

One difficulty the contractors face is the prejudice of the Mexican people against reinforced concrete. This has been largely due to the faulty work that has been done there in the past and is now rapidly disappearing. The fact that the concrete floors are so thin as compared with old unnecessarily thick form of constructions reduces any confidence that the people might otherwise have. In their floor construction they still adhere to the old Spanish system of "bovedas." This construction consists of I-beams spaced 1 meter between centers and arched with two and sometimes three thicknesses of common brick, upon which more brick or plain concrete of unnecessarily great thickness is laid. The completed floor ranges from 15 in. to 2 ft. in thickness from the bottom flange of the I-beam to the top. The arched portion between the I-beams is then plastered and painted, and the bottom flanges of the beams are thus left exposed. This construction not only is expensive and extremely crude, but it also shows lack of economical design and artistic taste.

Since cost of materials for reinforced concrete construction is higher, while that of labor is lower than here, the total cost of such work in Mexico compares very favorably with that of similar work in this country. It is, however, usually safe to count on double the time to complete the same job in the Republic that would be needed in the States.

The customary process of drawing up contracts and specifications is adhered to. Revenue stamps are placed on each sheet of paper according to the amount of the contract. After these are canceled by the contractor, and the whole document signed by both parties and witnessed, the papers are in legal form.

The owners, as a rule, are very lenient with the contractors, and often reward them with bonuses for good work done. They appreciate honest work, and one can always rely on their influence for future work or references. A square deal in contracting in Mexico is what wins the confidence of the Mexicans first of all, and thus assures the contractor success in his business.

Quantity System of Estimating

It is interesting to note from the last "Monthly Letter" of Secretary Sayward of the Master Builders' Association of Boston, Mass., that progress is being made in that city in the direction of Quantity Surveying, or what may be designated as the Quantity System of Estimating. Something like six months ago a number of general contractors held a meeting to discuss the matter and a committee was appointed consisting of Isaac F. Woodbury, Charles Logue and Arthur W. Joslin to study the question of Quantity Surveying, Standardization of Units and Rules of Measurement.

This committee has just made its report to the general contractors mentioned, the report formulating a comprehensive set of rules for standardizing of measurements under the following heads: Excavation, Finished Grading and Landscape Work, Drains, Drainage Accessories, Stone Foundations, Concrete Foundations, Stone Ashlar, Concrete Floors, Sundry Concrete Work, Piles, Sheet Piling, Reinforced Concrete, Cut Stone, Architectural Terra Cotta, Brick Work, Structural Terra Cotta, Composite Construction, Frame, Studding, Furring, Boards, Upper Floors, Screeds, Windows, Doors, Shingles, Clapboards, Outside Finish, Architraves, Edge Casings and Window Frame Veneers, Window Stools and Aprons, Stop Beads, Base and Molding, Chair Rails, Dado Capping, Picture Molding, Sheathing, Panel Dadoes, Fittings and Cabinet Work generally.

Cost of Driving Piles with a Gasoline Hoist

The cost of driving 1300 piles with a 6½-hp. gasoline engine operating a 1.650-lb. drop hammer is reported in the *Engineering Record* to be 18.2 cents per lineal foot of pile in place, including the cost of the pile. The costs are itemized as follows: Cost of piles delivered, $1,432.80; labor, $1,653.93; engine and hoisting outfit, $340; scow, $154.45. The piles were driven from a scow on which the engine was mounted, and were driven to an average depth of 13.15 ft. The cost of the piles alone was 7.5 cents per linear foot.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

THE term "bending moment" is a description of the breaking effect of external forces on a beam. The term "resisting moment" is a description of the effect of internal forces in a beam set up to resist breaking. The action of the resisting forces may be illustrated by simple framework, for a frame is merely a light beam containing little or no superfluous material. The ideal frame contains no superfluous material but if this is obtained by an increase in cost of fabrication the frame is not ideal from the standpoint of the user, regardless of the mathematically ideal condition. The designer soon finds that mathematical analysis of stresses deals with frames as lines through the center of gravity of pieces. It is with pieces that the designer has to deal. In a mathematical design of a frame all forces act at points and when a line of infinitesimal thickness, dealt with by the mathematician, is replaced by a piece of wood or steel or concrete certain stresses are set up around the points. Then joints are constructed and an analysis must be made of the forces around the joints, this involving the design of rivets and fastenings to keep the joints from moving. A simple beam contains some superfluous material but much of this material acts to transmit stresses in various directions and thus take care of internal stresses which otherwise would interfere with the direct action assumed to take place along the lines connecting the points around which the forces act.

The strongest frame is a triangle, for a triangle with sides of fixed length cannot distort under direct stresses acting along the center lines of the pieces of which it is composed.

The capital letters A, B and C are used to designate the three angles of a triangle and the corresponding small letters are used to designate the sides opposite the angles. By placing the capital letters so small b will represent the base and small a will represent the altitude (height) of a triangle the student has a mnemonic idea of the relations of the sides and angles. In the following figures

$a = B\text{-}C$ (line from B to C.)
$b = A\text{-}C$ (line from A to C.)
$c = A\text{-}B$ (line from A to B.)

Then in Fig. 37

$$b = \sqrt{a^2 + c^2} = 8.246$$

in Fig. 38

$$b = c = \sqrt{(a/2)^2 + (\text{line } A\text{-}a)^2} = 8.062$$

in Fig. 39

$$c = \sqrt{a^2 + b^2} = 8.246$$

The rule is known as the "Rule of Pythagoras" and is given in every school arithmetic as follows:

In every right angled triangle the square on the hypothenuse is equal to the sum of the squares on the other two sides.

In Fig. 37

$M = cP = 8 \times 3000 = 24{,}000$ ft. lb. in member C.

The stress in $c = \frac{M}{a} = \frac{24{,}000}{2} = 12{,}000$ lb. ten-

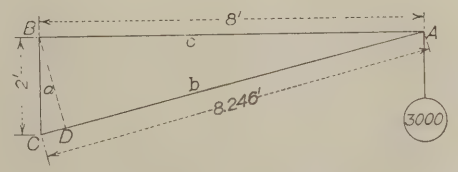


Fig. 37—Frame with Inclined Strut

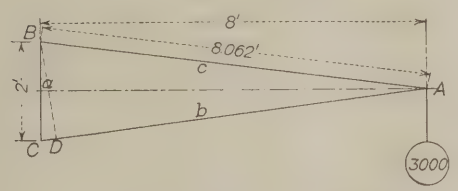


Fig. 38—Frame with Inclined Strut and Inclined Tie

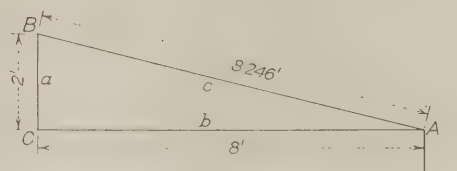


Fig. 39—Frame with Inclined Tie

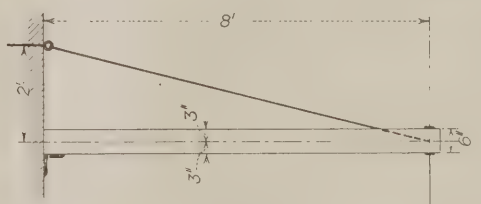


Fig. 40—Design for Sidewalk Canopy

Design of Beams, Girders and Trusses—Frames of Various Forms

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 39 of the January issue.

sion, for the stress *acts away from* the point *B*.

$$M = bP = 8.246 \times 3000 = 24{,}738 \text{ ft. lb.}$$

for member *b*.

$$\text{The stress in } b = \frac{M}{a} = \frac{24{,}738}{2} = 12{,}369 \text{ lb. com-}$$

pression for the stress *acts toward* the point *C*.

In Fig. 38 $M = cP = bP = 8.062 \times 3000 = 24{,}186$ ft. lb.

$$\text{Stress in } c = \text{stress in } b = \frac{M}{a} = \frac{24{,}186}{2} = 12{,}093$$

lb. the character of the stress in each member being determined by whether the member *pulls* from the point of fastening or *pushes* toward the support.

In Fig. 39 *M*, in member *c*, $= cP = 8.246 \times 3000$

$$= 24{,}738 \text{ ft. lb.} \quad \text{Stress in } c = \frac{M}{a} = \frac{24{,}738}{2} = 12{,}369$$

lb. tension.

M, in member *b*, $= bP = 8 \times 3000 = 24{,}000$ ft. lb.

$$\text{Stress in } b = \frac{M}{a} = \frac{24{,}000}{2} = 12{,}000 \text{ lb. compression.}$$

The examples just given show that *the stress at any given point in a beam, or any joint in a frame, is equal to the bending moment at the point divided by the depth at that point.*

Assume that the frame is made of some material, wood for example, in which a fiber stress of 500 lb. per square inch can be used in either tension or compression. Referring to Fig. 38, where the stress in each member is equal each member will require

$$\text{an area} = \frac{12{,}093}{500} = 24.186 \text{ sq. in.}$$

Extracting the square root gives the dimensions of each piece as 5.85 in. $\times$ 5.85 in., which, of course, will be commercial 6 in. $\times$ 6 in. wood, after surfacing. The pieces therefore can be 6 in. square. The lines of stress pass through the centers of the pieces, otherwise some twisting and bending strains will be set up. Twisting is called torsion in such cases.

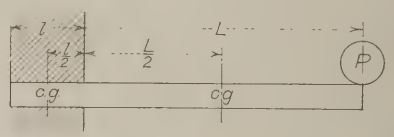
The actual construction of such a bracket frame is shown in Fig. 40, the stresses for which are given in Fig. 39. The lower piece rests on an angle at the wall and a plate may be placed between the end and the wall if the pressure exerted is greater than the wall can stand. The area of the plate will be such that the pressure will be distributed to an extent calculated to keep the allowable compressive load on the wall within proper limits. The load *P* represents the reaction at the outer end of the frame, the reaction at the wall end being carried on the angle support. The diagonal is a rod which will be about 1 in. in diameter if of steel, for steel can be stressed to 16,000 lb. per square inch in tension. To anchor the rod in the wall a rod 1 in. in diameter extends in to the far side and there a plate is fixed or it may be anchored in a concrete block in the wall.

The circumference of a circle is 3.1416 $\times$ the diameter. The circumference of a 1-in. rod is 3.1416 in., so for each inch in length there is an area of 3.1416 sq. in. An adhesion of concrete to steel of 75 lb. per square inch is customary so the adhesion per inch of length of the anchor rod in the concrete $= 3.14 \times 75 = 236$ lb. The total

$$\text{length of the rod} = \frac{12{,}369}{236} = 52.41 \text{ in.}$$

Instead of using one straight rod with a ring in the end it can be made U-shaped, each leg embedded in the concrete 27 in. Practically, however, the frame is not well designed. The stress equals the moment at the wall divided by the depth, so a much lower stress may be obtained by running the tie rod higher, an angle of about 45 deg. being good.

This example was worked to illustrate the simplicity of such computations and to show that all lines of stress must pass through points. In Fig. 40 the tie rod is shown to run quite a distance into the bottom member in order to have all the forces acting properly. In practical work the vertical bolt suspending the load will have an eye ring at the top to receive the tie. The eccentricity



Design of Beams, Girders and Trusses—Fig. 41—Action of Moments in Anchorage of Cantilever Beam

will not be large enough to make a great difference, but even this small amount can be greatly reduced by running the tie at a steeper angle.

Assume that the lines of stress are contained within a beam, Fig. 41, anchored in the wall in the usual way. The size of the beam is proportioned to take care of the tensile, compressive and shearing stresses and the anchorage is the only item to be now considered. The wall reaction is equal to the sum of all the loads on the beam, so the weight of the wall resting on the beam must be equal to, or exceed the reaction. Weight implies bulk and bulk implies bottom surface, and as the wall must be of a definite width to rest on the beam a moment is created.

In Fig. 41 the weight of the wall multiplied by the distance from the face to the center of gravity must be equal to the moment obtained by multiplying the loads on the beam by the respective distances from their centers of gravity to the face of the wall.

The illustration of how the stresses are obtained is true for beams or frames resting on two or more supports; the stress being equal to the moment at a point divided by the depth at that point. When the lower member is a square piece of timber the distance is measured from its center and when the upper member is a rod the distance is measured to the center of the rod. That is, all distances are measured between centers of gravity of the parts, or members, of a frame, the total hight from the top to the bottom being equal to the distance center to center plus half the thickness of each piece.

When a frame or truss is composed of angles or other rolled shapes the distance is always measured between centers of gravity of the top and bottom

chords. Thus when depth is mentioned it is not the over-all depth. The stress obtained is the stress on the center line passing through the center of gravity, the stress being slightly larger at the outer edge of the rolled section and slightly smaller at the inner edge, when there is bending. In pieces acting as plain ties or plain struts, so the stress is pure tension or pure compression without bending stress, the stress is equal over the entire area. In a frame pieces are generally so placed that the stresses are purely tension or compression but a beam is a solidly filled frame and the stress is greatest at top and bottom, reducing to zero on the line where the compressive force changes to tension. It is necessary then to find the position of the center of gravity of the beam on each side of the neutral plane, or, as it is sometimes termed, the neutral axis.

The question may be asked, "Why is the depth used as a divisor?" Referring to Fig. 37 and Fig. 38 a dotted line is shown from *B* to *D*. The moment is obtained by multiplying the load by the horizontal distance from the wall. To resist this moment, which means to prop up the member *A-B*, there must be some force exerted at a distance *B-D* from the point *B*. That is the bending moment and the moment to resist it are taken about the point *B*. The bending moment at $B = 8 \times 3000 = 24{,}000$ ft. lb. This is resisted by some force acting about the point *B* with an arm = *B-D*. Thus the upward pushing force in the member *A-C* must equal the downward moment divided by the length *B-D*. This upward force is a reaction and is compressive.

To obtain a reaction multiply the loads by the distance through which they act and divide by the span length between supports. The obtaining of tensile and compressive stresses is the same thing. First a downward bending moment is obtained and then a reaction is found by dividing, not by the span of the beam, but by the span between supports. There is an upper support to which the tension member is fastened and a lower support against which the compression member abuts. The distance between them is the span between supports. This span is the distance measured on the shortest line between the lines representing the direction of the forces, so it is perpendicular to the direction of the inclined member. For all practical purposes the lower support is at *D* and not at *C*. The member is merely carried on to the point *C*.

It is correct to multiply the load by the arm *B-A* and divide by the arm *B-D* in all cases but considerable work must be done to obtain the length of the arm *B-D*. This requires a knowledge of geometry and trigonometry and the use of tables of functions of angles. To obtain the length of the inclined member and use this as a moment arm and then divide by the vertical distance between the centers of gravity of the top and bottom members is the shortest method and that commonly used. The experienced structural designer uses tables of squares to lighten the labor of making the computations involved in obtaining the hypothenuse of a triangle. Barlow's Tables contain the squares, cubes, square roots and cube roots of all numbers from 1 to 10,000. Smoley's Tables for the Use of Structural Designers contain the squares of all lengths up to 100 ft., varying by 16ths of an inch.

(*To be continued*)

Suggestions for Laying Terra Cotta

Kind of Mixture to Be Used—Pointing the Joints—Weight and Crushing Strength

TERRA COTTA should always be set in either natural cement or Portland cement, mixed with sand, and in about the same way as stone is set. As soon as set, the outside of the joints should be raked out to a depth of three-quarters of an inch to allow for pointing and to prevent chipping. The terra cotta should be built up in advance of the backing, one course at a time, and all voids, except those projecting beyond the face of the wall, should be filled with grout or mortar, into which bricks should be forced to make the work as solid as possible. All blocks not solidly built into the walls should be anchored with galvanized iron clamps, the same as for stonework, says H. L. Fitzsimmons in an Exchange, and, as a rule, all projecting members over 6 in. in hight should be anchored in this way. After the walls are up, the joints should be pointed with Portland cement colored with a mineral pigment to correspond with the color of the terra cotta. The pointing is done in the same way as in stonework, except that the horizontal joints in all sills and washes of belt courses and cornices, unless covered with a roll should be raked out about two inches deep, calked with oakum for about 1 in., and then filled with an elastic cement.

The weight of terra cotta in solid blocks averages 122 lb. per cubic foot. When made in hollow blocks 1½ in. thick, the weight varies from 65 to 85 lb. per cubic foot, the smaller pieces weighing the most. For pieces 12 by 18 in. or larger on the face, 70 lb. per cubic foot should be a fair average. The crushing strength of terra cotta blocks in 2 in. tubes varies from 5000 to 7000 lb. per square inch. Hollow blocks of terra cotta, one foot high, unfilled, have sustained 186 tons per square foot. From these and other tests I would place the safe working strength of terra cotta blocks in the wall at 5 tons per square foot when unfilled, and at 10 tons per square foot when filled solid with brickwork or concrete. If it is desired to test the strength of special pieces, two or three small pieces should be broken from the blocks and ground to 1 in. cubes, and then tested in a machine. Should the average results fall much below 6000 lb., the material should be rejected.

Concrete Construction in the Winter

Heating the Water, Sand and Gravel by Steam and the Enclosed Work by Stoves, Salamanders, Etc.

By Harmon H. Rice

ONLY a few years ago most building construction, and particularly concrete work was, by common consent, stopped with the approach of cold weather. Increasing building activities, however, and particularly increasing use of concrete in the construction field generally, made it necessary for engineers and building contractors to discover means whereby they could carry on concrete construction during the winter months to prevent the loss of time and money involved in laying up their equipment. To prohibit the placing of concrete when the temperature is near or below freezing, as was once common, caused unnecessary delays and imposed an unjust hardship upon the contractor.

If concrete work is properly handled, it may be successfully carried on, regardless of temperature conditions, and present practice relative to concreting in cold weather has been developed from a wide field of experience, so that concrete construction during the winter is now attended with the same success as prevails during the summer.

Concrete Construction in the Winter—Fig. 1 Showing One Method of Heating Water by Means of Steam

Winter concreting suggests so many opportunities to builders and contractors that many who perhaps are not familiar with the requirements leading to success, will be interested in knowing how easily their forces can be employed during the period of the year when heretofore they have been laid off a greater portion of the time. Although there is some difference of opinion as to just what details shall govern the methods of mixing, depositing, and protecting concrete during freezing weather, the essential requirements are simple. Water is an element required to bring about the hardening of Portland cement, and that means that water must not be allowed to change into ice. Therefore, concrete must not be allowed to freeze while it is being mixed, placed, and undergoing early hardening.

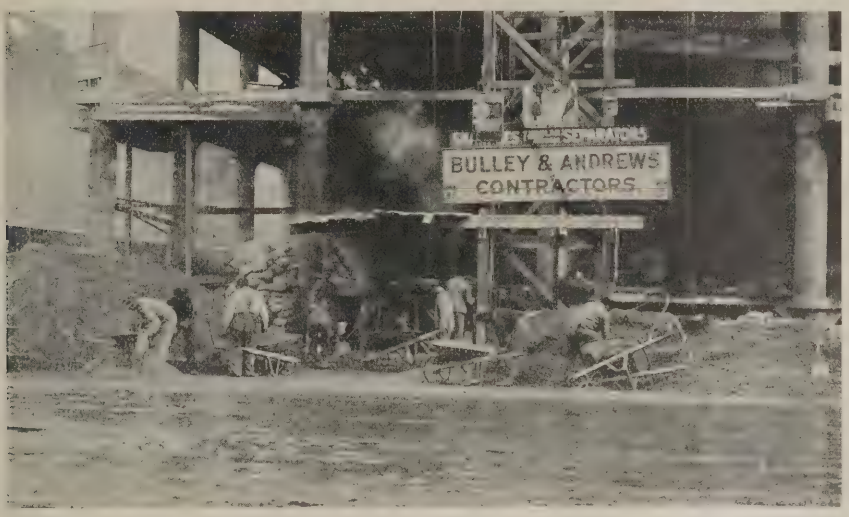
At one time the practice was quite general to use salt in the mixing water, whenever concrete was to be placed during freezing weather. Salt lowers the freezing point of water, and the fact that it is a cheap material resulted in its popularity as an ingredient of concrete to prevent freezing of the freshly deposited material. Rules for the use of salt were formulated, the most widely accepted one being that which calls for its addition to the mixing water in an amount equaling 1 per cent of the weight of water, for each degree of temperature below freezing point to be counteracted. But as more than 10 per cent. cannot be used without seriously affecting the strength of concrete, salt cannot be depended upon to provide protection against temperatures below 22 deg. above zero.

Some engineers still employ salt to prevent freezing of freshly deposited concrete, but its use is not to be commended for several reasons. Although it lowers the freezing point of concrete, hardening is retarded so that a much longer time is necessary for the concrete to gain its ultimate strength.

Another reason why salt cannot be considered with favor and used in concrete is that if the surface appearance of the work counts for anything concrete in which salt has been used with the mixing water is likely to become coated with what is known as efflorescence, this being a whitish deposit caused by the release of the salt from the concrete by crystallization on the surface during varying atmospheric changes, this tendency being more marked in a lean and porous concrete than in a rich, dense one. Concrete containing salt used in the manner indicated has also been found subject to electrolysis, while in the absence of salt, concrete resists such action. Also, inspection of reinforcement in concrete where salt has been used has disclosed considerable rust on the steel, and every one knows that if such foreign materials as salt are not pres-

ent the impervious concrete will perfectly protect the steel from rust.

Calcium chloride (chloride of lime) also has been used in the same manner as salt; but the practice is now becoming general to discard these agents of protection and to heat the aggregates and mixing water immediately before mixing the concrete and afterward to protect the concrete against the loss of heat so given for a sufficient length of time to accomplish early hardening.



Concrete Construction in the Winter—Fig. 2—Method of Heating the Aggregates

Aggregates are not always heated except in very cold weather, that is, when they do not contain frost or frozen lumps, but if frost or frozen lumps are present, sand and gravel or broken stone must be heated. In all cases the mixing water should be heated so as to give the very best results.

There are several ways of successfully and economically heating concreting materials. One of the most efficient methods of heating mixing water is by steam, as is shown in Fig. 1 of the illustrations. This method was employed in the construction work on a Chicago warehouse. Water was taken from a hydrant at 40 deg. temperature and heated in a barrel by means of steam carried through a ¾-in. pipe from a 12-hp boiler, supplying power to the hoisting engine. Boiler pressure varied from 85 to 90 lb. Water for each batch of concrete was dipped from the barrel as required, the time required averaging about one and one-half minutes for each batch. At the time of mixing the temperature of the air was 53 deg. and that of the mixing water when heated varied from 164 to 173 deg. When the concrete was taken from the mixer it had a temperature of about 60 deg., which shows what may be accomplished in applying heat by means of heating the water only.

Aggregates may be heated in several ways. A common practice is to use an old boiler or boiler smokestack, build a fire inside, and pile the materials, to be heated around the outside. While this method is satisfactory for small jobs, work on a large scale will need better facilities, because in heating aggregates as just described the material which is nearest to the fire—that is, lying against the pipe or boiler—must be excessively heated before the proper amount of heat can be given to materials on the outside of the pile; and as most sands turn red and certain kinds of stone and gravel soften or split when excessively heated, some arrangement for heating aggregates by steam is then preferable. Steam hose may be connected with a steam boiler on the job and short pieces of iron pipe fastened to the ends of the hose and thrust in piles of sand and gravel or stone, as in Fig. 2, thus effectively introducing heat at a temperature not sufficiently high to injure the materials. If the plant is of a permanent or semi-permanent nature, aggregate bins will usually be provided, and these may be equipped with perforated steam pipes, so that the opening of a valve will turn the steam into the bins and cause it to pass through and warm the aggregates. Cement need not be heated, as it is but a relatively small portion of the bulk of the concrete.

Another advantage in having steam available for heating purposes is that if metal forms are used these must be warmed during freezing wather before placing the concrete, and particles of ice or frozen concrete clinging to the interior of forms, also must be removed, and steam is one of the most efficient means of accomplishing this.

Fig. 3—Showing Use of Salamanders for Keeping the Enclosed Work During the Process of Construction at the Proper Temperature

Heating materials in the manner suggested accelerates the hardening of concrete. Under normal conditions cement or concrete in mass develops about 140 deg. of internal heat within from six to twelve hours after being mixed with water. This development of internal heat is hastened and augmented by heating the aggregates and mixing

water, so the combination of internal heat and heat from the materials supplement each other and cause the concrete to harden in a manner quite as satisfactory as under the most favorable summer weather conditions.

Although cases are on record where Portland cement concrete has been frozen and after having thawed out finally hardened satisfactorily, nevertheless concrete is injured by alternate freezing and thawing during the first few days after placing. Therefore as soon as deposited concrete should be protected from freezing for at least five days.

Character of the Protection Required

Just what this protection need consist of depends largely upon the size and character of the work and the conditions under which carried on. If the forms in which concrete is deposited are of tightly-jointed 2-in. lumber, these will frequently afford sufficient protection, although the top of the forms should always be covered by tarpaulins when there is any likelihood of frost. Some contractors have found that by furring the outside of forms with 2-in. strips, or if studding is on the outside, tacking building paper across the studs, the air in this confined space will be from 10 to 15 deg. warmer than the outer air, thus affording ample protection for changes not exceeding 10 or 15 deg.

Floors are usually protected by a covering of straw or sawdust, 10 or 12 in. deep; and, such covering should, of course, be dry. Manure also is sometimes used, but should not be placed directly upon the floor on account of possibility of discoloring the work, while some have contended that if manure is placed directly against green concrete a disintegration of the surface is likely to result. Canvas is used to a great extent to temporarily enclose buildings, as shown in Fig. 3 of our illustrations, so that by placing salamanders or similar heating devices, a sufficient warmth can be provided to protect the concrete during the early hardening period. The illustration referred to is from a photograph representing winter work on a ten-story reinforced concrete building in Chicago. On this particular job sand and gravel were heated with steam from an auxiliary boiler, which also supplied steam for heating the mixing water to a temperature of about 100 deg. An extra steam pipe from the same boiler supplied steam for warming the forms and removing ice and snow where necessary. Floors were covered with tar paper and sawdust; the work was housed in and then salamanders placed to provide the necessary heat. These were kept burning for a period of from twenty hours to two days after placing the concrete.

The Matter of Cost

Naturally contractors will realize that a slight added expense is involved in carrying on concreting under unfavorable weather conditions, and probably will be interested in knowing the average of such increased cost. Operating salamanders, including fuel and labor, has been shown to cost from 70 to 80 cents per day each. The cost of heating aggregates, water and forms, and protecting the structure by enclosing with canvas if necessary, increases the cost in a variable amount generally ranging from 6 to 10 per cent. But it should be remembered that this increased cost of carrying on the work is often largely, if not entirely, offset by the opportunity of keeping one's plant and forces actively engaged, and also by the fact that buildings can be made ready for occupancy in accordance with contract.

One other important precaution should be observed in connection with cold weather concreting. Everyone knows that cold delays the hardening of concrete and forms must not be removed too early. Removing forms at too early a period is to be condemned in connection with all concreting work regardless of the weather conditions under which carried on, but deserves particular emphasis as regards cold weather work. Better be safe than sorry. Any additional money that may be saved as the result of removing forms a day or two ahead of the safe time is often disastrously offset by failures that could have been prevented by the "ounce of prevention" that is worth more than the "pound of cure."

Many of the large cement companies issue booklets giving detailed methods of procedure for concreting in cold weather, and every contractor should have one of these in his possession, so that he may realize that there is no longer any need for his having his own and his entire laboring force's time going unoccupied just because of the winter season.

New Form of Slate Roofing

What is known as "inlaid" slate is made from genuine roofing slate, the latter being sawn into small squares to secure flexibility, then assembled and mounted on a backing of strong roofing felt thoroughly embedded in a high melting asphalt mixed with sand at the proper temperature. The material is then cut into units containing 20 slates and is shipped in crates.

The materials entering into the manufacture of inlaid slate are well known to architects, engineers and builders for their enduring qualities in resisting the destructive action of the elements, and are no experiment whatever. They are combined in a practical form under necessary conditions of heat, etc., at the factory with the aid of special machinery, making practical roofing material for flat roofs.

The waterproofing for an inlaid slate roof, says the *American Roofer*, is built up in the usual manner that has been in use for the past 30 years: lapping three sheets of single ply roofing felt and mopping each sheet well back under the lap with straight-run American coal-tar pitch, each sheet being first nailed down about every 3 ft. with tin caps. When the roof boards have to form the ceiling inside, such as in factories, an extra sheet of resin sized building paper is first put down over the roof boards with an inch lap before the tar paper is put on.

On comparison of weight of tile and inlaid slate it is found that a 6 x 9-in. tile weighs 4½ lb.; inlaid slate, same size, weighs 25 oz. A freight car loaded with tile weighing 60,000 lb. will cover 5,000 ft. The same car loaded with inlaid slate weighing 60,000 lb. will cover 16,000 ft.

The material is highly flexible, conforming easily to the shape of any roof, and can be cut to any size or shape with an inlaid slate cutter as easy as cutting a thin board with a sharp saw.

Fire Engine House for a Small Town

Details of Construction Which the Builder Will Find of Value—Cost of Erection About $1,500

IN every well organized community provision is made for fighting fires either through volunteer companies or regularly established fire departments, this feature depending altogether upon the extent of the population. In the rural and suburban districts, as well as in the smaller towns, where the fire engines are operated by hand power, volunteer companies are most frequently found, and it is a station for an engine of this kind which constitutes the basis of the present article. The building is such, however, that any other kind of engine might be housed in it. From the half tone picture it will be seen that the engine house is a one story affair, which is constructed of a red clay gas burned brick laid up in chocolate colored mortar. Local limestone is used for the range work and trim above grade. The foundation walls are of concrete, use being made of a 1:3:5 mixture. All foundation and partition walls were slushed in and no stones larger than 3 in. were used.

A Fire Engine House for a Small Town.—C. F. Bowdle, Architect, Piqua, Ohio

The framing timbers are of yellow pine, the wall plates and ceiling joists being 2 x 8 in., the rafters 2 x 6 in., the collar beams 1 x 6 in. and the hip rafters 2 x 8 in. There are two rows of ⅞ x 2½ in. bridging between the ceiling joist. The roof is covered with sheathing boards over which is placed roofing felt weighing 40 lb. to the square and on this in turn is placed 6 in. red shingle tile with cresting and hip roll as indicated in the picture.

The chimney is of brick with 6 in galvanized iron thimble 8 ft. above the floor level.

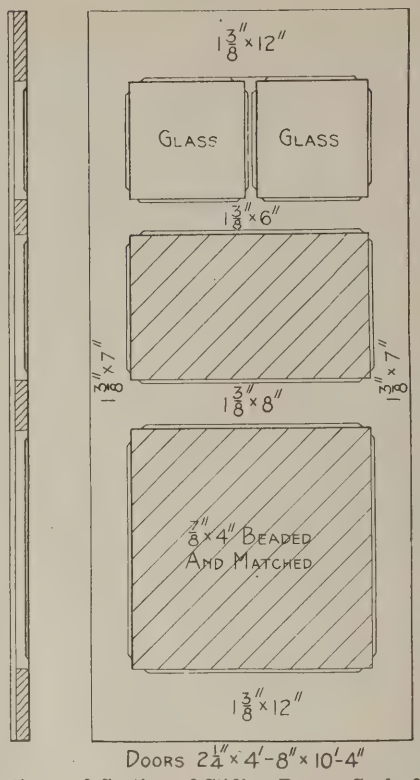
The floor of the engine house is of cement laid on a bed consisting of 12 in. of coarse gravel well rammed in place and covered with 4 in. of a 1:3:4 mixture and finishing with a 1:2 mixture well troweled to a smooth level surface. The floor is so made as to give a fall of 1 in. from the side walls to the cast iron drain at the center. This drain has 12 in. diameter face and connects with 4 in. glazed tile laid with a good fall to a ditch at the right side of the building. There are 6 in. tile at the hose bibb for drain and shut off valves.

The wheel guards at the main entrance are of a 1:2 mixture anchored into the walls and floor 2 in. and tightly pointed.

The walls are covered with two coats of patent cement plaster with sand finish.

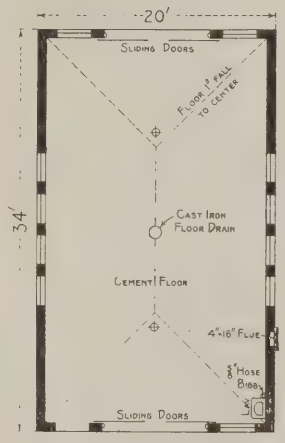
The single door is of white pine 1¾ in. thick and has five raised panels. The sliding doors have mortised, tenoned and keyed facing of poplar about 1⅜ in. thick, with a back of ⅞ x 4 in. matched and beaded yellow pine put on diagonally with flat head screws. The sliding doors at front and rear are fitted with Richards trolley roller bearing barn door hangers with two tracks of corresponding size and make, each 20 ft. long. Guide rollers are

Front Elevation.—Scale 1/8 In. to the Foot

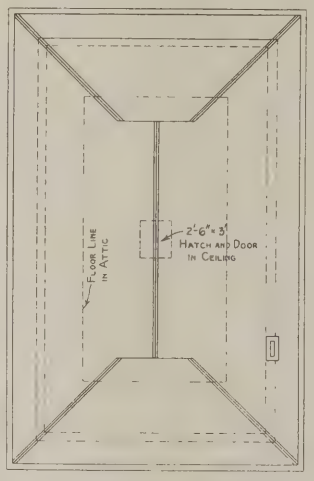


Doors 2 1/4" × 4'-8" × 10'-4"

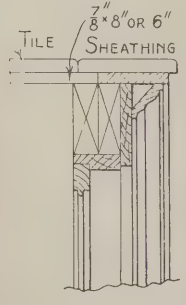
Elevation and Section of Sliding Door.—Scale 3/8 In. to the Foot



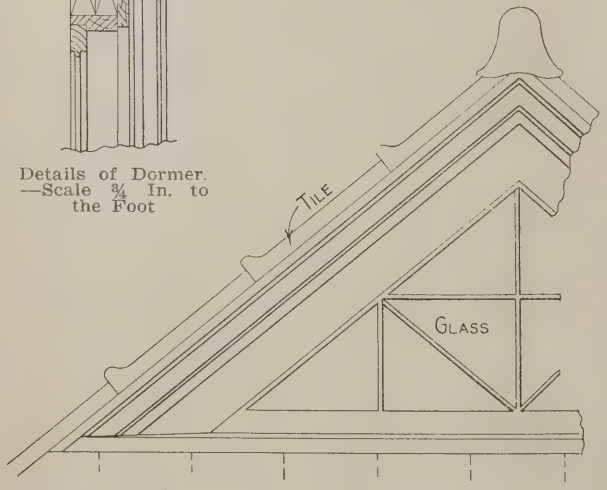
Floor Plan.—Scale 1/16 In. to the Foot



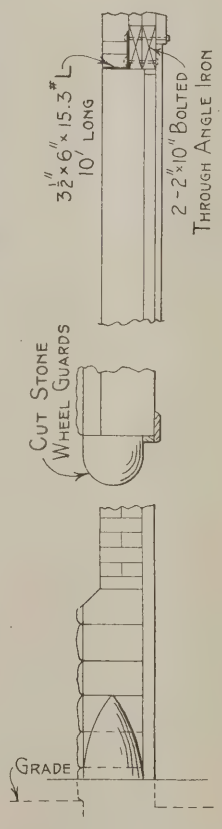
Roof Plan.—Scale 1/16 In. to the Foot



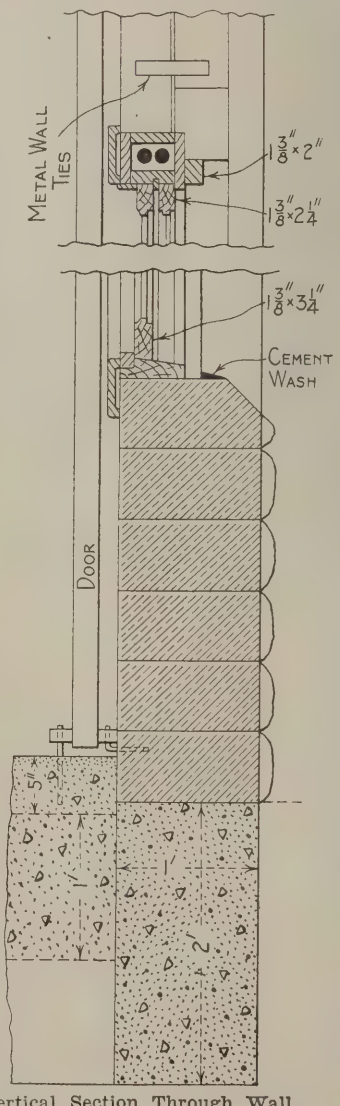
Details of Dormer. —Scale 3/4 In. to the Foot



Partial Elevation of Dormer.—Scale 3/4 In. to the Foot



Details of Main Entrance. — Scale 3/8 In. to the Foot



Vertical Section Through Wall. —Scale 3/4 In. to the Foot

Fire Engine House for a Small Town.—Plans, Elevations and Miscellaneous Constructive Details

provided at the bottoms of the sliding doors.

The windows have cast bronze window fasteners and steel bronze finish bar sash lifts on the lower sash. The sash are hung with braided cord running over steel pulleys and balanced by means of cast iron weights.

A hatch in the ceiling gives access to attic for the storage of supplies.

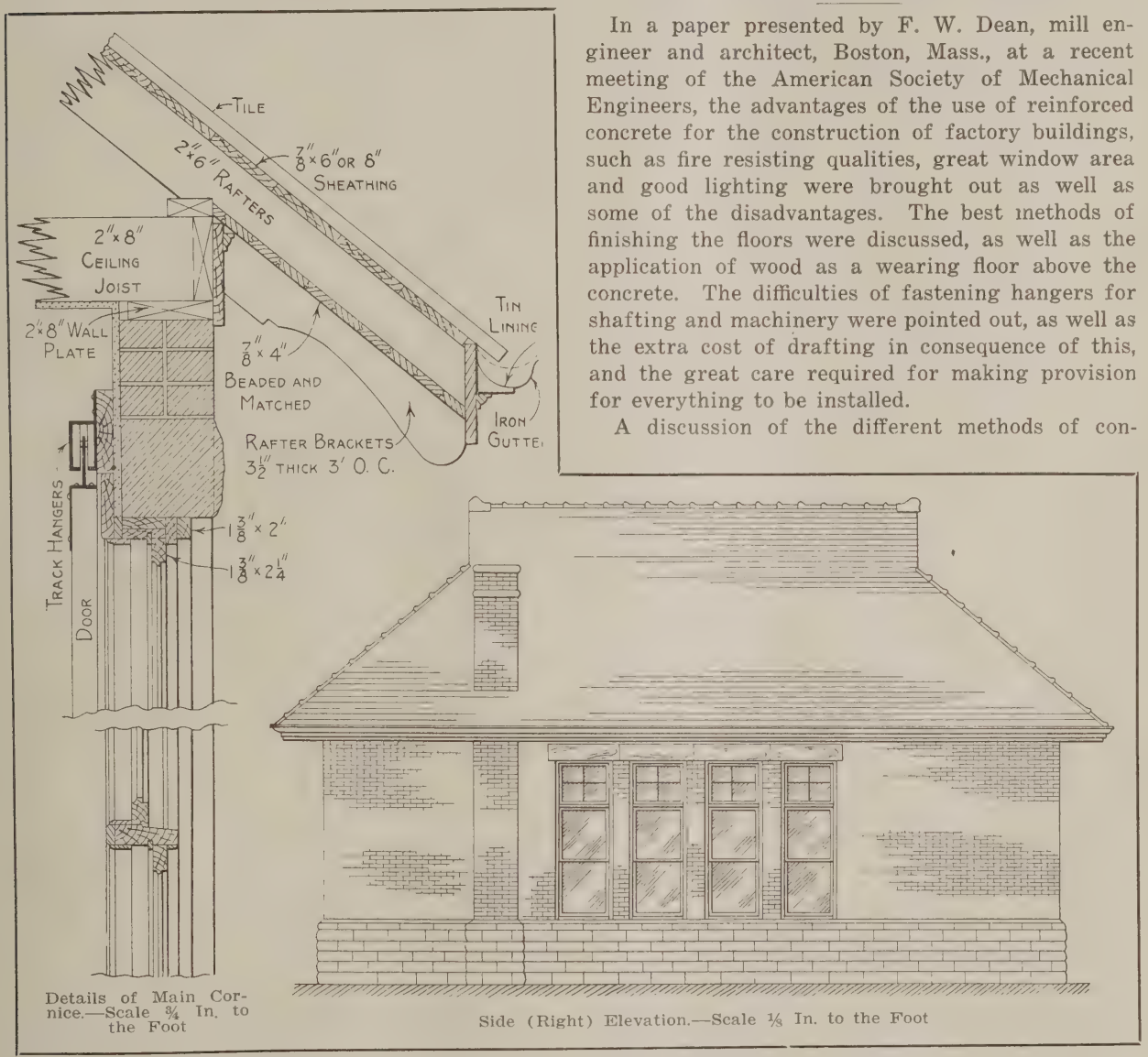
There is provided and placed as shown on the floor plan a cast iron white enameled wash bowl 16 x 16 in. in size with nickel plated faucet, and near it a ¾ in. bibb water faucet 20 in. above the floor with shut off valve and drain at the bottom.

The building is wired for electric lights, there being two clusters of three lights each on the ceiling at the points marked on the plans, the wiring, insulation and fixtures being in accordance with the fire underwriters code. The building is heated by means of a gas stove.

All inside door and window trim and inside of sash were treated to one coat of liquid filler and then one coat of varnish. The outside sash, as well as doors and all exposed woodwork, were treated to one prime coat of white lead and linseed oil followed by two coats of prepared paints. The sheet metal and iron work had one coat of linseed oil and mineral red and two coats of prepared paint.

The inside and outside of the doors are of a light stone color with a darker shade for the panels. The outside sash are black and the balance of the woodwork and sheet metal work a dark olive green.

The fire engine station here illustrated and described is located at Covington, Ohio, and was erected in accordance with plans prepared by C. F. Bowdle, architect, Room 72, Young Block, Piqua, Ohio. He states that when erected a few years ago the cost was about $1,400, but would cost slightly more at the present time.



Fire Engine House for a Small Town.—Elevation and Details

Reinforced Concrete Factory Buildings

In a paper presented by F. W. Dean, mill engineer and architect, Boston, Mass., at a recent meeting of the American Society of Mechanical Engineers, the advantages of the use of reinforced concrete for the construction of factory buildings, such as fire resisting qualities, great window area and good lighting were brought out as well as some of the disadvantages. The best methods of finishing the floors were discussed, as well as the application of wood as a wearing floor above the concrete. The difficulties of fastening hangers for shafting and machinery were pointed out, as well as the extra cost of drafting in consequence of this, and the great care required for making provision for everything to be installed.

A discussion of the different methods of constructing floors and the various forms of ceilings were presented, also data on the relative cost of concrete and regular mill construction buildings.

In one of the camps on the shore of Lake Sebago there is a fireplace containing sixty rocks, every one of which bears the likeness of the face of a man or animal. The rocks have been collected from many miles around, and the effect is heightened by glass eyes which have been added.

The Chimney in Modern Home Building

Showing How Judicious Treatment of This Important Adjunct of a Building Adds to the Architectural Effects

By Albert Marple

TO the person about to construct his or her first dwelling the building proposition is a problem. It is not the easiest matter in the world to design and oversee the construction work of a five, six or seven-room home, and when one is about to undertake this task for the first time, and even long after that, suggestions and timely hints are extremely welcome as there are a thousand and one little details to which one must attend.

Adding to the Appearance of the Home

To lighten the work of the home builder in at least one particular is the object of this article, at the same time offering suggestions which, if adopted, may enhance the general appearance of the home. We will discuss at this time the concrete chimney, which is being so largely used in Southern California, known as "the home of the bungalow," and elsewhere. As this form of home is more universally erected in that section than probably any other place in the world, we would naturally look to that locality for improvements and new ideas in that form of dwelling.

We might mention that the ornamented concrete chimney, even in Southern California, is of comparatively recent origin. Before the ornamented feature was introduced the home builders and building companies seemed to be satisfied to construct chimneys that were void of attraction. In many instances they were simply heaps of concrete or brick erected at the side of the bungalow simply because the home buyer had become accustomed to seeing them there and because they formed part of the architectural scheme of the bungalow type of home.

While preparing the article we found there are in that sunny section hundreds of different styles of chimneys. Nearly every chimney has some unique interesting feature not before seen. The few styles shown in the group picture on the facing page will give an idea of what is being done in this line.

The "Block" Chimney

In the case of the very low, squatty bungalow a pretty effect is secured by the adoption of the "block" chimney with a flower stand on either side of the upper section. Upon these stands may be placed potted flowers and ferns of any kinds.

The art of ornamenting the chimney was started by the introduction of the indented figure. This may be of any size, shape and depth desired and may be placed at any hight from the ground. There are a number of pleasing effects that may be secured when this feature is used. The chimney may be given the same finish over all, the main section may be given a rough finish with the interior of the indention done smooth, or the main section may be left in the natural cement color with the depression finished in a darker hue, etc. This may also be done with the raised figure work, which is a very pleasing improvement and consists of figures of various styles and sizes constructed, during the process of building, in the positions in which they are afterward seen. They have the appearance of having been placed in position, but that is not the case. In nearly all of the chimneys that are being constructed at this time one or both of these two figures are being incorporated.

Then there is another effect that has been accepted with favor by the home builder and buyer alike and that is the raised figure work that has been left entirely free from the finish coat. This may be secured only when the chimney is constructed of brick and is given a coating of plaster as a finish. Many of the chimneys having the appearance of solid concrete are in reality made of brick with a plaster exterior. The brick raised work is left so that the ends and sides of the bricks are plainly visible, contrasting nicely with the light-colored cement finish.

Latest Effect in Ornamentation

The very latest effect in the ornamenting of the chimney is the flower holder chimney. This is of recent origin, but since being introduced the idea has spread rapidly and at this time a number are in the course of construction. The effect is secured by forming an indentation of at least 6 in. in the chimney, of any desired shape and size, and of the construction along the bottom of this indentation for the entire width of a concrete shelf of, say, 4 in., making a 10-in. surface upon which to place the box containing flowers or trailing vines, the foliage of which contrasts vividly with the light color of the lower part of the chimney.

Generally speaking, the bungalow chimneys of Southern California are given one of three finishes. There is the "plaster" finish, this being similar to that given to the interior walls of the home where tinting is to be done; the "splatterdash," which is somewhat rougher than the plaster effect, and the stucco finish, which is considerably more coarse and uneven than the "splatterdash."

But whatever is or is not done the chimney should not be neglected. The exterior chimney is generally visible from the street and for this reason alone it should be given attention and made as attractive as possible. The time spent on beautifying this part of the home will more than pay the home builder for the effort expended and will continually be a source of gratification.

No. 1—Chimney with Sunken Panels; No. 2—Chimney for Low Buildings; No. 3—Tall Chimney of Semi-Plain Variety; No. 4—Chimney Whose Simplicity it Its Beauty; No. 5—Chimney Having Appearance of Cement-Block Construction; No. 6—Panelled Chimney with Flower Holders; No. 7—Block Chimney Showing Flower Holders Doing Service; No. 8—Side Views of Flower Holding Chimney; No. 9—Chimney with Stucco Finish and Deep Indentation; No. 10—Chimney Showing Effect of Brick Raised Work; No. 11—Near View of Flower Holding Chimney; No. 12—Another Block Chimney with Flower Holders.

The Chimney in Modern Home Building—Examples Showing Varied Treatment

A Country House Built of Concrete

A Suburban Home with Monolithic Concrete Walls and Roof of Dark Green Flat Tile—Cost $5500

WE have taken for our colored supplemental plate this month a suburban or country home, the design of which is Spanish Mission in its tendencies. The colored plate affords an excellent idea of the effect produced when erected upon a picturesque site. As regards the layout of the interior a central hall gives access to the principal rooms upon the main floor, the stairs rising from a point about midway the depth of the building. The conspicuous feature is the living room on the left which extends the full depth of the house, is well lighted front and rear, and gives out upon the enclosed porch or conservatory at the extreme left. The opposite side of the house contains the dining room with commodious butler's pantry which communicates with the kitchen located immediately at the rear of the main hall. There is a passage way leading directly from the kitchen to the front hall so that there is no necessity of passing through other rooms in reaching the front door. On the second floor are three sleeping rooms, a bathroom and a child's room, which, in case of necessity, can be used for a sewing room. The bed room over the living room is the full depth of the house.

The Foundations

The foundation walls are of concrete 12 in. thick resting on a footing course extending 8 in. on both sides. The foundation walls are waterproofed outside and the back fill is solidly rammed in place.

The main walls of the house which extend up to the roof plate are of Monolithic concrete 10 in. thick and composed of Portland cement, sharp sand and sharp trap rock broken so that the pieces will readily pass through a 2½ in. ring. All window and door openings are reinforced with ¾ in. rods at the top to form lintels. The roof plate is bolted to the wall by means of 3 ft. anchor bolts placed 6 ft. on centers. The exterior walls, chimney, etc., have a cement finish. The chimney flues are lined with 1 in. fire clay flue tile, the flues having 8 in. of brick work all around.

The Framing

According to the specifications of the architect the floor beams are to be of 3 x 10 in. yellow pine placed 16 in. on centers, the rafters to be 2 x 8 in. placed 20 in. on centers, and the girders to be 6 x 8 in. yellow pine.

The rafters are to be covered with 1 x 10 in. sheathing and waterproofed paper which in turn is to be covered with flat glazed tile laid in regular courses.

The finish flooring is to be matched maple, blind nailed. All interior trim is to be chestnut. The main entarnce door is to be finished in oak veneer with a core of white pine.

The main walls are to be lathed and plastered with three-coat work and with hard white finish. The exposed corners are to be protected with concealed metal corner beads.

The house is to be piped for gas and wired for electricity, the fixtures being combination type.

The Plumbing Fixtures

The plumbing fixtures are to be porcelain and all exposed pipes are to be nickel plated. The bathroom is to have a white tile floor and base laid on a foundation of cinder concrete. The main lines of the house sewer are to be 4 in., the branches 2 in., and the vents 3 in. cast iron.

The heating is to be by steam and the radiating surface sufficient to maintain a temperature of 70 deg. Fahr. in the rooms when it is zero weather outside.

All exterior and interior woodwork is to have three coats of paint. The floors are to be varnished.

The approximate cubic contents of the house here shown is 30,280 cu. ft., which at a unit price of 18c. per cu. ft. gives a total of $5,450.40.

Estimate of Cost of Materials and Labor

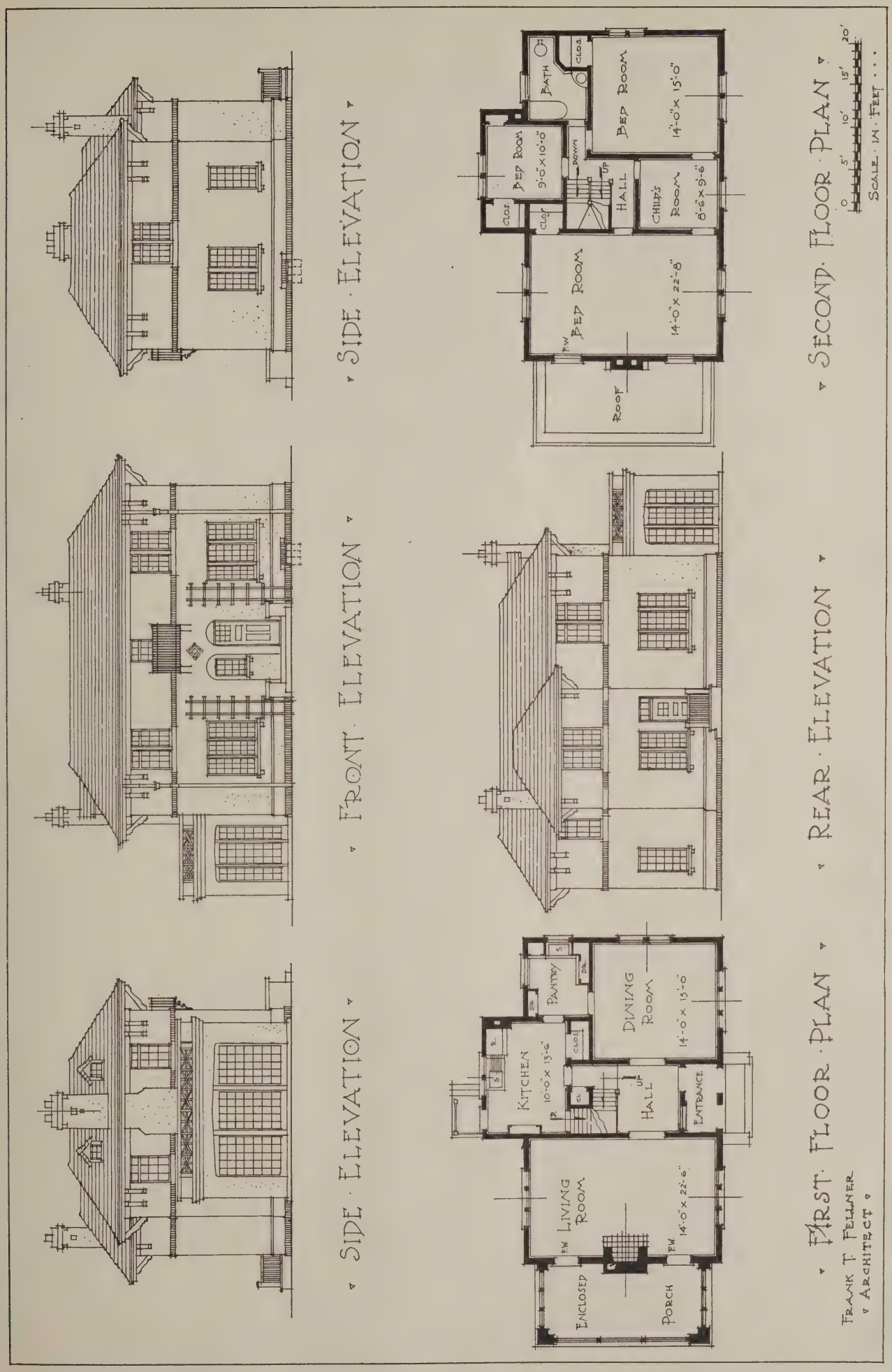
According to the calculations of the architect the following is the estimated cost of labor and material in connection with various classes of the work:

Grading and excavating	$180.00
Masonry (concrete and cement)	1,295.00
Plastering	385.00
Mill work and carpentry	960.00
Painting	320.00
Heating	410.40
Mantels	52.00
Plumbing	390.00
Gas and electric work, fixtures, etc.	420.00
Hardware	68.00
Metal work	150.00
Tiling	820.00
Total cost	$5,450.40

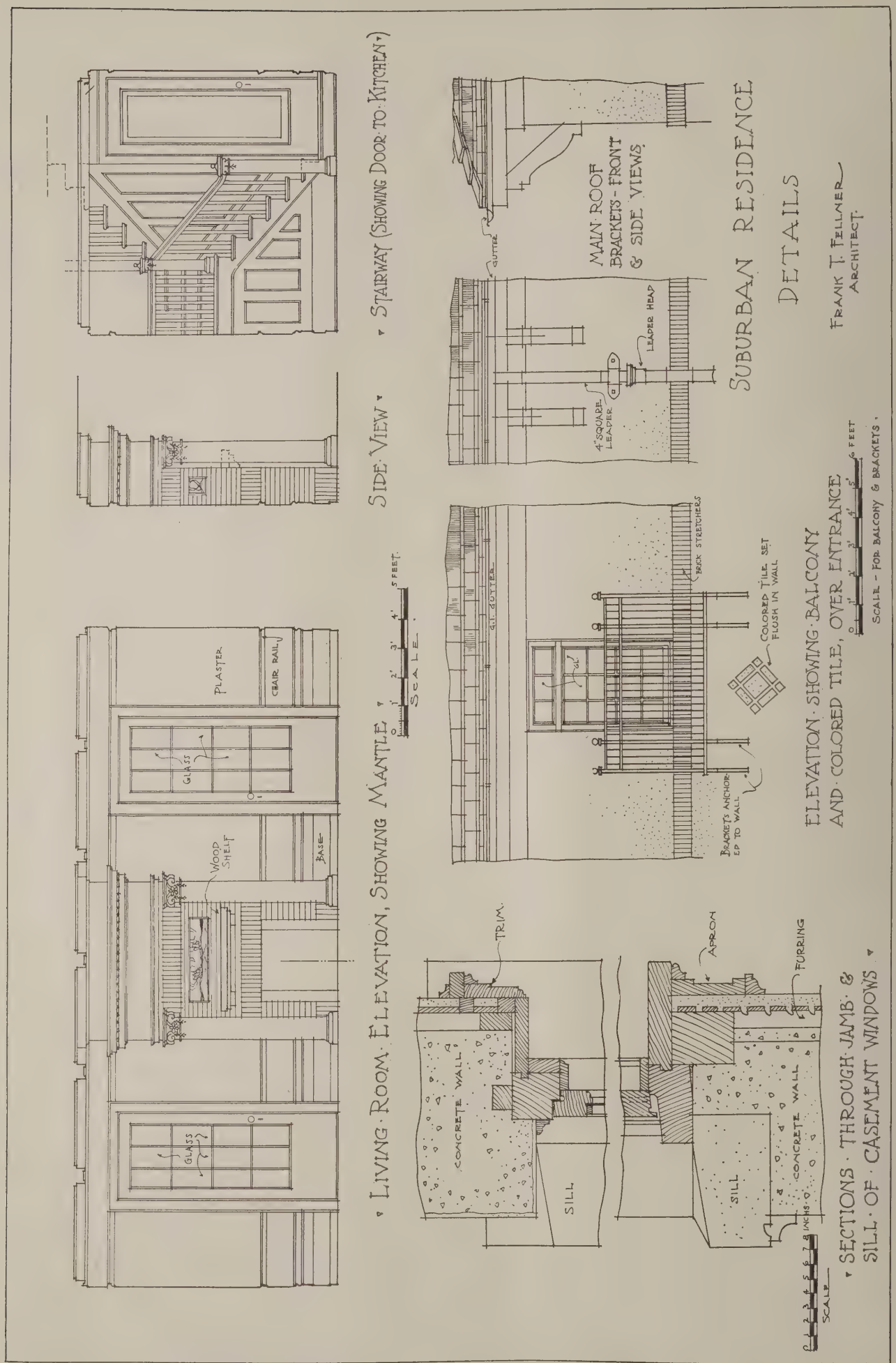
The country house here shown was designed by Frank T. Fellner, architect, 413 Caton avenue, Brooklyn, N. Y., or care *The Building Age*, 239 West Thirty-ninth street, New York City.

Safety Features of New Equitable Building

Much has been written about the new Equitable Building in course of completion in lower Broadway, New York City, but little or no reference has been made in these columns to the fireproofing and fire protection of the structure, which, it may be interesting to state, is the first office building ever erected to conform in every particular with the requirements and suggestions of the National Board of Fire Underwriters. In order to safeguard the lives of the occupants exits were divided into four fireproof corridors, all independent of each other and separated by fire walls and fire doors. This sub-division of the building into four complete separate structures makes it feasible for the fire



Plans and Elevations of the Concrete House Forming Basis of Our Colored Supplemental Plate



Miscellaneous Details of the Concrete House Forming Basis of Our Colored Supplemental Plate

department to go up into the building in the event of fire and fight the fire either from the floor on which it is burning or from the floor above. The sub-dividing partitions, doors, locks, door frames and in fact every detail that has entered into the construction of the building have been known to successfully resist temperatures equivalent to the heat of a conflagration, and every one of these details has the underwriters' approval as being the highest type of fireproof materials.

Fireproofing Features

In referring to the fireproofing and fire protection of the building, B. E. Loomis, chief engineer of Marsh & McLennan, to whom the working out of the details of fire-resisting materials and devices was entrusted, states that the elevator shafts are walled with brick and equipped with heavy wire-glass instead of the usual open grille work, and all door openings are protected by the Saino automatic fire door, of which about 295 are installed for the protection of elevator shafts and corridors. The doors are pocketed behind tile walls and operate by fusible links. They are made of two walls of cross-laid 22-gauge galvanized steel with air spaces and sheet asbestos between.

The doors throughout the building, as well as window trim, base, picture mold, etc., are of hollow steel construction. The doors and trim are built up from 18 gauge steel reinforced with steel channels welded by the acetylene electric process and are hung to steel bucks, thus eliminating the use of wood. There are approximately 7500 doors, 300,000 lineal feet of running members, and trim for 5000 windows, all of which are being installed by the Empire Art Metal Company. The frames and sash of the 5000 windows are of steel, acetylene welded at all miters and sandblasted and electro-galvanized so as to afford perfect protection from rust or corrosion.

Openings Protected by Fire Doors

In order to make assurance doubly sure every opening through a fire wall, no matter how small, is protected by an automatic steel damper or door equipped with a fusible link. Great care has been taken to protect every vertical opening and to so arrange the fire walls that an incipient fire would be isolated. The freight elevator shafts are equipped with Peele counterbalance fire doors so arranged that they are continually closed except when the car is at the floor. The doors open up and down from the center, the two halves balancing and being operated by flexible chains running over ball-bearing pulleys.

Globe automatic sprinklers are installed in portions of the various floors. Chemical fire extinguishers will also be installed throughout the building wherever necessary.

From the basement, three stories below the street level, and extending to the roof of the building in a specially designed fireproof shaft, is the smoke stack made of 5/16 in. steel and 596½ ft. long.

The building will also have the most elaborate alarm system ever installed in a structure for safeguarding it in the event of incipient fires.

It may be interesting to state that 52,000 tons of terra cotta were required for fireproofing purposes, 34,000 tons being used in the floor arches. Other terra cotta requirements were 300,000 ft. of girder and wind-brace covering, 300,000 ft. of column protection, 500,000 ft. of furring and 1,250,000 ft. of partitions, which make a very respectable total.

A Dutch Bungalow

One of the latest additions to the houses of the summer colony at Newport, R. I., is a Dutch bungalow of stone and brick pointed with a white cement and relieved with blue trimmings. The dining room of mammoth proportions is finished in Flemish effect. The drawing room in the front faces the ocean and is 60 ft. long, 15 ft. wide and 10 ft. high. It is finished in redwood. The reception hall is finished in oak and the sun parlor facing the ocean is finished in cream white.

The sleeping rooms, each with its bath room, are in white enamel and are finished in the Dutch style. The upper part of the house is devoted to the servants' quarters of 15 rooms and four bath rooms.

The floors are done in cement—black or blue according to the decorations—and are covered throughout with rugs. All the furniture is of the Old Dutch style. Some rooms have large open fireplaces fitted for log burning or heating by electricity.

Wasteful Estimating

A report upon the problem of estimating by contractors as at present practised, and prepared by the Illinois Chapter of the American Institute of Architects, states that members of the Chapter investigated the office work of five representative contractors and found that the average number of contracts estimated by each contractor in one year was twenty-two, the average number of jobs which he obtained from these estimates being ten. The average value of the time spent by the office force of each firm on each estimate, including additions by subcontractors and material men, was $503.

The report points out that the cost of six bids on a building costing between $100,000 and $150,000 ran to over $3,000, that is, between 2 and 3 per cent. of the whole cost of the work.

Perhaps in no other business to-day is so much unproductive work done at so high a cost. Recognition of the quantity system as a remedy for this evil is spreading and adoption of the measure is bound to come.

Concrete Slabs for Screens and Partitions

Reinforced concrete slabs for screens and partitions at the North Station of the Boston Elevated Railway are made of a 1:2:4 mixture of Portland cement, granite crusher dust and small granite screenings. The slabs are reinforced with Clinton wire cloth and round rods in both directions. Dowels, projecting at the sides and ends, are cemented into the adjacent slabs by a mortar filling. The slabs are cast flat, in a sand mould, and, when firmly set, the upper surface, which is flat, is highly polished; this gives a finish, it is stated, similar to the best granite or marble. The exterior face is treated architecturally with panels and mouldings and is left in the rough, as it comes from the form with a coating of sand.

Chicago's 1914 Progress in Building

Pictures of Some of the Many Handsome Skyscrapers Constructed in Spite of 10% Decrease in Permits

DESPITE the fact that general business conditions in Chicago were under the same depression as other cities throughout the country, the records of the building department for 1914 show only 10 per cent decrease in permits issued, frontage occupied and cost involved, as compared with the previous year. These statistics are in no wise discouraging, inasmuch as the Windy City had an extended brick strike in the spring which affected the second quarter to the extent of a falling off of 738 building permits compared with the same period in 1913. It is no exaggeration to say that Chicago would probably have recovered from this setback had not the European war occurred. The effect of the war on American commerce is already a matter of record and Chicago suffered as did the rest of the Middle West.

The first quarter was very encouraging when statistics showed a gain of 240 buildings. The history of the second quarter is told in the first paragraph. The third and fourth quarters showed respective losses of 224 and 206 permits compared with 1913. The months of March, April, June and July were easily the best, each one being 200 permits in excess of other months. In spite of this, however, April was 250 building permits behind April, 1913, while May fell off almost 50 per cent. as compared with May, 1913.

The business district saw probably more new buildings of the skyscraper type started and completed than ever before in the history of Chicago. There was a constant activity in the "Loop," and from the accompanying half-tone engravings it will be seen that many handsome structures were erected. Some of these were started in 1913 and their costs included in that year's statistics. There were also numerous others started in 1914 which will be completed during 1915. Important among these new projects were the following buildings:

Continental & Commercial National Bank Building; 22 stories; architects, Graham, Burnham & Co.; general contractors, Thompson-Starrett Co.

Michigan Boulevard Building; 15 stories; architect, Jarvis Hunt; general contractors, George A. Fuller Co.

Stevens Building; 18 stories; architects, Graham, Burnham & Co.; general contractors, George A. Fuller Co.

Lumbermen's Exchange; 16 stories; architects, Holabird & Roche; general contractors, George A. Fuller Co.

Conway Building; 21 stories; architects, Graham, Burnham & Co.; general contractors, Thompson - Starrett Co.

Borland Building addition; 18 stories; architect, Charles S. Frost; general contractors, George A. Fuller Co.

State Building; 17 stories; architect, James B. Dibelka; general contractors, Darling & Eitel.

Morrison Hotel; 21 stories; architects, Marshall & Fox; general contractors, John Griffiths & Sons Co.

Kaiserhof Hotel; 17 stories; architects, Marshall & Fox; general contractors, Blome-Sinek Co.

Marshall Field Annex; 20 stories; architects, Graham, Burnham & Co.; general contractors, Lanquist & Lillsley Co.

The Continental and Commercial Bank Building in Course of Erection

Of these structures the Continental & Commercial National Bank Building; Marshall Field Annex, Michigan Boulevard Building, Stevens and Conway buildings have been completed. The first section of the Morrison Hotel has been formally opened, and work on the remaining two sections will be started in the near future. Finishing touches regarding the interior equipment and finish of other buildings quoted are being hurried for immediate occupancy.

In the Continental & Commercial National Bank Building the city of Chicago has one of the largest and most perfect banking and office buildings ever constructed. It is 22 stories high, and covers an

At the Top—Marshall Field Annex and the Lumbermen's Exchange Building—In the Center, the Michigan Boulevard Building—
At the Bottom, the Kaiserhoff Hotel, the Stevens Building and Mandel Bros. Building

A Few of the More Important Buildings Erected in the City of Chicago in 1914

entire city block, measuring 167 x 325 ft. It is provided with a basement and two sub-basements, the entire investment representing an expenditure of $12,000,000. The Continental & Commercial National Bank occupies the main banking floor, comprising 31,775 sq. ft. The center of the banking room is flooded with an abundance of light through an arched gridiron skylight about 100 ft. above the floor in the light court of the building. The latter has dimensions of 152 x 54 ft., and extends from the fourth to the twenty-first story. The building is 260 ft. high, having foundation piers to bedrock 100 ft. below the sidewalk level. The exterior is unusually handsome. The lower part is of Vermont granite, while the upper walls are of granite terra cotta. The style of architecture is Greek and Roman classical.

The Stevens Building is 342 ft. long, having a frontage on State street of 93 ft. and a Wabash avenue frontage of 48 ft. It is 18 stories high, having an attic floor in addition to three sub-basements on the Wabash avenue side and two on the State street side.

There are 36 caissons beneath the building proper and 23 additional beneath party walls. They sink to an average depth of 95 ft. to bedrock, each with a 7 ft. 6 in. diameter. Special care in construction was found necessary along the north and State street lines due to the fact that the adjacent Columbus Memorial Building rests on a floating foundation. In the first floor construction three interior columns were omitted, the loads being carried on a 52-ton steel plate girder located on the third floor line. The first floor has exceptionally large window display, an additional feature being an island showcase of unusually large dimensions. For the first two stories the exterior finish is granite, the remaining walls being of polished terra cotta. The first six stories are occupied for shops and offices, the rest of the building being devoted to regular office arrangement.

The Michigan Boulevard Building occupies an exceptionally fine location at the corner of Washington street and Michigan boulevard, overlooking Grant Park and Lake Michigan. It is fifteen stories high, with a basement and sub-basement. It is detached on all sides, the light court above the third floor opening directly on Washington street. The exterior treatment is particularly handsome and harmonious. The front elevations are Gothic in design, of polished granite, bronze and old ivory terra cotta. The excellent lighting arrangements on the interior are made more effective by a finish of white marble and white enameled steel. This is particularly noticeable, more especially in the elevators. All steel framework is immaculate, presenting a truly sanitary aspect. Hand rails are of glass, with brass knobs and holders. Office interiors are finished with Honduras mahogany. The lower floors and basement are tenanted by modern shops and general offices. From the eighth to the thirteenth floor the building is occupied exclusively by physicians, an arrangement which necessitated special provision for doctors' requirements. Architects also occupy the top floor, Jarvis Hunt, owner and designer of the building, having most elaborate and modern quarters on the top story.

Three blocks from this building on Washington street is the Conway Building, a 21 story building, the second portion of which was recently constructed. This structure is practically square in plan, measuring 187 x 197 ft. Architecturally, the Conway stands out prominently in the business district, the exterior finish of granite, terra cotta and enameled brick being particularly striking. The interior finish is of white marble, all doors, trim and cabinet work being of selected mahogany. There are 16 passenger elevators and one for freight. Besides a commanding entrance on Washington street there are doors on Clark street and Commerce court which give access to a central rotunda 76 x 100 ft., the latter being covered with a skylight 32 ft. above the first floor.

The Borland Building addition has a frontage of 78 ft. and a depth of 50 ft. It is 18 stories high. The exterior finish is Bedford stone to the fourth floor, and pressed brick with terra cotta corners for the rest of the frontage.

The State building located at Fifth avenue and Randolph street is a 17-story building measuring 60 x 100 ft. The structure rests on 27 caissons, 5 ft. 6 in. diameter, having a depth of about 100 ft. to bedrock. The building is practically detached, a feature affording good lighting arrangement throughout. The exterior finish is glazed, white enameled terra cotta from the base. Mahogany and marble, with marble floors, constitute the interior finish. The building represents an investment of $600,000.

The accompanying table gives the statistics of Chicago building activity during the past ten years:

Comparison of Ten Years

	No. of Buildings	Feet Frontage	Cost
1904	7,132	203,785	$44,596,090
1905	8,337	243,485	63,455,020
1906	10,447	276,770	64,298,335
1907	9,338	253,993	59,065,080
1908	10,771	291,655	68,204,080
1909	11,241	310,351	90,509,580
1910	11,409	327,250	96,932,700
1911	11,106	299,032	105,269,700
1912	11,210	322,454	88,048,500
1913	10,891	321,002	89,394,150
1914	9,963	290,422	83,261,710

Hints on House Planning

When you commence to plan your new house get a good sized scrapbook in which to paste every kind of a suggestion you come across. There are hundreds of little ideas, as well as some larger ones, which will help you give your home added charm or comfort without much increase in cost. Ideas about built-in things, from a simple shelf to a medicine closet or a seat in an inglenook. There are things to do and things not to do about the placing of lights and of radiators and of water or steam pipes. There are principles of harmony to be remembered in the selection of rugs, draperies, wall decorations and furniture. We all run across such suggestions, but rarely remember them. So get a scrap-book, or else a large envelope or a flat box, labeled "The New House." It will pay.

There are 435 shingle mills in the state of Washington with a daily output of 15,000,000 shingles. The capital invested in these mills is estimated at $20,000,000, and they employ 14,000 men, with a daily wage approximating $14,000,000 a year.

Important Legal Decisions in 1914

Phases of Building Contracts Litigated—Right of Architects to Compensation—Other Points Adjudicated

By A. L. H. Street

ALTHOUGH litigation appears to be an economic waste which is "here to stay," the close of the year 1914 leaves the legal rights and liabilities of architects and builders more clearly defined than they were in many respects at the opening of the year.

Perhaps the most notable result of litigation during 1914 is the firm establishment by several authoritative decisions of appellate courts that the workmen's compensation acts constitute valid legislation, although practically every one of the decisions recognizes material imperfections in the laws. These defects, however, must be remedied by the legislature, and not by the courts, the judges say.

Question of Insurance

The Texas Court of Civil Appeals holds that a building contractor has such interest in a building in course of construction by him that he may take out valid insurance on the structure to the amount to become due him under the contract.

An architect, in undertaking to prepare plans for a building, does not impliedly warrant that they will be perfect, according to a decision of the Kentucky Court of Appeals. The test of his right to compensation is whether he has used a reasonable degree of skill. But the California Supreme Court declared that, by accepting a contract of employment, an architect impliedly represents that he possesses the skill of the average competent member of his profession.

Where a building contract contemplated performance in midwinter in a Northern climate, and nothing was said about heating the structure, to avoid injury to the plastering, etc., the duty to heat devolved upon the owner and not the builder, according to a ruling of the Michigan Supreme Court.

Damages Recoverable by the Owner

Where work is defectively done by a contractor, the measure of damages recoverable by the owner is the cost of remedying the defects, if they can be readily remedied, says the Texas Court of Civil Appeals. If the defects cannot be corrected, the measure of recovery is the excess of the value of the building contracted for above the value of the building erected.

The same court decided that when an owner takes a building over on the contractor's breach, and completes it at an expense less in amount than the sum remaining due the contractor in the owner's hands, the contractor can recover the excess.

In a Washington case, the Supreme Court held that the evidence offered was insufficient to show a custom among builders to make buttresses connected with the steps of a building out of the same kind of material as the steps, as distinguished from the walls of the building.

When one of the parties to a building contract claims that, as written, it does not state the true terms of the agreement, through some mutual mistake, he is entitled to maintain a suit to have the contract reformed to express the true agreement, as decided by the Wisconsin Supreme Court.

When Bids Are Not Asked

An interesting decision handed down by the Circuit Court at Jacksonville, Fla., a few weeks ago holds that so far as a public contract requires special skill and learning, such as is required of architects, the board awarding the contract need not ask for bids. In declaring that county commissioners were justified in awarding a contract to architects without competition, in the construction of additions to a county building, the court said:

"No man in private life would employ his family physician, his lawyer, or his architect, on any such competitive plan, and if he did so the chances are large that he would regret it. County commissioners ought, in the absence of direct statute to the contrary, to be permitted to use as much judgment and discretion as private citizens generally use under like circumstances."

The Pennsylvania Supreme Court announced a similar decision, applied to the erection of a city building.

Specification of Materials

In the Florida case, the Circuit Court holds that specifications for a public building may validly call for materials of a certain kind—although they are made by one manufacturer only. The reason assigned for this decision, in the face of the established rule that there must be competition afforded in *street* improvement contracts, is that a board charged with the erection of a building is entitled to choose brick of a certain manufacture, or stone from a certain quarry, or other special materials, to carry out a scheme of architectural beauty.

But the same decision holds that, under the Florida laws, a county building contract is invalid if it specifies that workmen shall not be employed more than eight hours a day; and where it appears that the bidding for the work has been affected by the requirement, the whole contract is voidable.

The final point decided in the Florida case was that when material alterations are made in plans

and specifications for a public building after bids have been received, there must be a re-advertisement.

The right of a building contractor to recover a payment on the ground that it was involuntarily made was the subject of the case of James C. McGuire & Co. vs. H. G. Vogel Co., 149 New York Supplement 756. The Appellate Division of the New York Supreme Court decided that a contractor who made a payment to a subcontractor who had installed fixtures could not recover the amount on the ground that payment was induced by the latter's threat to bring suit to replevy the fixtures or to take them by force. The court finds that a threat to file a suit cannot be deemed to constitute such force as makes a payment involuntary, since, if the suit is unjust, it can be defeated; and that the threat to remove the fixtures by force was unavailable to the contractor, since it appeared that he had delivered possession to the owner.

Mechanic's Lien Decision

Under the New York lien law, which requires a notice of lien to state "the labor performed or to be performed, or materials furnished or to be furnished and the agreed price or value thereof," the Appellate Division of the Supreme Court decided that a notice was insufficient where it stated that the labor performed and unperformed for which a lien was claimed was "carpenter work" at an agreed price of $850; there being no definite showing as to the amount of work already performed. (Bachmann vs. Spinghel, 149 New York Supplement 610.)

The New Jersey Court of Errors and Appeals decided that an architect was not precluded from recovering compensation for preparing plans by reason of the fact that they did not exactly comply with the requirements of building laws, if the variation was so slight that it could be readily corrected, and the architect was given no opportunity to make the alteration. (Klemm vs. Hermann, 92 Atlantic Reporter 51.) And, in the case of Ferneskes vs. Nugent Sanitarium, 149 Northwestern Reporter 393, the Wisconsin Supreme Court, in holding that the fact that architects employed to prepare plans and specifications for an addition to a building discontinued work on it after being advised that the owner had decided not to construct the addition and that the plans were not wanted, did not preclude the architects from recovering damages for breach of the contract, declared that it was both the right and duty of the architects to discontinue the work under such circumstances.

Payment for Changes in Plans

A request by an owner that an architect change the plans for a building, after contract for the work had been let, implied a promise to pay for the service rendered in making the change, according to an opinion rendered by the Michigan Supreme Court.

The conclusiveness of a supervising architect's certificate was the subject of controversy in the case of Bavaria Investment Co. vs. Washington Brick, Lime & Sewer Pipe Co., 144 Pacific Reporter 68, which was passed upon by the Washington Supreme Court. Summarized, the important rules laid down in this case are as follows:

Where a building contract provides for supervision by an architect or superintendent and confers power upon him to determine differences which may arise in the performance of the work, his certificate is conclusive upon the parties until shown to have been induced by fraud or mistake. If the contract provides for an appeal from his decision, and no appeal is taken, the decision is final. So an architect's decision as to damages sustained by the owner in consequence of the contractor's delay is conclusive, where the contract is broad enough to authorize him to pass on that question. If an architect is able to pass upon the question whether terra cotta is defective, his decision will not be vitiated on the ground of his incompetency, although he may not understand the method of manufacturing terra cotta. But where a contract merely makes him judge of the question whether materials furnished are defective, his decision as to the amount of damages sustained by the owner in consequence of defects is not binding. For the same reasons, power to determine the cause and extent of delay in performing the contract work does not empower an architect to declare the amount of damage sustained by the owner in consequence of a delay. Portions of a certificate which are invalid, because covering matters in excess of the architect's power, do not affect clauses lying within his powers.

Assumption of Risk of Injury

An experienced carpenter was held to have assumed the risk of being injured through a particle of steel flying from the head of a chisel on its being struck by a hammer, where the battered condition of the chisel was just as obvious to the employee as to the employer. (Maine Supreme Judicial Court, Cooney vs. Portland Terminal Co., 92 Atlantic Reporter 178.) The court reaffirms the following rule, which was announced in an earlier case:

"A servant assumes the risk of injuries from simple and ordinary appliances and methods, the nature of which he understands, or which is easily understood. It is a part of this doctrine that the duty of inspection by an employer, of the appliances used by his employees, does not extend to the small and common tools of which the employees using them may reasonably be supposed to be judges."

Kentucky Compensation Act Invalid

The Kentucky workmen's compensation act, which was to have become operative January 1, has been declared unconstitutional by the State Court of Appeals. The decision was of wide interest, inasmuch as the act affected all manufacturers employing six or more men. The principal grounds for the action of the court, which divided on the question, four to three, were that the law violated the constitutional provision that no limit may be placed on amounts recoverable for personal injuries and that, while entering the compensation system was made optional, the election of employers and employees was surrounded with so many conditions that it amounted to coercion. As it is likely, in view of the decision of the court, that a constitutional amendment will be needed before another law can be enacted, it is certain that Kentucky will have no such legislation for a number of years.

The Vapor System in House Heating

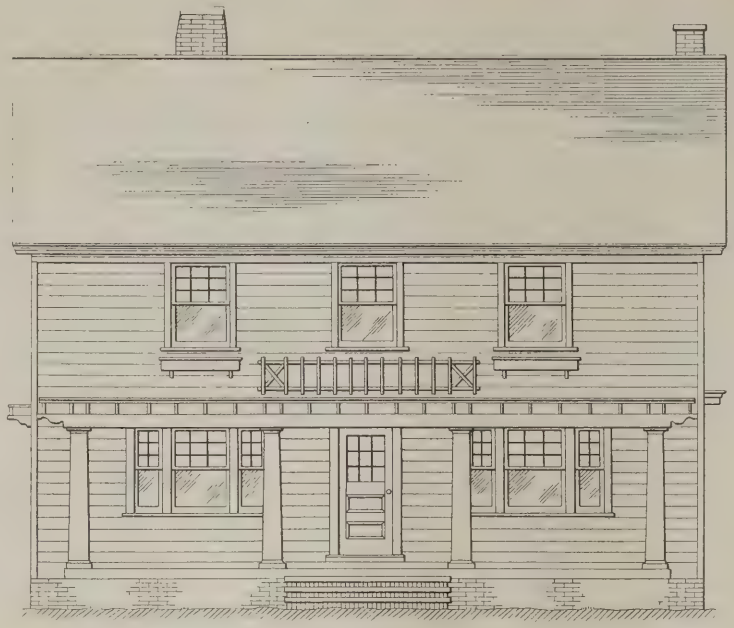
A Frame Dwelling Heated by Two-Pipe Low-Pressure System with Modified Heat Control at Radiators

THE proper heating of a house is something in which the builder as well as the architect is more or less interested, constituting as it does an important factor in the problem of satisfactory home building and equipment. The dwelling heated by the system above indicated and which we have taken as the basis of our comments is of the Colonial type of architecture, is of substantial yet simple construction and embodies an arrangement of rooms which utilizes practically every inch of available floor space. All the rooms are of good size and are well lighted. An idea of the layout is clearly indicated on the plans presented herewith, while the pictures show an interior view as well as the appearance of the finished structure. The exterior view it will be noticed was taken when the snow lay deep upon the ground and emphasizes the importance of a satisfactory heating system in order to render comfortable the occupants within the house.

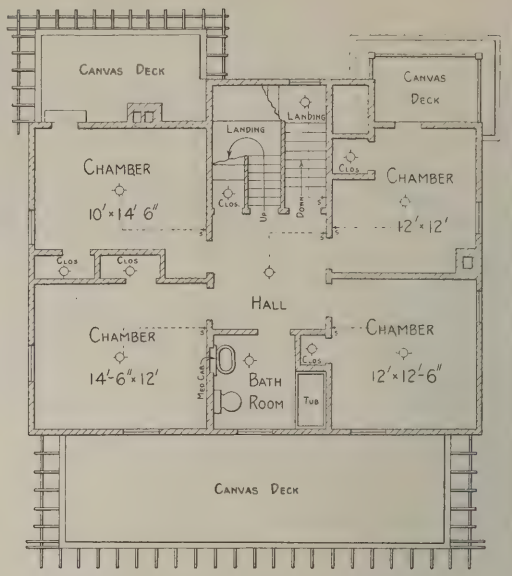
Entrance to the home is from a large, wide porch through a vestibule, and into the hall that extends from the vestibule door to the stairway at the rear. To the left is a living room 26 x 14 ft. 6 in., extending the depth of the house with a large fireplace at the back wall, on each side of which French doors open on a small back porch. On the right at the front is the dining room, connected to the main hall by French doors.

At the top of the stairs on the second floor near the center is a roomy hall from which doors lead to each of the four bedrooms, the attic and bath room. The bath room is unusually large and is located in the center at the front. Off the hall is also a closet and on one side is a linen closet and drawers. An important feature of the hall closet is that it is in reality a double closet. Inside the closet near the center is another door, which separates the back part, and this is designed for fine wearing apparel, being practically dustproof. French windows in the back bed rooms open on the flat decks of two small rear porches, one of which

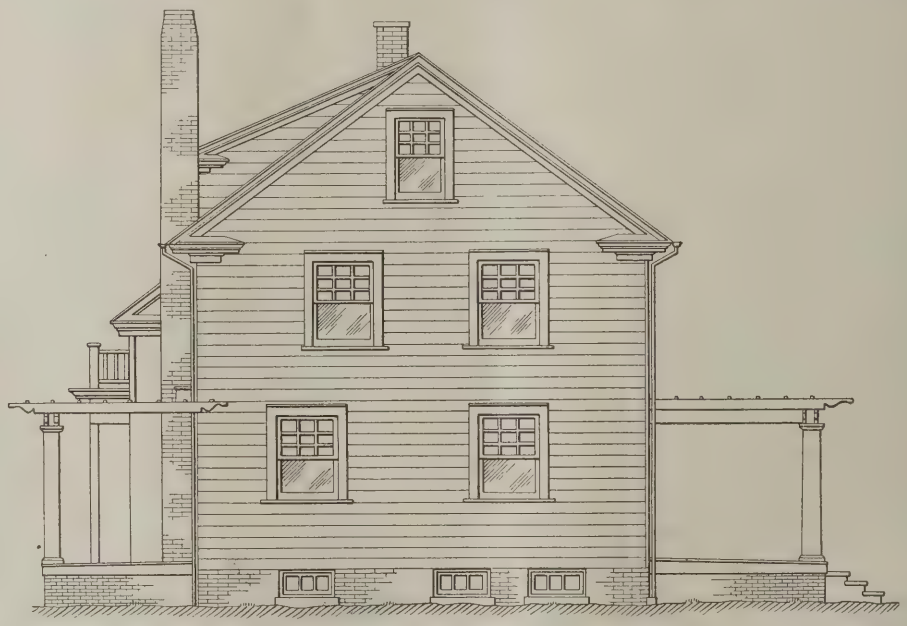
The Vapor System in House Heating—Residence of M. J. Mireau at Lakewood, Ohio, Erected by R. J. Moore, Building Contractor, of that Place



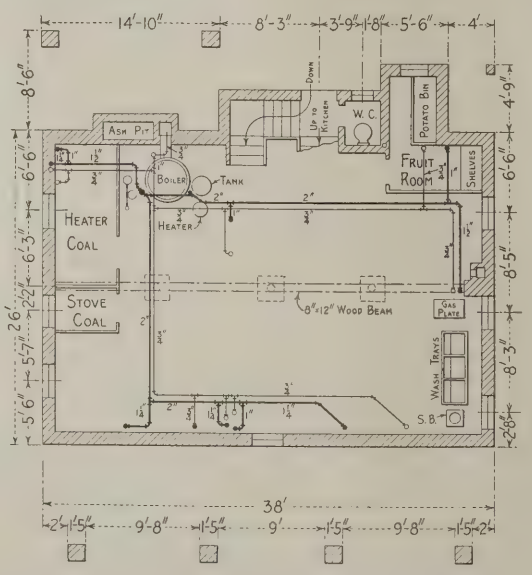
Front Elevation—Scale 3/32 In. to the Foot



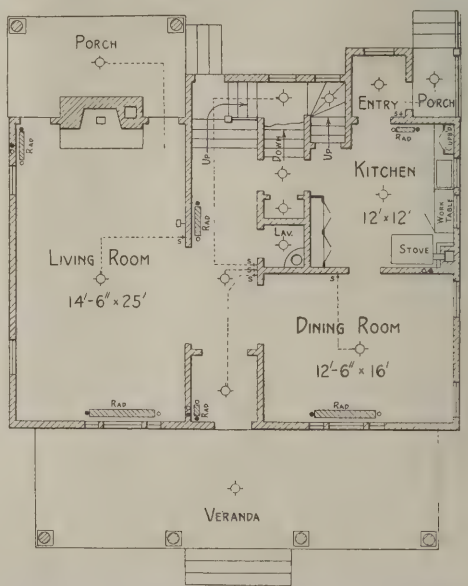
Second Floor Plan—Radiators Not Shown—Scale 1/16 In. to the Foot



Side (Left) Elevation—Scale 3/32 In. to the Foot



Basement Plan Showing Layout of Piping of the Heating System—Scale 1/16 In. to the Foot



Main Floor Plan Showing Position of Radiators and Run of Wire for Electric Lighting Fixtures —Scale 1/16 In. to the Foot

The Vapor System in House Heating—Plans and Elevations

is enclosed by a railing. At the top of the stairway are French doors so that in cold weather heat can be confined to the lower floor when desired. In the attic is one finished room 14 x 28 ft. in size.

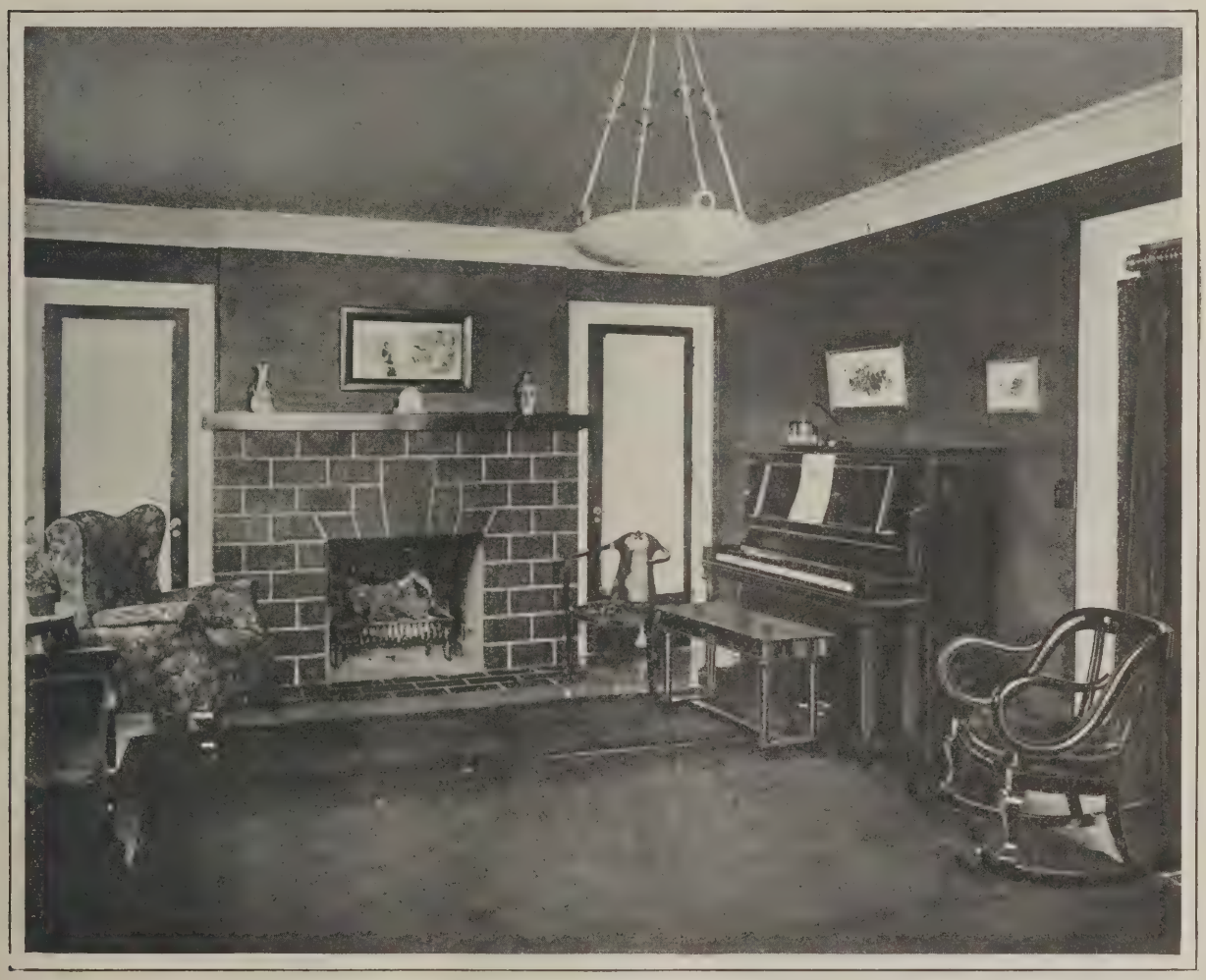
The basement ceiling is 7 ft. in the clear. The footings consist of two courses of hard burned brick laid in Portland cement extending 5 in. on each side of the wall, and 5 in. stone under the iron stanchions. The mortar used for laying all brick and tile is composed of one part Lehigh Portland cement, one part hydraulic lime and three parts sharp sand. The walls below grade are laid up with glazed tile plastered with Portland cement mortar.

The cellar floor is of concrete 2 in. thick composed of one part of Portland cement and three parts of course gravel, the cement being laid on a 2 in. bed of cinders.

The framing timber is Norway pine. The girders are built up of 2 in. stock well spiked together. The first and second floor joists are 2 x 10 in. and the ceiling joists 2 x 8 in., all placed 16 in. on centers. The first floor joists are set on a 2 x 4, spiked on the side of the girder. The joists are cross bridged with 1 x 2 in. stock, 6 ft. on centers. The wall plates are one piece 2 x 12 in. The headers, trimmers and joists under partition are doubled. The rafters are 2 x 6 in. placed 16 in. on centers. The studs are 2 x 4 in. placed 16 in. on centers with a 4 x 4 plate at the top and 2 x 4 in. at the bottom of partition. All openings 4 ft. wide and over are strengthened by being trussed.

The exterior walls and roof are covered with $\frac{7}{8}$ x 6 in. matched No. 1 hemlock sheathing. The sides are covered with waterproof paper, over which is laid $\frac{7}{8}$ x 8 in. rabbetted pine siding. The profiled rafters and beams on the porch are Cypress. The porch ceilings are ceiled with $\frac{3}{4}$ in. yellow pine. The front and rear porches have floors of $1\frac{1}{8}$ x $3\frac{1}{2}$ in. cypress laid in white lead. The roof is covered with black Bangor slate laid 6 in. to the weather.

The first and second story walls and ceilings are plastered with two coats, one coat work being used in the attic and on the basement ceiling. U. S. gypsum hard wall mortar was used on all two-coat work. The kitchen and bath room are finished in Keene's cement marked off to represent tile. The former has a wainscoting 3 ft. 6 in. high and the latter 4 ft. 6 in. high. Metal lath is used where wood lath cannot be fastened. Parker's metal corner bead is used at all corners.



The Vapor System in House Heating—The Living Room in the Residence of Mr. M. J. Mireau on Clifton Boulevard, Lakewood, Ohio—Builder, R. J. Moore of the Same Place

The decks are covered with 12 oz. double weave canvas laid in white lead and covered with two coats of lead and oil.

The exterior finish was given three coats of white lead and linseed oil paint. Exterior sheet metal work was given a coat of English Venetian lead and boiled linseed oil mixed with turpentine.

The floors of the rooms in the first and second stories are double, the sub-floors being 6 in.

matched Norway pine. The finish floors, except in the kitchen, vestibule and bath room, are clear oak. The kitchen floor is white pine and the third floor rooms yellow pine. The vestibule and bath room have tile floors. The living room and the second floor bed rooms are finished in white wood, except bed room window sills, which are birch. The dining room is in oak and the kitchen in Georgia pine.

The Interior Woodwork

The doors are of birch, except the outside front door, which is solid mahogany, and the door between the kitchen and dining room, which is oak. All the interior wood work including the birch doors are finished in four coat work, except the white wood, which is finished in six coat work. The oak floors after the pores were filled with a paste filler were given two coats of varnish.

The house is wired throughout with insulated copper wire. All wire is suspended by porcelain knobs with porcelain bushings where it passes through the wood work.

The plumbing fixtures on the first floor include a 20 x 30 in. porcelain enameled one-piece sink in the kitchen and a small vitreous china side wall lavatory located in a small room adjoining the main hall. In the bath room there is an enameled tub with enameled shield front, the supply and waste fittings having china escutcheons and china cross handles, and a vitreous china pedestal lavatory with similar fittings. The closet is of the Victor siphon type with vitreous china tank and Wico seat with white hinges. Hot water is supplied through a 40 gal. heavy galvanized tank attached to a gas heater with automatic control.

The house is heated by two pipe low pressure vapor system open to the air through ¾ in. vent pipe that vents the entire system into the chimney in the basement. The system used is the Mouat graduating vapor heating system with modified heat control at each radiator. The space heated is about 17,000 cu. ft. The plans called for 508 ft. of radiation, but the owner had this increased to 615 ft. in order to be sure to have sufficient radiation. The boiler is provided with two 2 in. and one ½ in. flow mains leading to the sides of the basement, this being reduced to smaller sizes after some of the risers are taken off. The pipe layout is shown on the basement plan. The living room is heated by two radiators, one at the front with 97½ ft. of radiation and one at the side at the back of the room with 36 ft. One radiator providing 90 ft. of radiation heats the dining room and another with 48 ft. of radiation the center hall. Contrary to the usual practice, a radiator is provided in the vestibule with 13 1/3 ft. of radiation.

Details of the Heating System

All riser lines run inside of partitions. The riser lines and horizontal runs in the basement and horizontal runs between the joists and boiler manifolds are covered with ¾ in. air cell covering with brass strap canvas backing. The boiler is covered with 1½ in. asbestos plastic cement. Basement pipe lines and connections are supported by expansion hangers. Where risers pass through the floor the openings are fitted with nickel floor plates. All rooms on the second floor are heated, but the positions of the radiators are not shown on the plans.

Vapor is furnished by a No. 42-S cast iron tubular natural gas fired boiler, made by the Bryant Heating & Manufacturing Company, Cleveland. This boiler has 12,180 sq. in. of heating surface and has a rated capacity of 800 ft. The boiler is 45 in. high and occupies a floor space of 27 in. by 30 in. The boiler is connected with a ¾-in. water supply main and a 1-in. gas main. It is connected to chimney with a 10-in. 20-gauge galvanized pipe.

The boiler is equipped with a Mouat vapor regulator, which automatically governs the pressure in the entire system by controlling the gas supply. It turns down the gas when the pressure reaches 1, 2 or 3 ounces, according to the adjustment of the regulator and turns on the gas with a drop in pressure of about one ounce. With the regulator a constant and uniform regulation is provided, resulting in a saving of fuel.

The Vapor Regulator

The vapor regulator is constructed on the principle of a hydro-static balance. It is automatically operated by moving water from a stationary receptacle to a movable receptacle and vice-versa, caused by a slight increase or decrease in the pressure of the vapor. The regulator is not operated by water in a boiler, but by means of water in an auxiliary tank entirely separate from the boiler water. The working parts of the regulator are connected above the water line of the boiler and are not affected by high or low water in the boiler.

The radiators are equipped with the Mouat fractional radiator valves so that each radiator may be kept partially or entirely heated as desired. By the use of these valves different temperatures can be maintained in different rooms, and overheating and waste of fuel are avoided in mild weather.

The system is further controlled by a Minneapolis heat regulator located in the living room. While the Mouat regulator is controlled by pressure the heat regulator is controlled by temperature and when the temperature of the room rises above 70 degrees, or the point at which the thermostat is set, it automatically entirely cuts off the gas, thus providing a positive and quick acting regulation. When the temperature falls to a given point the thermostat again turns on the gas.

Equipment of Radiators

Peerless radiation of the American Radiator Company is used throughout the house. The radiators are equipped with Mouat return fittings through which the air and water leave the radiator and travel through the return pipe to a point near the boiler where the water passes into the boiler and the air from the system escapes through the vent pipe into the chimney flue. By use of this system the annoyance caused by sputtering, leaky radiators is eliminated.

The residence described is that of M. J. Mireau on Clifton Boulevard, Lakewood, Ohio. R. J. Moore, of 1439 Clifton Place, Lakewood, Ohio, was the builder. The heating system was installed by the Mouat-Squires Company, of Cleveland, Ohio.

CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

Laying Out Hand Rail for Spiral Stairway

From Morris Williams, New York City.—In reply to the request of "M. F. S." in the January issue I would say that in Fig. 1 there is shown a plan of one revolution of a circular or spiral stairway containing 23 steps. The first two steps are made a trifle wider than the others, all of which are of the same dimensions and of the form of winders, measuring 5 in. upon the center line of the rail and 10 in. upon the travel line. The travel line as shown is placed at a distance of 14 in. from the center line and represents the stepping space in ascending and descending the stairway.

The purpose in having uniform widths upon the center line is to secure uniformity of pitch for the hand rail and equal lengths for the balustrades. The rail as shown in the plan is to be worked in four sections, the first one being struck from the center *M* and the other three from the center *O*.

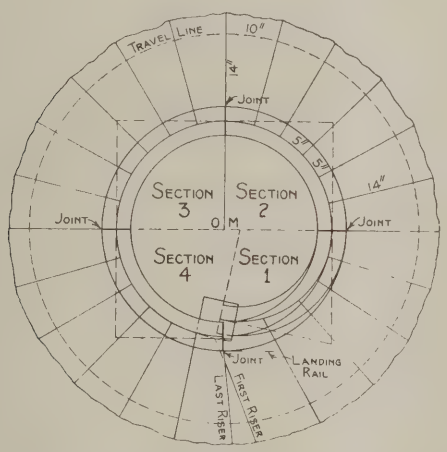


Fig. 1—Plan of a Circular Stairway, the Rail to Be Made in Four Sections—Scale ⅜ In. to the Foot

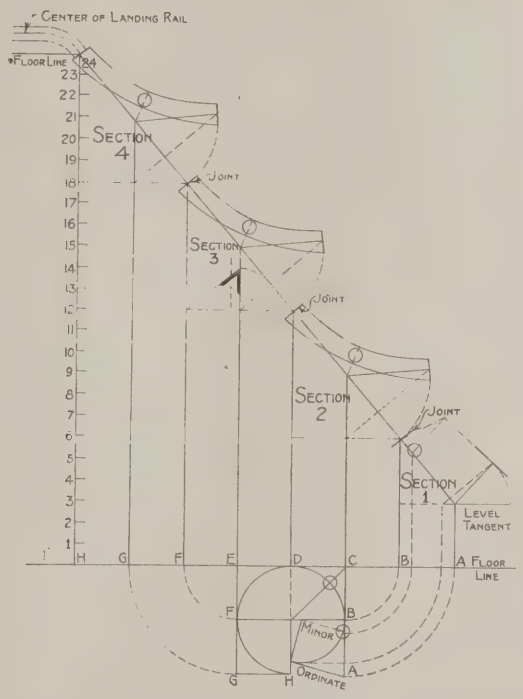


Fig. 2—Elevation of Fig. 1 Showing Pitch of the Tangent and Face Molds—Scale 3/16 In. to the Foot

Laying Out Hand Rail for Spiral Stairway—By Morris Williams

The last three are equal, each taking up a complete quadrant, all as clearly indicated.

The first section as shown struck from the center *M* is of less radius than the others, for the purpose of turning out the rail at the starting, thus producing extra width and better appearance. The plan tangents are drawn all around the sections.

A complete elevation of the plan is shown in Fig. 2 which indicates a uniform pitch for all the tangents except the bottom one which is made level in order to produce easement in the rail. Upon the pitch line of the tangents is shown the development of the four face molds; the three upper ones being similar due to the similarity in the plan conditions.

To draw this figure measure up from the floor line the hight of 24 risers contained in the plan and revolve the plan tangents as shown to the floor line. Fix upon the hight the rail at the bottom is to be and which is shown by the position in the figure of the level tangent. Draw a line from the top floor as shown to the level tangent thus obtaining the pitch line of all the tangents.

Now draw the horizontal lines to define the rail sections, locating the joints as shown on the pitch line and indicating that each section covers the hight over six risers.

An explanation of the method for developing sections 2, 3 and 4 is shown in Fig. 3, which is a reproduction of section 2 in Fig. 2.

Proceed by revolving the tangent *C* to the ground line as shown at *A*. Connect *A* and 12 for the pitch; draw a line from the corner *N* square to the pitch and revolve the bottom tangent as shown to cut it in *W*. Connect *W* and *E* which will be the bottom tangent as required upon the face mold.

Now draw the dotted lines shown paralled to the tangents and connect the corners to locate the minor axis. Draw the major axis square to the minor.

Upon the minor axis draw a circle equal in diameter to the plain width of the rail, and at a distance from *E* equal to the distance of the circle shown in the plan from the corner *N*. Make *W X* and *W X* equal to *X X* on the long edge of the bevel.

By bending a lath to touch these points the curves of the mold may accurately be described.

The bevel has been found as shown by placing one point of the compasses in *N* and extending out to touch the tangent, its base being the plan tangent. The bevel is to be applied to both ends reversely.

As shown in Fig. 2, this face mold applies to the three sections of the rail and may be applied continuously to any number of spiral revolutions.

In Fig. 4 is shown how to lay out the bottom face mold. This is a case where the bottom tangent is

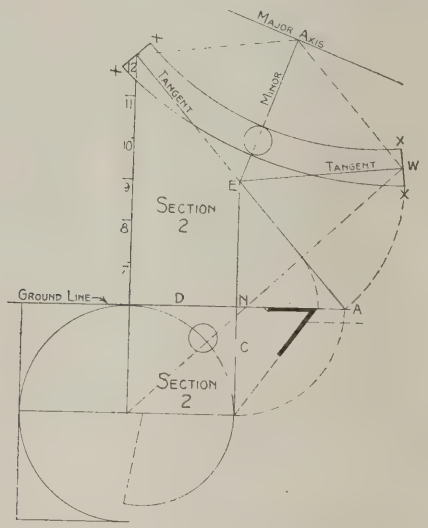


Fig. 3—Development of the Face Mold for Section 2

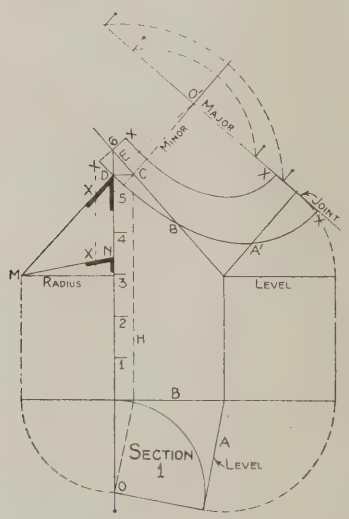


Fig. 4—Development of the Face Mold for Section I Using String and Pins

The width of the mold at *C* upon the minor axis will be equal to the plain rail and at the ends it will be determined by the bevels which are shown in the diagram to have their base equal to the plan radius.

Bevel *D* is formed by connecting *D* with *M*, as shown, and bevel *N* by connecting *N* with *M*. The hight from 3 to *N* is equal to the line shown from *D* to *E* upon the tangent *B*.

Bevel *D* is to be applied to the bottom joint and bevel *N* to the top one.

D X upon the long edge of bevel *D* represents half the width of the mold at the bottom end while *N X* represents half the width at the top end. In this diagram the mold is completed by what is known as the String and Pin method.

In Fig. 5 we show how to lay it out by the "Ordinate" method. The principle involved is to cross the plan rail with ordinates and transfer them to the section as shown in the diagram. The bottom tangent being level determines it as the directing ordinate both in plan and section. Make all the ordinates on the section equal to those on the plan

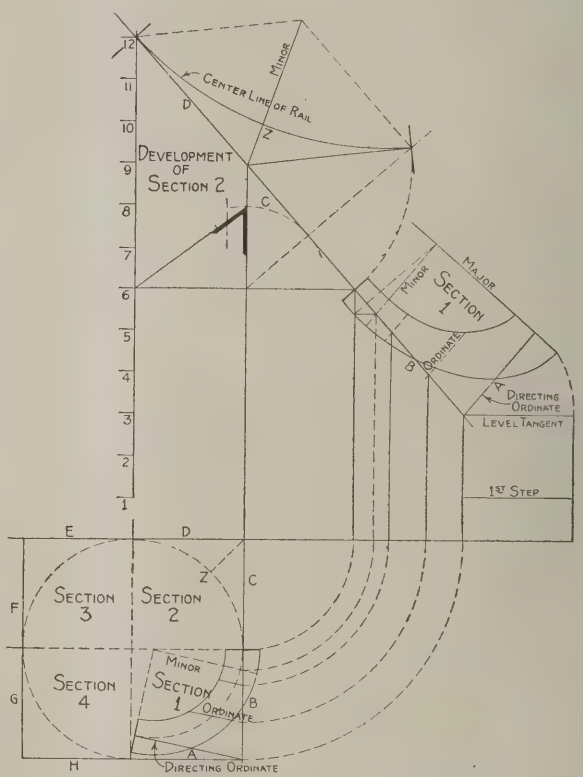


Fig. 5—Development of Face Mold for Section I by the "Ordinate" Method

Laying Out Hand Rail for Spiral Stairway—By Morris Williams

level to form an easement in the rail and the other tangent has an equal pitch with those of the sections above it as shown in Fig. 3. Proceed by drawing a line from the plan center *O* parallel with the level tangent *A*. This line will be the plan of the minor axis. Erect the line *H* extending it to cut the pitched tangent *B* as shown at *C*. From *C* draw a level line to *D*, and from *D* draw a line to *O'* square to the tangent *B*. Connect *O'* with *C* which will be the minor axis.

Now draw the bottom tangent *A'* parallel with the minor axis and make it equal in length to the plan level tangent *A*. Draw the joint square to the tangent and continue to *O'*. This line will be the major axis.

measuring the distances from the tangent *B* in plan and section and trace curves through points found.

The development shown in the diagram of section 2 is explained in Fig. 3.

Design Wanted for Two-Story Frame Building

From F. A., Brooklyn, N. Y.—As an old reader of *The Building Age*, I would like very much to have some of those architecturally inclined to send for publication sketches of a two-story frame bar-room, with living rooms on the second floor. The corner lot is 25 x 100 ft. and I must keep 3 ft. away from both side lines. The bar must face the front. Will

the readers answering tell me where it will be better to have the hall from which rise the stairs to the second floor on the narrow frontage or have the entrance for the stairs built on the 100 ft. line of the building between the bar and the sitting room.

At the same time I would like to have the bar and sitting room divided by a partition so that anyone entering the bar-room can look into the sitting room.

Building a Reinforced Concrete Porch Floor

From Builder, Clinton Co., N. Y.—According to my idea "J. H. V.," Sioux Center, Iowa, has three methods of doing his work. One is to fill in with cobblestones to the desired level to serve as a bed for the porch floor, and then a lean coat to fill to the level of the stones can be roughly tamped and this covered with 2 in. of plastic concrete of a 1:3 mixture, without stones. In a case which I have in mind I used ore-bed sand which is quite coarse, although pit sand and pebbles make good aggregate. This was troweled very smooth after sufficient setting. If water appears on the top of the concrete under the trowel, neat cement should be sifted on the wet spots and troweled until it becomes glassy in appearance. The floor in question is laid in flags 4 ft. wide. The "form" should have a strip of tar paper next the concrete coating to the rough surface as indicated in Fig. 1 of the sketches.

The second course should be put on while the first is wet. All the smoothing should be done from a bridge. Trowels can be obtained to form the edges of the flags.

On a job which I did I used old rails and laid the flanges close together; painted them with tar and covered them with concrete to the desired thickness. No reinforcement was used in either method.

The correspondent may use T-beams or bulb beams instead of railroad rails if he so desires. This iron will cost about 2 cents a lb., but if this is too costly he may spread the beams 20 in. to 24 in. and use low arches as in Fig. 2. The iron may be procured curved to any radius. If he uses heavier iron it need not be curved. No reinforcement is required for this method. No. 7 wire 1-in. to 2-in. mesh will make better reinforcement than rods.

A hardening material for the surface of concrete floors contains 95 per cent. of iron dust or iron flour.

Fig. 1—Use of Tar Paper in Laying the Floor

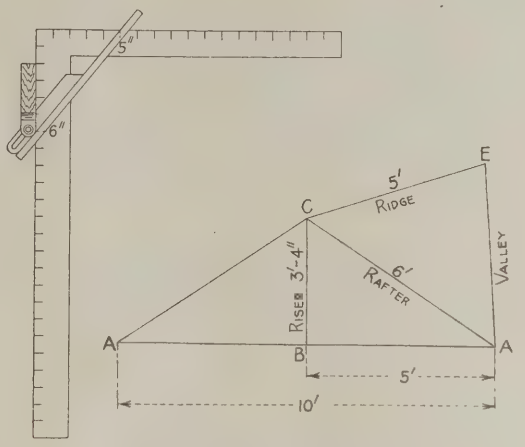
Fig. 2—How T-Beams May Be Used to Good Advantage

Building a Reinforced Concrete Porch Floor

It is added to the dry cement in the proportion of 15 or 20 lb. to each 100 lb. and one part of the mixture is used with two parts of sand. This preparation is applied as a top coat to a thickness ranging anywhere from ½ to 1 in. It forms a hard and durable floor, is claimed to be waterproof and not slippery. It is also used for making new concrete adhere to old in repairing.

Obtaining Cuts for Gable Rafters

From J. J. W., Pittsfield, Mass.—I am enclosing sketches showing a simple way to obtain bevel cuts for gable rafters and which may be of interest to the correspondent who inquired some time ago regarding the subject. The sketch shows an 8-in.



Obtaining Cuts for Gable Rafters

rise per foot run. A-A represents the width of the gable, which is 10 ft. The distance from B to A or half the width of the gable is 5 ft. As the rise is 8 ft. multiply 8 by 5, which gives 40 in., or 3 ft. 4 in., from B to C. The length of the rafter from A to C is 6 ft. As half the width of the gable is 5 ft. so the ridge C to E must be 5 ft.

Lay the straight edge across the angle of the steel square from the 5-in. mark on the tongue to the 6-in. mark on the blade. Set the bevel square from the 6-in. mark up the straight edge, which gives the bevel for the rafter. Now set the bevel square from 5 in. down the straight edge, which gives the bevel for the roof boards.

This rule applies to even or uneven pitches. First obtain the length of the rafter, then the length of the ridge. Lay the straight edge diagonally from the length of the rafter and the length of the ridge and you have the bevel cuts—the bevel for the rafter and the cut for the roof boards.

Freezing of Concrete Septic Tank

From W. C., Aberdeen, So. Dak.—My attention has been drawn to the article in the November issue of *The Building Age* entitled "Construction of Concrete Septic Tank," by Percy H. Wilson. I would like to ask the writer of the article or any one else who has had experience with septic tanks whether or not there is danger of the winter frost damaging the tank or interfering with the working of it if the top of the tank is placed only 6 in. below the ground level as stated in the article? It seems to me that the frost would interfere with and even damage the tank. I am contemplating building a septic tank soon, and naturally desire to get it as practical as recent experience proves best.

Answer—The question of our correspondent was referred to Mr. Wilson, the author of the article in question, who furnishes the following comments:

"The low temperatures prevailing in winter time will not prevent the operation of the septic tank even though it is only 6 in. below ground. The tem-

perature of the sewage and the putrefactive and bacterial action taking place therein tend to keep the contents of the tank at a sufficiently high temperature to prevent freezing. It is often the practice to place the septic tank even with the surface of the ground, but with a climate such as that which is found in South Dakota it is probably a wise precaution to use the earth covering which should be increased if considered advisable. It is of course understood that the deeper the tank is placed in the ground the less fall there will be for the drain tile lines into which the effluent is discharged. Where a grade is to be had below the tank this objection naturally does not apply.

Construction of a Drum Sander

From J. F. H., Indianapolis, Ind.—In the December, 1914, issue, page 55, "D. D.," Drayton, Ont., asks for plans and description of a Drum Sander. I can furnish him with plans and specifications for building one, but would not advise him to attempt the work for such a machine can be purchased ready to run for about the cost of the material of which one can be built.

He should not try to build a machine unless he can find a drum and a mandrel all ready for the frame and bearings. In such a case, it would pay to construct the wooden frame for the machine, but I would not advise "D. D." to purchase a drum sander only. By all means get a combined disc and drum sander all mounted on one shaft. The disc should be large, preferably one 42 in. to 48 in. in diameter, but of course a smaller machine can be procured if desired. The large machines are greatly to be preferred, as they have a greater range of work, and do it quicker than the smaller machines.

Preferably, the disc should be about 48 in. in diameter, as stated, and placed upon the extreme end of the mandrel, so as to overhang, and upon the outside of the machine frame at that. One of the journals should be close to the disc, then the belt pulley close to the other end of the same journal bearing. The drum may be placed a foot or so away from the pulley, so as to give room for the work between the disc and the drum. Lastly, the second bearing should be placed on the far end of the shaft, thus bringing the drum and drive-pulley between the bearings, with the disc upon the overhang.

A machine of this kind and size can be made to do a very large amount and variety of work, and it should be given a drive of at least seven or eight horsepower, but of course that amount will not be used except when very heavy work is being done.

It should have at least a six-inch belt on a 12-inch pulley. The speed at which such a sander should run varies greatly with different makers. As far as work is concerned, the greater the velocity of the sand paper, the more and better work the machine can do. But there is a decided limit in the permissible speed of drum sanders, and that limit is the keeping of the paper upon the drum. Probably trouble will be met with through action of centrifugal force upon the paper when the 24 in. drum is revolved above 450 revolutions per minute. But the paper upon the disc may be run with perfect security at 600 or even more revolutions per minute.

If cloth paper should be used instead of sand paper, the drum may be run at a greater speed. But if the paper tears off easily and quickly, breaking at the point between clamp and drum, then one may be quite sure that the speed of the drum is too great.

There is one other point to be considered when speeding up a sander, and that is:—The power required increases very fast when the speed is increased. In fact, the power required when the speed is doubled, is much more than doubled.

Doubling the speed of a ventilating fan requires about eight times the power, and doubling the speed of a drum sander results in a power increase in almost the same ratio; therefore, when setting up a machine of this kind, do a little calculating as to whether or not the increased capacity of the machine due to increasing its speed, is or is not warranted by the increased power consumption demanded by the increased speed of rotation. But do not make a drum sander until you look around a bit and see what you can purchase a good machine for, in the open market—and almost any machinery dealer will quote you prices upon drum sanders. Furthermore, when you purchase, get one with a disc attached, by all means.

Building Small Concrete Bridges

From J. A. F., Covington, Ky.—May I ask some of the practical readers to tell me through the correspondence columns of *The Building Age* something about building small concrete bridges. I want to know whether or not flat tops can be made strong enough for the purpose and how should they be reinforced? What I have in mind are small bridges, say 12 x 16 ft., or in fact of any size, for placing over ordinary creeks.

Will the readers making reply kndly give me some rule by which the strength may be estimated.

Answer—The U. S. Department of Agriculture and the U. S. Department of Public Roads, Washington, D. C., issue pamphlets on the subject of bridges and culverts of concrete which cannot fail to be serviceable to this correspondent. Every state having a Highway Department or a State Highway Engineering Department prints pamphlets giving standards for use and he may procure such standards by writing to the proper officials. Among states having published standards are Massachusetts, New York, Pennsylvania, West Virginia, Virginia, Ohio, Illinois, Wisconsin, Iowa, Minnesota. The Universal Portland Cement Company, Chicago, issues a pamphlet entitled "Small Concrete Bridges and Culverts" containg a great deal of useful information on such work an dalso containing illustrations of standards of several of the states above named and standards recommended by the U. S. Department of Public Roads.

Our correspondent asks for some a rule by which the strength may be estimated. It would require a fair sized book to explain to a man how to design a bridge to carry heavy moving loads. He would require a knowledge of algebra and the mechanics of materials. This is work amateurs should not attempt. There are several excellent treatises on reinforced concrete on the market from which the desired information may be obtained. The standards above mentioned are designed by well edu-

cated engineers so may be used with confidence. For such work as a majority of contractors may do it is not necessary to prepare any plans, as those published are sufficient and cover every span likely to be used.

Floor Plans for Six-Room Cottage

From W. R. G., Dixon, Illinois.—I am enclosing a floor plan, Fig. 1, of a six-room cottage in answer to the request of "W. H. Y." Lonoke, Ark., which appeared in the December issue of the paper. No details in the way of description have been given as this is merely a suggestion, and that, I believe, was all that the correspondent requested.

From L. N. B., Darlington, Ind.—In looking through the Correspondence Department of the December issue of *The Building Age* I find that "W. H. Y." wants a house plan consisting of six rooms and bath with two bedrooms opening into the bath room. I believe the plan which I am enclosing and shown in Fig. 2 may suit his requirements, and it is possible that some of the other readers may be interested.

From J. McC. Barnwell, Charleston, S. C.—I noticed in the Correspondence Department of the December issue of *The Building Age* a request from "W. H. Y." Lonoke, Ark., for floor plans of a one-story six-room and bath cottage to face north in a southern climate. I take pleasure in submitting a plan, Fig. 3, which I hope may prove helpful to the correspondent in question. It will be seen that the main entrance hall is in the center of the frontage and is provided with an open fireplace so that if one desires he may use it as a reception room. On the left and rear are three sleeping rooms each with an open fireplace and a clothes closet. The bath room is so placed as to be readily accessible to each of the bed rooms as well as to the other portion of the house through the medium of a hallway running longitudinally of the plan. The kitchen is at the rear beyond the dining room, with which, however, it communicates through a well equipped pantry. The dining room is provided with an open fireplace and mantel and is separated from the living room by a cased opening which may be closed with *portieres*, or if the owner so desires sliding doors can be used. It will be seen that the front is toward the north as requested and that across

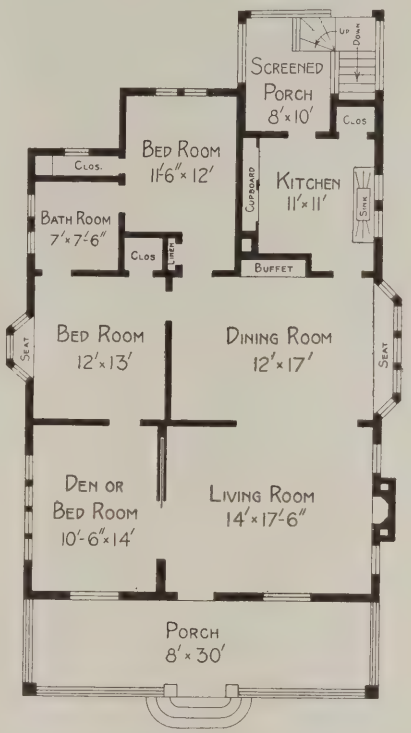


Fig. 2—Plan of "L. N. B."

Fig. 1—Plan Submitted by "W. R. G."

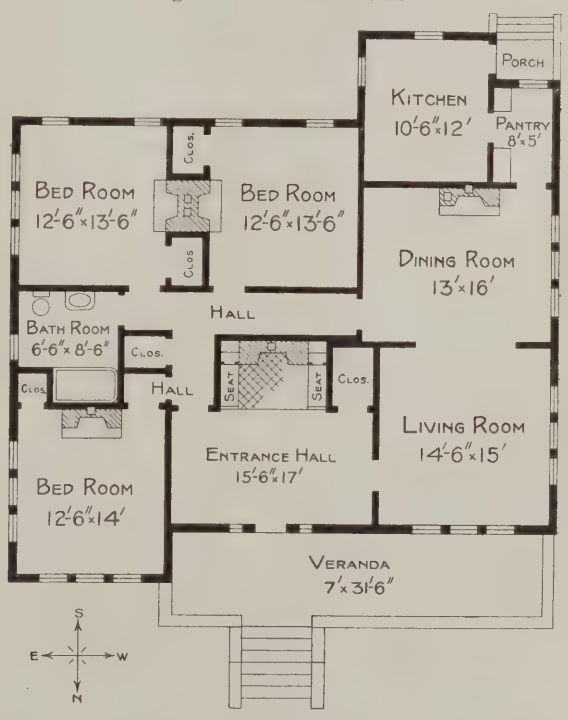


Fig. 3—Arrangement Suggested by J. McC. Barnwell

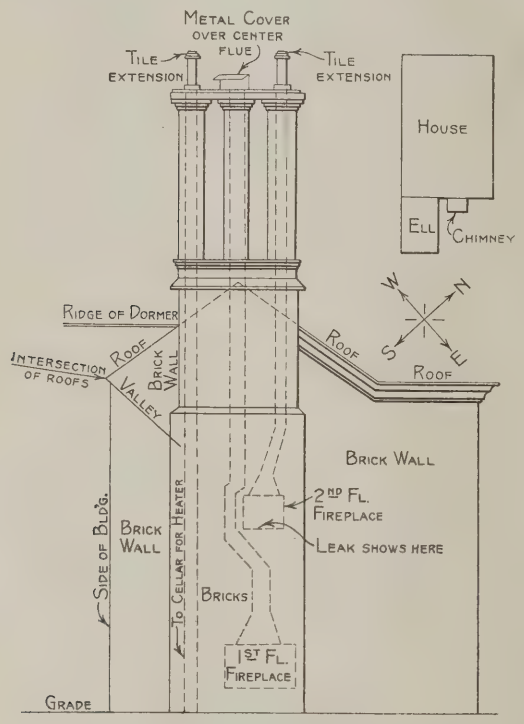
Floor Plans for a Six-Room Cottage—Suggestions of Various Correspondents

the greater portion of the house is a veranda seven ft. in width.

Note.—We also have a reply to the same inquiry from "R. W. W.," Dayton, N. Y.

Trouble with a Leaky Chimney

From W. A. W., Danvers, Mass.—Knowing the willingness of readers of the Correspondence Department of the paper to assist in solving problems which confront the builder, I desire to call their attention to a matter which is puzzling me. It relates to an outside chimney on a brick building, the chimney being constructed with 12 in. walls part of the way and with 8 in. walls the remainder. There are three flues in all, each having a flue lining. The chimney is on the end of a brick house, its relative position being clearly indicated



Trouble with a Leaky Chimney

by the block plan in the accompanying sketch. The trouble is that water runs on to the hearth of the fireplace at the second floor and apparently comes down the flue. The sketch shows the arrangement of the chimney flues and also the position of the fireplace where the leak occurs.

I have covered over the tops of the flues but it seems to make no difference. The chimney is built of hard brick with the strongest of cement mortar and I have gone over it very carefully and pointed every pin hole and then waterproofed the work thoroughly but it did no good. I have put new flashings in the chimney and as a consequence the water does not show in the attic.

The chimney does not leak with every storm but it is sure to whenever there is a driving northeaster; then the chimney leaks a stream, and while it appears that the rain comes through 8 in of solid brick and then through the flue lining this does not appeal to common sense. A peculiar feature is that the chimney is exceptionally well built, while other chimneys of the same house which are not as well built do not leak at all.

If any of the practical builders, masons or bricklayers know of any remedy for this trouble I wish they would tell it through the Correspondence Department as I am at my wits' end. I am happy to say that I did not build the house but have been called upon to remedy the trouble.

Designs Wanted of China Closets, Bookcases, Cabinets, Etc.

From W. O. H., Minatare, Neb.—I would like to build in several articles of household equipment such as kitchen cabinet and sink, china closet, bookcases, colonnade, etc., and shall take it as a favor if some of the interested readers will furnish drawings of such articles and at the same time tell just how the work is done.

Safe Construction of Church Roof Trusses

From Ernest McCullough, Chicago, Ill.—In the January issue of *The Building Age*, page 60, first column and two lines above the diagram bearing the caption "Elevation of Truss B," the types make me say, "a 2 in. x 2 in. post 10 ft. long can carry a load of 3,840 lb." The dimensions should have read 2 x 8 in., although of course the statement in the next sentence that "Four such pieces will give an 8 x 8 in. post, etc.," will show that a mistake had been made.

Front Elevation Wanted of a Bank Building

From A. B., Marthasville, Mo.—I have been a subscriber to the paper for several years and now come to the Correspondence columns for assistance. I would like some of the interested readers, and especially those architecturally inclined, to furnish for publication the front elevation of a one-story brick bank building, which is to be 35 ft. wide, and with ceiling about 15 ft. in the clear. Only the front of the building will be exposed to the street as it will occupy a position in the center of the block.

A Greatly Admired $4000 Bungalow

From J. G. M., Milton, Wis.—I wish to compliment D. W. Shoupe of Chicago Lawn, Ill., on the character of his bungalow which was so attractively illustrated and described in the January issue of *The Building Age*. After 25 years spent in studying and drawing plans I have never yet seen one which was quite as satisfactory to me in every arrangement as that of Mr. Shoupe's. It is so plain and simple, with no floor space which cannot be utilized to advantage that I hope Mr. Shoupe will not object to me and many others who greatly admire it, using the plan for our own use.

The forests of Florida are said to contain at least 175 different kinds of wood.

A Profitable Specialty for Builders

A Member of the Trade Who Specializes as "Building Loss Adjuster" for Fire Insurance Companies

By G. D. Crain, Jr.

IN a certain city of the Middle West, having a population of 250,000, is a builder who has become a specialist. His particular calling is practically unknown to other members of the trade in that city, and he has succeeded in building up a business until he enjoys a monopoly of good-will in this special line.

He has no title, though he was referred to not long ago as a "building loss adjuster" for fire insurance companies. In 1913 he presented bills to the companies for repairs, made necessary by fire damage, amounting to $115,000. Ten years ago, when he started his specialty, the amount of business handled was less than $7,500. The growth of his business is sufficient proof of the soundness of his proposition.

Replacing Damaged Property vs. Cash Payments

It may be explained, in the beginning, that the insurance companies have the option of replacing damaged property instead of paying cash equaling the amount of the damage and the cost of replacement. In a great many cases where the property owner refuses to come to a satisfactory settlement as to a cash payment, the insurance adjusters find it better business to employ a carpenter to do whatever work is necessary, frequently saving to the companies a considerable difference between the cost of the work and the amount which would have had to be paid in order to make a settlement by cash.

The insurance adjuster, as a rule, is an insurance specialist, and not a building specialist. Consequently, when he has a building loss, he must have the services of an expert in the building line, in order to know what the actual damage, as measured by the cost of replacement, is. Usually he "picks up" a man in the locality where the fire occurred, though in time most of the company representatives establish connections with carpenters and builders at various points, calling on them for service when an adjustment of a building loss is on the schedule.

Advantages to Insurance Companies

The builders, as a rule, do not give a great deal of attention to this work, as far as recognizing in it an opportunity to develop along a special line which has greater possibilities, perhaps, than ordinary building work. But in the case referred to at the beginning of this article, the builder saw his opportunity and has taken advantage of it.

The advantage to the insurance companies and their field representatives through having a competent builder in their employ is obvious. When a man devoting all of his time to handling building losses is available, this work is automatically turned over to the builder, and the company representative is relieved of the necessity of inspecting the loss, getting a builder to look it over and appraise the damage, and then going through the form of either paying the amount involved or having the work done. There are so many petty losses of this kind that if the average special agent were compelled to adjust all of them in person, his time would be so monopolized that he would have little opportunity to attend to more important matters.

A recent incident which happened in the city referred to will give an idea of the character of the work done.

A fire happened at 10 o'clock in the morning. The roof of a dwelling in a suburb of the city was partly burned off, and probably $100 worth of damage was done. The builder, who has authority from practically all of the companies in the city where he works to act as their adjuster, was apprised of the fire, as he makes a point of getting this information direct from the headquarters of the fire department, and in an hour he was on the spot, having driven thither in his automobile.

How the "Building Loss Adjuster" Operates

The fire was out and he looked over the damage, arranging with the owner and occupant to send a force of men to the spot the same afternoon. The next day the roof was back in good condition, and the assured were satisfied with the excellent service which had been rendered, while the companies were equally glad to have had the loss given prompt attention and the amount held to the reasonable sum required for replacing the roof.

The building specialist has two runabouts, one of which he uses himself, and the other of which is operated by his assistant. Whenever a loss is adjusted, one or the other of them makes the trip by automobile in short order, no time being lost, and each loss being "cleared up" in much less time than would be taken if the ordinary channels were followed.

If the matter were allowed to take its own course, the plan would be this: The assured would notify the agent from whom he had secured the policy of his loss. The agent would notify the company, as well as its field representative. Several days would elapse before the latter had an opportunity to go into the matter. He would then visit the property, ascertain roughly the amount of the damage, and probably have a conference with an architect or builder before agreeing on the amount of the loss. Then the settlement would be made, a cash payment or repairs being provided for. In this way from one to two weeks would elapse before the settle-

ment, and during this time the assured, or the occupant of the house, if it were rented, would be inconvenienced and would probably be compelled to lose the use of the property for the entire time.

Repairs and Settlement Are Immediate

In the way noted, the repairs are made immediately, and the settlement takes practically no time. The loss is adjusted on the lowest possible basis to the companies—the cost of replacement—and in a satisfactory manner to the assured—immediate settlement. Both sides are satisfied, and the builder has had the pleasure and profit of a job.

This particular builder has a force of about fifteen men. They are not regularly employed, on account of the fact that the work varies in volume. Nevertheless, they are paid better than the average wages, and are consequently willing to work in this manner, as their total income is probably greater than if they worked all the time at the usual remuneration. The increased wage is in recognition both of the irregularity of the work, and of the emergency character of the operations, which requires a little more aggressive, snappy action than is given to the routine building job.

The builder has enough work to do to warrant him in buying his lumber in carload lots. He maintains a yard where the lumber is sorted, but does not cut the stock to dimension, this being done in the local planing mills. In larger cities, with a correspondingly larger amount of work to handle, it would probably be worth while to operate a shop. Staple mill work, such as doors, sashes, etc., is purchased from local jobbers, and bought in such quantity as to get the regular dealer's discount.

The builder also buys his hardware in large lots, getting prices as low as those quoted to retailers. In this way, he is in a position to make a dealer's profit in selling the material for use on a specific building job. Inasmuch as the retail price would have to be paid for the material if each job were handled separately, the builder takes the legitimate profit he has earned by reason of providing the larger stock and carrying it for the service of the fire insurance companies. As he likewise makes a charge for each job covering the use of his labor and equipment, he is in a position to secure a good margin on each piece of work handled.

Amount of Work Handled

It was stated in the beginning that last year the builder handled $115,000 worth of work. This is entirely in addition to the volume of losses handled where cash settlements were made. As the adjuster of the fire insurance companies, the builder made a number of settlements of this kind. In case of total losses he usually made a cash settlement, the cost of replacement merely being figured as a basis for fixing the amount which the assured was entitled to recover under the policy. In cases of this kind the builder merely gave his professional services, doing no work, and being paid a fee for his expert advice regarding the building problems involved.

The field which has been created by this man in his particular community is a big one. The fire losses of the country total hundreds of millions each year, and while a large part of this amount is represented by losses on mercantile stocks, a great sum is represented by building losses. The carpenter and builder who qualifies himself, by a study of the insurance problems involved, to offer expert advice to the fire insurance companies, as well as prompt and efficient service in the matter of organization and character of work done, can make himself so useful to them that, like the builder whose operations have been described, he will be given a monopoly of the field in his territory.

The Specialist Is the Winner

The specialist nowadays is the man who wins. The men who are making the most money are those who have mastered some one thing, and know more about it than others. The building field is so immense that it is well worth while to study some particular phase of it, so as to be able to offer a service which cannot be had everywhere. Not only does the specialist thus attract business by reason of his professional equipment, but he is in a position to make a charge in proportion to the value of his services.

The builder who can make appraisals, adjust fire losses and repair buildings, all in a business-like, economical and satisfactory way, is a specialist. He has made himself stand out from his fellows, and he has put himself in a position to earn a great deal more than the man who confines himself to the routine jobs for which everybody is competing.

Consolidation of New England Sheet Metal Interests

It is interesting to note that on the first of January of the present year a consolidation which gives New England the largest sheet metal manufacturing plant of its kind in that section of the country went into effect. In fact, with the additions to the modern reinforced concrete factory buildings now constructed at Cambridge it will be the largest plant east of Pittsburgh. This was brought about by the merging of the Eastern Expanded Metal Company with the Penn Metal Company of Boston. Under the same roof there will be turned out every form of metal roofing, siding or other metal for exteriors; all forms of metal for interiors, concrete reinforcement, metal lath, metal corner bead, metal studs, conductor pipe, gutters, fire doors, hollow metal window frames, kalemein doors, metal window sash and, in fact, every conceivable form of metal work for construction. The new concern will be known as the Penn Metal Company with main offices at 201 Devonshire street, Boston, Mass., and with sales offices in leading cities throughout the country. The president of the new company is George P. Bullard and the treasurer and general manager is George A. Sagendorph. It is expected that the opening of the Panama Canal will greatly increase the sales of New England sheet metal products on the Pacific coast and throughout South American countries.

The first "French Flat" or apartment building erected in New York City was put up in 1852, at 256 to 258 West 37th Street. In those days it was known as a "model house."

A Concrete House with Double Walls

A Striking Example of Hollow Wall Construction—Various Interesting Details—Some Figures of Cost

IT is a well known fact that a house constructed with double walls so as to provide an insulating air space between them is much cooler and more comfortable in summer than is the case where the walls are solid; while in the winter months the cost of heating the house is appreciably reduced. This form of construction is rapidly growing in favor throughout the country, more especially where concrete is used as the material for the enclosing walls. The result is a building that is fire resisting, thus greatly reducing the cost of insurance; repairs are a negligible factor and the necessity of painting is eliminated. In the accompanying illustrations we show a reinforced concrete residence erected in accordance with the method referred to. The design is one well suited for execution in any section and is finished with a coating of cement.

Concrete Residence Designed by Mr. Otto W. Gall at Binghamton, N. Y., for His Own Occupancy

In the arrangement of the rooms a noticeable feature is the hall which extends entirely across the house about midway of its depth. The entrance on one side gives ready access to the living room and dining room as well as to the main flight of stairs leading to the second story, while from the other side the porch entrance gives ready communication with the kitchen. It will be seen from an inspection of the floor plans that the living room, measuring 13 x 23 ft. in area, extends entirely across the front of the house, and from it French doors give out upon a porch of corresponding frontage. The living room is well lighted and has between the French doors an attractive open fireplace, a general view of the interior of the room being shown in one of the halftone pictures presented herewith. The dining room is separated from the main hall by sliding doors and communicates with the kitchen through a double swing door. There is a slide in the wall just over the table in the kitchen so that dishes may be readily passed from one room to another, this resulting

in the saving of many steps to the house domestic.

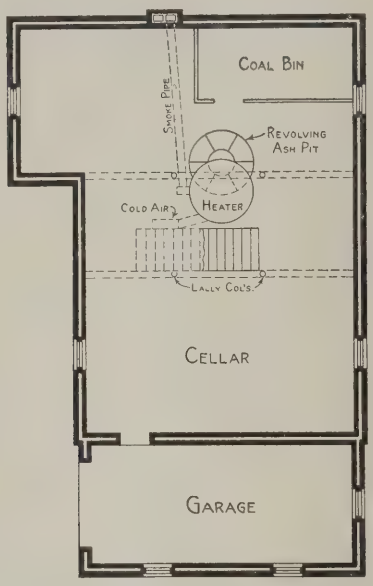
Over the living room on the second floor is a sleeping room of the same size and which communicates through a clothes closet directly with the bathroom. There are two other sleeping rooms at the rear of the house, each measuring 12 x 12 ft. in size and opening out of them are commodious clothes closets. The arrangement is such that one good room can be finished off in the attic if desired.

The outside dimensions of the house are 24 ft. 6 in. wide in front, 30 ft. 6 in. wide in the rear, and 36 ft. 6 in. deep from front to rear, exclusive of porches. The front porch is 10 x 23 ft. outside measurement. The cellar is 7½ ft. in the clear. The hight of rooms on the first floor is 9 ft. 3 in. and on the second floor 8 ft. 10 in. The full hight of the house to the roof plate including the cellar is given as 26½ ft.

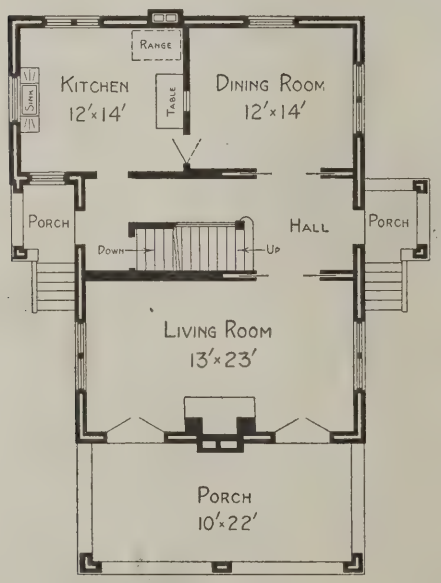
This house was erected last season by Otto W. Gall, at 90 Prospect street, Binghamton, N. Y., for his own occupancy and from plans prepared by himself. The footing under the cellar wall is solid concrete 18 in. thick and 12 in. deep. The cellar walls are 8 ft. high and up to the water table the outside wall is 6 in. thick and the inside wall is 4 in. thick, with a continuous air space between them 2½ in. wide, thus giving a wall that is 12½ in. thick. The two concrete walls do not touch each other at any point but are firmly bound together by galvanized ties with bent ends running from the middle of one wall across the air space to the middle of the other wall, and producing a construction that gives an even temperature and freedom from dampness within the house. The superstructure and porches have double 4 in. walls with air space as stated. Each wall is reinforced with wire all around the building every 9 inches in hight. The insulation by means of the air space is so effective that a hot air furnace two sizes smaller than would be necessary for a house of the same size of frame construction, will keep the rooms at a comfortable and uniform temperature. The walls were erected by what is known as the Van Guilder method, use being made of immediate releasing "forms" which eliminated the destructive waste of lumber as in "poured" concrete work and saved duplication of labor and handling of materials. The chimneys are part of the concrete wall and thus free from danger of fire.

The stucco finish was applied directly to the outside walls. On this house three coats were used, composed of light colored sand Portland cement and hydrated lime. The third coat was applied with a whiskbroom producing a "whip effect."

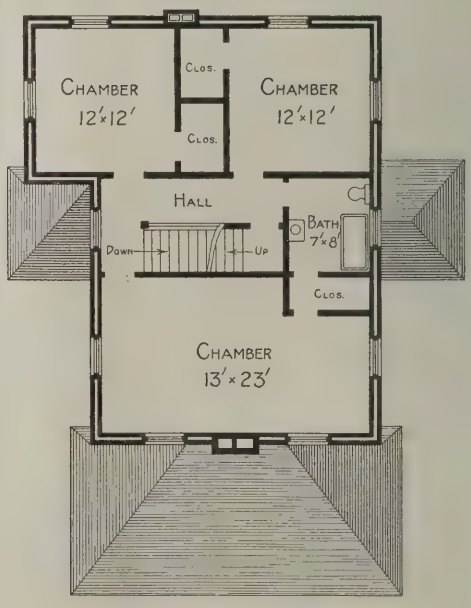
The material used to build the outside walls of the house, including footings, cellar walls, superstructure and porches, was 116 cu. yds. of bank run sand and gravel at $1.25 per cu. yd. and 124 barrels of cement at $1.40 per barrel. The concrete was mixed in the proportions of one part cement to six parts sand and gravel. There were $28 worth of wire ties and reinforcing material used. The workmen employed consisted of one man operating the Van Guilder hollow wall machines at $4 per day and four helpers at an average of $2.25 per day. It required only 21 days to do the work. The entire cost of the concrete work, including footings, cellar



Foundation Plan Showing Position of Heater

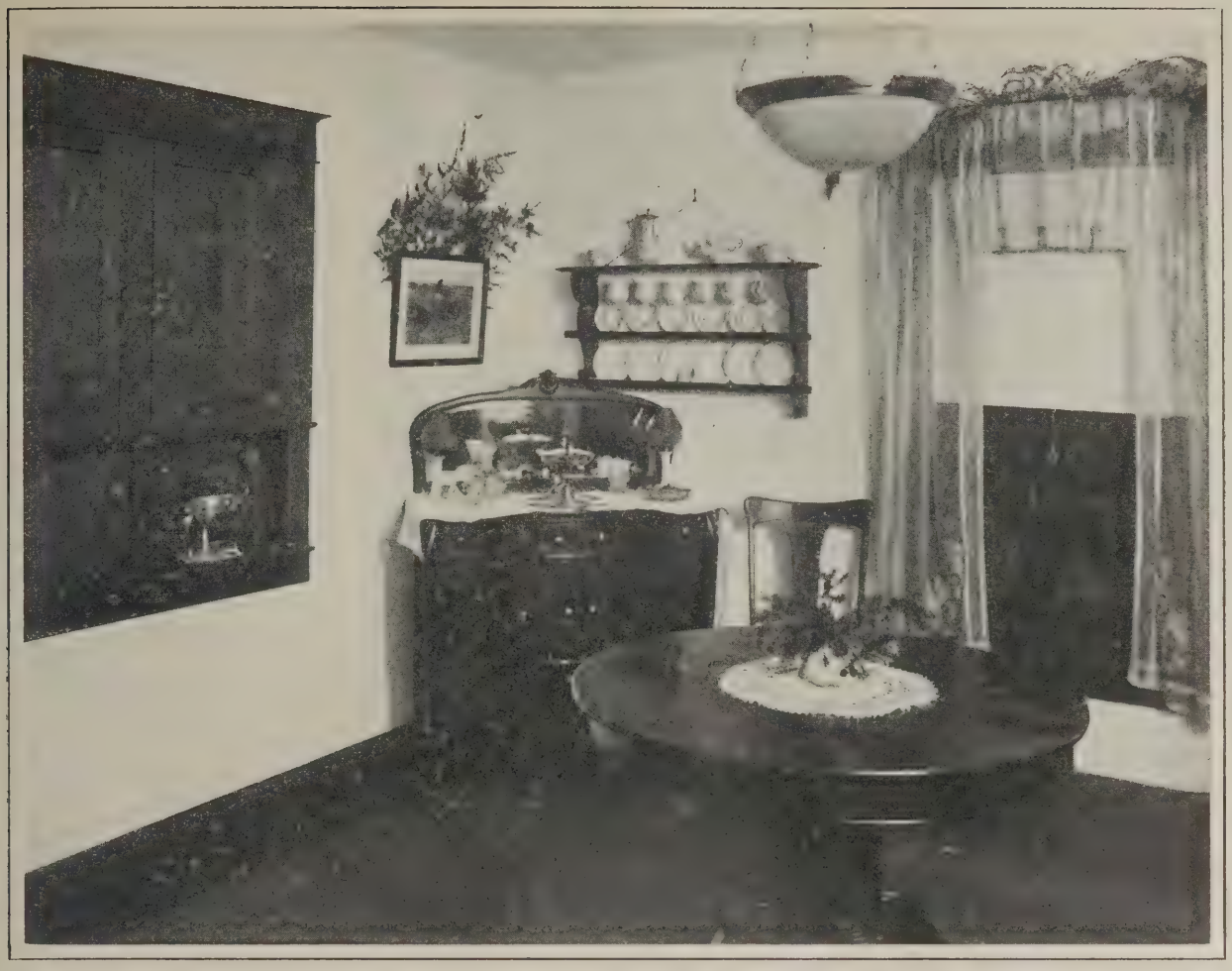


Main Floor Plan



Second Floor Plan

A Concrete House with Double Walls—Floor Plans—Scale 1/16 in. to the Foot



View in Dining Room of Residence of Mr. Otto W. Gall at Binghamton, New York

A Concrete House with Double Walls—General View in the Living Room as Seen from Front Hall

walls, superstructure, porches and chimneys, was $640. The cost of the hollow wall, including 1c. per foot for investment in machines and wear and tear of them, was 16c. per sq. ft. or surface foot.

The plaster was applied directly on the inside

A Concrete House with Double Walls—View in One of the Sleeping Rooms

walls, the insulation provided by the air space making furring and lathing unnecessary. The floors are double in the rooms of the first and second stories, the first story rooms having finish floors of oak and the second story rooms of North Carolina pine.

All partitions throughout the house, except where sliding doors run, are 6 in. thick, and where there are sliding doors the partitions are 8 in. thick. The floors of the kitchen and bathroom are of Monolith Composition Flooring. The kitchen trim is of North Carolina pine, natural finish. All other trim in the rooms on the lower floor including the stairway is of cypress, finished with one coat of dark Mission stain. The trim on the second floor is of North Carolina pine, finished with three coats of white enamel.

The outside trim is of cypress stained with tobacco brown creosote. The roof is covered with slate.

The house is heated by means of a hot air furnace located as shown on the foundation plan and having as a feature a revolving ash pit 3 ft. deep, containing 6 cans, which can be lifted out. The coal bin is conveniently located as regards the heater. The house is wired for electric lighting and the kitchen range is supplied with connection for using gas as a fuel.

The contractor of the house was William S. Snyder, 30 Crary Avenue, Binghamton, N. Y., and the work was executed by means of machines made by the Van Guilder Hollow Wall Company, 712 Chamber of Commerce Building, Rochester, N. Y. The mixing of the concrete was by means of a Big-an-Little mixer made by the Jaeger Machine Company, Columbus, Ohio. It had a hoist attachment for carrying the concrete to the double wall machines which were used.

The dome of one of the mosques at Cairo is said to have the appearance of a soft green color, remarkable for its freshness, considering that no direct light shines upon it. On a near inspection it is found that instead of being painted one even tone, it is dotted all over with purple and yellow spots on a white ground, leaving parts of this ground exposed. Distance causes these colors to blend and produce a most beautiful tone, impossible to obtain by pigment mixture.

The friends and parents of the pupils of the Baron de Hirsch Trade School, 222 East Sixty-fourth street, New York City, attended an exhibition of the work of the scholars on Tuesday evening, January 26. The efforts of the pupils were attractively displayed and showed to good advantage what had been accomplished in the various lines during the school term just brought to a close.

The Kitchen Side of the House of Otto W. Gall Showing Porch Entrance

British Method of Laying Bricks

Practical Comments on Spreading the Mortar and Laying the Bricks—What Constitutes Good Brickwork

THERE is no craft in the building trade that looks so simple and easy to an outsider as bricklaying, yet if an amateur undertakes to lay a brick he will probably be surprised at the results as compared with his pre-conceived notions. Apart from gauged arches and ornamental carved brickwork where drawings are necessary, there is not any great amount of intricacy in setting out and executing an ordinary brick building, says F. Pelling writing in the "Building World," but a valuable asset to the bricklayer is a well-trained eye.

Spreading the Mortar

Before laying a brick it is necessary to have some knowledge of spreading the mortar. It should be spread evenly to the required thickness so that there shall be no violent knocking to set the brick in it proper position. The spreading of the mortar also finds out any extraneous lumps that would prevent the brick lying solid. The mortar should be sufficiently soft and plastic as to be easily spread with the trowel, and by its being plastic the waste of mortar will be more considerably reduced than would be the case if the mortar were short.

The bricklayer in working to the line will take up and spread about three trowelfuls of mortar in succession, as this is generally found to be sufficient at one time, or the mortar will stiffen before the bricks are laid. In getting up piers and quoins only sufficient mortar is spread to take one brick, and the brick is laid before spreading more mortar. In every case the bed is left a little hollow in the center and full at the edges, so that when the brick is tapped into position with the trowel it will lie firm. The mortar should be sufficiently soft to adhere, when drawn to the side of a brick, as a cross joint. It is necessary that the brick itself should be damp and free from dust to facilitate the adhesion of the mortar.

Qualifications as a Bricklayer

The writer on one occasion heard it said by an authority on brickwork that to see a bricklayer handling the trowel and spreading the mortar was a good guide as to his abilities at bricklaying. The manipulation of the mortar is a by no means unimportant part of bricklaying, and in reference to the cross joints, unless the same amount of mortar is applied, the face bond will be affected through the perpends not being properly kept, thus spoiling the looks of the face work and weakening the bond.

The footing courses will be the start of bricklaying in a new building, and in reference to the footings it need only be said that the courses should be perfectly level and consist of all headers.

Building the Corners

The next important item is getting up the corners, known technically as quoins. These require to be level and upright, for upon them depend the level and perpendicularity of the adjacent wall.

It should be stated that in starting to build a quoin there is a right and a wrong way to lay a brick. Some bricks have one frog, some have two frogs, and some have none at all. In the case of bricks with one frog, the frog should always be laid uppermost, although sometimes, in order to keep a thin joint, they are laid frog downward. There is, of course, no alternative with a brick having two frogs; they are a special kind of brick, and do not form the general mass of brickwork. In the case of a brick without a frog, the brick should be laid the same way as moulded. This is generally distinguished by faint lines indicating where the clay was struck off in filling the mould; but in every case where the brick is hollow on the bed the hollow side must be laid downward.

Whatever bond is used in walls over 4½ in. thick, a 2¼-in. lap should be given. This is obtained by cutting a closer to a wooden gauge the requisite width. It is always used next to the starting header; then the bond is kept right on the face by making the cross joints the same width. The dimensions of the bricks must be uniform.

Tools Necessary for the Purpose

In building the quoin the bricklayer uses a plumb rule, straightedge, and spirit level to guide him to keep the brickwork true. After the quoin is raised about 2 ft. the plumbrule is not much used only as a check for correctness. The bricklayer uses a straightedge for every second-course corner brick laid, the bottom part of the straightedge resting firmly against the plumb bricks below. Two things should be avoided in getting up corners so that the intermediate brickwork when built shall bed solidly on the quoin. Of course, this does not refer to toothings left out for another wall, to be bonded into an existing wall at a later date.

In reference to the thickness of the bed joints it may be stated that the happy medium is the best—neither too thick nor too thin. This is best obtained by measuring the height of four bricks laid dry, and then allow another inch for bed joints.

Having got the corners up about 3 ft. high, a gauge rod should be used to see that both quoins are rising correctly. It is much better and quicker

and quite as accurate as levelling; of course, it is assumed that the corners have started from the same level course. Next the intermediate part is filled in by straining a line from corner to corner. If there is much length of line it will require tingling up to keep it from sagging. To tingle a line it is best to have a plumbing place at that point where the tingle is to be fixed so as to ensure the work being kept true. When the tingle brick is laid plumb and the correct thickness of joint, a short piece of string is looped round the line and the line drawn up to the edge of the brick. The tingle is fastened on the top of the brick by a small pat of mortar, on which is placed a piece of brick to keep the tingle firm. The line should be looked through each time it is raised as to its correctness, for the truer the line the more regular the work.

Laying Bricks to the Line

In laying the bricks to the line it is necessary to have an eye on the top and bottom front edge of the brick at the same time, so that, when laid, the brick will be flush with the one beneath it and also just clear of the line; then there will be no hatching or irregularities of the face bricks, which spoils the appearance of otherwise good work.

The ideal way of laying a face brick is, after the mortar is spread, to avoid any hard knocking of the brick to get it into its proper position. In fact, the brick should be just squeezed or pressed into its bed by a slight rubbing motion, and the superfluous mortar caught on the trowel to form a cross joint for the next brick to be laid.

This buttering of the cross joint is sometimes objected to, but if, after the course is laid, the remaining part of the joint is properly flushed up, the objection is more apparent than real; it is the omission of properly flushing up each course that causes bad work.

The bricklayer always examines a brick before laying it. The reason is to see which end and face is square one with the other; also, in face work the brick is examined as to its color and freedom from chips and flaws.

Importance of "Sectional" Bond

No mention will be made of the different kinds of bond in general use, as they are too well known, but perhaps it is as well to mention an important item which is often overlooked, namely, sectional bond. No matter which bond is used on the face of the work the same bond must be kept through the thickness of the wall. In other words, sectional bond is that the transverse joints run unbroken through the wall. When sectional bond is absent, strength will be wanting. It should have been mentioned that in laying bricks as an oversailing course, whether plain or moulded, the bricklayer strains the line to the bottom front edge of bricks and not to the top. The reason for this is that it is the underside or bottom edge of the brick course that catches the eye.

A passing reference as to bats. These accumulate by handling in transit from the brick manufacturers to the job, and the proportion of bats to a given quantity of bricks will depend on the quality of the bricks themselves. It is only fair to the builder who has to pay for them that they should be used on the job, and the bricklayer, in using them with discretion as they come to hand, will not harm the work to any appreciable extent. The evil of using bats is when they are allowed to accumulate to such an extent that they become a nuisance on the scaffolding and the bricklayer uses them in one place of the wall in order to get rid of them.

In conclusion, good bricklaying may be distinguished by the regularity of the face bond; by the absence of broken bond; the levelness of the bed joints; the perpendicularity of all angles, external or internal, producing sharp, well-defined lines; and the general smoothness of the face work.

Concrete Roofs for Dwelling Houses

In reply to a builder who asked if there were any residences in California with concrete roofs and how such a roof for a dwelling should be constructed the editor of the San Francisco *Architect and Builder* offers the following comment:

"There are a number of reinforced concrete houses in California having concrete roofs, but we know of no frame dwelling with such a roof and would not recommend such construction, as the weight would be too great unless prior provision had been made in the superstructure to carry the extra load. In Los Angeles there are a number of houses with concrete tile roofs but here, too, it has been found necessary to materially strengthen the walls and rafters to carry the increased weight.

"Concrete roofs are all right for ice houses, coal sheds, chicken houses, etc., but for the average dwelling there is no better roofing than cedar or redwood shingles, or, if the house is in the mission or Spanish style, use galvanized iron, terra cotta clay tile, or felt and gravel."

In the same connection there is published the following method which a North Dakota builder used with good satisfaction in putting concrete roofs on a few of the houses he had erected:

"I cover the roof boards, which are already in place, with brown building paper, although tar paper might be better, to prevent the boards from swelling. Over this I put on an ordinary poultry netting, lapping each strip 4 inches or 5 inches and wiring them together. When I put on the concrete I take precaution to raise up the netting so that it will be embedded in the concrete nearer, of course, to the bottom than to the top.

"For the concrete I use a 1:3 mix of cement and a well-graded sand. This mortar is put on 1½ inches thick and well worked around the netting. In the valleys I use tin exposed about 3 inches or 4 inches. Over the hips and ridges I double the netting.

For very long roofs I put in double netting also, running two strips at right angles to prevent contraction cracks."

A revised edition of Specifications for the Construction of Vitrified Brick Street Pavements and Brick Highways has just been issued from the press by the National Paving Brick Manufacturers Association. These specifications have been prepared with the greatest care and consideration as to every detail of construction. The illustrations are of a most interesting and valuable nature. We understand that officials, contractors and engineers may secure a copy free of charge upon application to William P. Blair, Secretary, 830 Brotherhood of Locomotive Engineers Building, Cleveland, Ohio. To all others a charge of 25c. per copy will be made.

A Few Fastenings for Stone or Steel

How the Mechanic of the Present Day Utilizes the Devices Which Are Available for the Purpose Named

By H. M. Schember*

YEARS ago, when articles were to be fastened to a brick wall, etc., the method pursued, generally, was to drill a hole and force a wooden plug therein. After a time this plug would shrink and the work become loose and perhaps dangerous. Even today there are mechanics who still persist in using this old method, probably because the information regarding the modern expansion bolts and shields never came into their hands or was explained to them, or perhaps the first experience proved unsatisfactory and disastrous. Like everything else it must be studied as no two conditions are alike.

Concrete, brick, marble etc., can easily be drilled and the hammer and chisel method dispensed with by using a specially designed mechanical hammer known as the "Drilhammer." This tool, shown in Fig. 1, is very effective and efficient. By turning a handle it automatically strikes blows like a hammer, and the mechanical action of the tool is such that it gives rapid strokes with sufficient force to crumble the stone and drill a clean hole. They are made in two sizes and take drills in diameter from ¼ to 1¼ inches. The tools are of rugged and simple construction and of convenient size to carry in a tool kit. Extension attachments can be furnished for use in out of the ordinary positions and allows the operator to brace the Drilhammer between beams, joists or any other awkward position where it cannot be properly operated otherwise. With this extension attachment the operator stands in a natural position and therefore can work more rapidly and with better results. The Drilhammer and attachment was described at length in the issue of *The Building Age* for March, 1914.

For small, light work to be fastened to brick, marble or concrete, a two part lead composition anchor is the proper article. This anchor is used for fastening articles like bathroom fixtures, small signs, bulletin boards and telephones, as indicated in Fig. 2. Ordinary wood screws fit the anchor and when forced through cut their own thread into the lead. The holes should be drilled the same size as the outside diameter of the size anchor to be used, then the anchor should be inserted flush with the wall, the screw put through the article to be attached and screwed into the anchor as tight as possible.

On work of a medium character which requires good holding power, such as shelving, fixtures, wall cases, partitions, railings, etc., the type known as a lag screw shield, shown in Fig. 3, has proven the simplest and most effective. It is made in two parts from malleable iron. The outside has ridges which imbed itself into the brick or concrete. The inside is threaded to receive a standard lag screw and one end of the shield being thicker, as the screw approaches it expands. These shields are strong and of simple construction, easy to attach and the method of application is the same as explained on anchors except that the shields should be set well back in the hole.

Where an even expansion is required and extreme holding power is wanted, the type known as a double expansion shield, shown in Fig. 4, has proven very good and is really the original model of expansion fasteners. It requires a little more

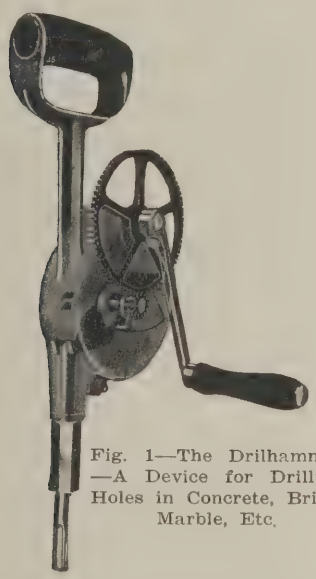


Fig. 1—The Drilhammer —A Device for Drilling Holes in Concrete, Brick, Marble, Etc.

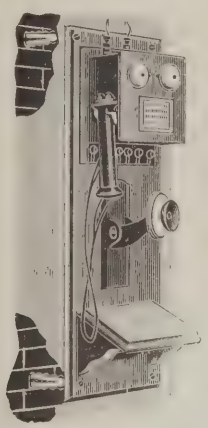


Fig. 2—Showing How a Lead Anchor Is Used

Fig. 3—A Lag Screw Shield

Fig. 4—A Double Expansion Shield

Some Fastenings for Stone or Steel

*Head of Hardware Dept., Hammacher, Schlemmer & Co.

labor and exactness, but once set will stay. It is invaluable for fastening hook, eye bolts, heavy brackets, etc., to brick or concrete walls. This type shield is used with machine bolts and consists of a center shell split into two parts and cut out wedge shape at each end with a collar top and bottom. The bottom collar is threaded on the inside and when the bolt is screwed home the wedges on the bottom and top collars force the shell apart until jammed tightly against the wall.

Sometimes articles like moulding, ornaments, etc., are to be fastened to hollow brick, a lathed wall, or a sheet steel wall, and it has proven difficult to fasten material of this style with nails or screws. Especially is this so if beams cannot be reached or are not spaced exactly. The toggle bolt shown in Fig. 5 covers this class of work admirably and is a contrivance that consists of a flat piece of iron with a hole drilled through a little off center and a bolt flattened on one end which is riveted close to the bar. When the toggle is to be inserted the bar is held parallel to the bolt and inserted into the wall. As soon as the bar is clear of the wall the heavy end falls into the hollow and the toggle is ready to fasten the work.

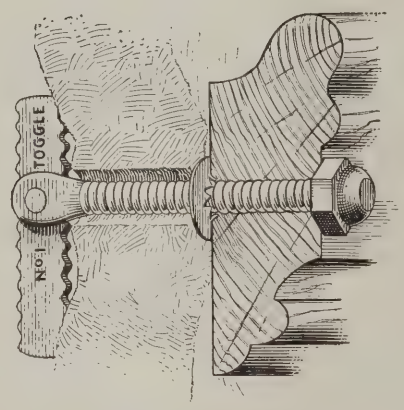


Fig. 5—Showing a Toggle Bolt and Its Use

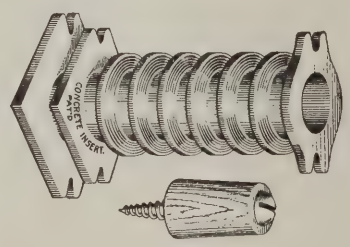


Fig. 6—General View of a Concrete Insert

Some Fastenings for Stone or Steel

In pouring concrete where the articles to be fastened are known and can accordingly be spaced and allowed for, a very good device is the concrete insert, Fig. 6, which is threaded on the inside and comes with a small wooden plug that fits in the end of the insert. The wooden plug is fastened to the form with a screw, then the insert is pressed over the plug. After the concrete has been poured and the form removed, the wooden plug comes away with the form and the insertion is ready for either a bolt or lag screw.

The fasteners, breast drills, etc., explained in this article are all time and worry savers and cover many ticklish jobs which otherwise may have been finished with some makeshift arrangement.

Building Trades Wages for 1915

We have just received from the United Board of Business Agents of the Building Trades of the Borough of Manhattan and vicinity, New York, the prevailing rate of wages in various branches of the building trades for 1915. This schedule is based on eight hours work per day, except on Saturday when work in the building trades ceases at noon.

Asbestos Workers, Boiler Felters, Pipe Coverers, Insulators	$4.75
Asbestos Workers' Helpers	3.00
Blue Stone Cutters, Flaggers, Bridge and Curb Setters	4.50
Blue Stone Cutters' Helpers	3.00
Carpenters and Framers	5.00
Cabinet Makers	5.00
Cement and Concrete Masons	5.00
Cement, Concrete and Asphalt Laborers	3.00
Decorators and Gilders	4.50
Decorative Art Glass Workers	5.00
Elevator Constructors	5.28
Elevator Constructors' Helpers	3.40
Electrical Workers	4.80
Electricians' Helpers	2.20
Electrical Fixture Workers	4.86
Engineers, Stationary	4.50
Engineers, Portable Hoisting, etc., $30.25 weekly; by the day	6.00
Engineers on Boilers, Pumps or Pile Driving Machines	$30.00 weekly
Engineers on all excavating	$30.00 weekly
Framers	5.00
House Shorers, Movers and Sheath Pilers	3.75
House Shorers' Helpers	2.65
Housesmiths and Bridgemen	5.00
Ironworkers	5.00
Ironworkers' Helpers	3.50
Ironworkers' Apprentices	3.00
Metallic Lathers	5.30
Marble Cutters and Setters	5.50
Marble Carvers	6.00
Marble Polishers	4.40
Marble Sawyers	4.65
Marble Bed Rubbers	4.95
Marble Cutters' Helpers, $3.25; Rigging and Crane Operators	3.75
Mosaic Workers	4.50
Mosaic Workers' Helpers	3.00
Machinists of all description	5.00
Paper Hangers	Price list
Plasterers' Helpers	3.25
Painters	4.00
Painter-Decorators, Painter-Stripers, Painter-Gilders	4.50
Painter-Letterer, Painter-Grainer	.50
Riggers	4.00
Roofers, Tar, Felt, Composition, Damp and Waterproofers	4.25
Rockmen and Excavators	2.50
Rock Drillers and Tool Sharpeners, open work, $3.68; tunnel	3.75
Sheet Metal Workers, Coppersmiths, Tinsmiths, Metal Roofers	5.00
Slate and Tile Roofers	5.00
Steam, Hot Water and General Pipe Fitters	5.50
Steam Fitters' Helpers	3.00
Tile Layers	5.50
Tile Layers' Helpers	3.25
Upholsterers of all descriptions	4.50
Varnishers	4.00
Wood Lathers on new work, $3.50 per M; overhauling jobs	5.00

Compensation for a practical foreman ranges from 50 cents to $1 per day over and above the schedule as shown. All recognized legal holidays and Sundays are figured at "double time."

Contract for Reinforced Concrete Buildings

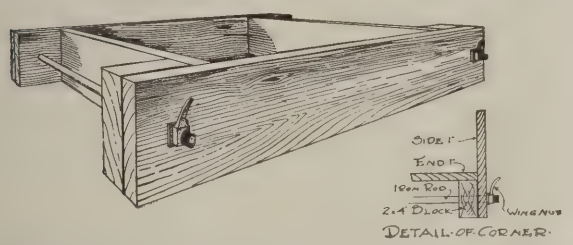
One of the results of the fire in Salem, Mass., which destroyed the greater portion of the business and manufacturing sections, is the award of the contract to the Turner Construction Company of New York City for the erection of a new $1,000,000 plant for the Naumkeg Steam Cotton Company, which had its various buildings destroyed in the conflagration which practically wiped out the city. The plant will comprise a four-story reinforced concrete building with a base area of 722 x 135 ft.; another structure of similar material covering a plot 500 x 100 ft. and six stories in hight, besides a number of small sheds and miscellaneous buildings. The plans were prepared by the architectural firm of Lockwood, Greene & Co., Boston, Mass.

Making Concrete Walks on the Farm

A Simple Method of Providing Substantial Walks from Building to Building or from the House to the Garden

By Percy H. Wilson

SOME years ago a firm of enterprising young men engaged in general contracting in a Pennsylvania town of three or four thousand inhabitants noticed that most of the streets that were little used had board sidewalks which were constantly rotting away or the ends of the boards had become loose and dangerous, warping with ex-



Making Concrete Walks on the Farm—Fig. 1—A Simple and Convenient Board "Form" or Box for Casting Concrete Slabs

posure and presenting an obstruction to pedestrians. Numerous complaints and frequent threats of suits for damages were filed with Town Council at each meeting of that body, and noting this the young contractors decided that a good opening for increasing their business was at hand. They did not intend to interfere with the professional sidewalk makers, but simply began the manufacture of concrete slabs and made it a profitable business.

A farmer who desires to have a substantial walk from building to building on the farm or from the house to the garden, can accomplish his purpose in much the same way as that here described. The method would be to make a few shallow boxes, each about 3 ft. long, 2 ft. wide and 4 or 5 in. deep. Then make a concrete composed of 1 part Portland cement, 2 parts clean sand and 4 parts gravel or crushed stone, the stone not larger than ¾ in.

To make the concrete, first thoroughly mix the cement and sand in the dry state and then add the water. The stone should also be wet and the whole mass mixed together until of mushy consistency, a consistency that would be called "sloppy." Dump the concrete into the boxes to the depth of an inch or more, puddle and work it, and then on top of this first layer of concrete place common chicken wire cut to the size of the box. Then fill the box with concrete and just before the latter had taken its final set the surface may be broomed with a circular sweeping motion to give a texture that will prevent people from slipping. The concrete may be removed from the forms or boxes in four or five days and protected from sun, wind and freezing, as the case may be, and thereafter sprinkled daily for about a week. The result will be a fine slab of indestructible, artificial stone.

Modern sidewalk practice does not always include a drained subbase, as many suppose, but on the contrary many sidewalks put down in the customary way have been successfully built by placing them directly on a compact earth surface. The farmer can lay slabs on a natural base where the soil is at all suitable. This plan means that he may make just as few or as many slabs as he has time to make, once he has procured the raw materials. He could soon fill a half-dozen 3-ft. molds and thus have 18 ft. of walk in the forms, which could be refilled the moment the first lot was removed, or at any convenient time. In brief, he would be making so much concrete lumber, which could be distributed quickly and easily, in fact in less time than would be required to put down a well-made boardwalk.

In making his walks, the farmer need not confine the dimensions of the slab to those given above. If he prefers a longer and wider slab, it can easily be made. In Fig. 1 is shown a simple type of "form" in which slabs may be conveniently cast, while Fig. 2 shows the surface texture of a concrete slab of the above dimensions.

Concrete walks of this character would not only last for all time, but could be conveniently changed to other locations or extended without the necessity of digging and filling a foundation, erecting side

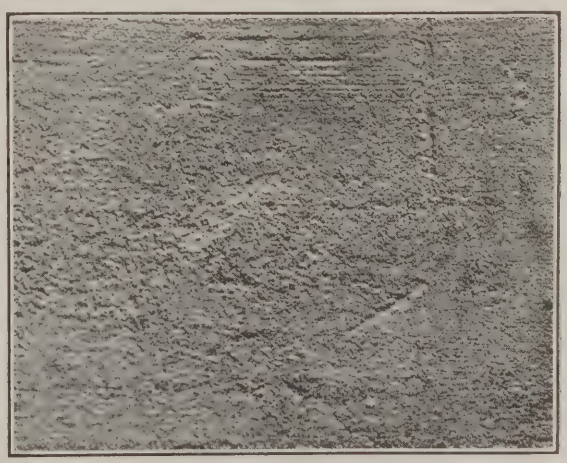


Fig. 2—View of a 2 x 3-Ft. Concrete Slab Suitable for Use in Constructing Farm Walks

forms or cutting joints. Like the concrete road, which has become a veritable boon to every farming community fortunate enough to be in touch with one, the slab walk could of itself accumulate neither mud nor dust, would grow stronger with age and exposure and contribute immensely to the comfort and convenience of its users.

Poured Concrete Houses in Australia

The construction of concrete houses of various kinds and more especially those of comparatively moderate cost by what is known as the "poured" process in connection with the use of moulds is growing in popularity in Australia. A prominent builder in Adelaide erected a large number of houses a year ago making use of a method which he developed and which has been styled the "Monolyte" process. The system is a close approach to that which Mr. Edison brought to public notice some years ago, but thus far the Australian has made use of his system only for building workingmen's cottages and structures of that class.

In the houses erected in Adelaide the walls and chimneys are monolithic while the roofs and floors are of strong construction, although floors and ceilings may be of reinforced materials if so desired. The statement is made that by the use of this system a six-room house was finished in ninety-six hours, the cost in Australia being considerably less than brick and almost as cheap as wood.

The "Monolyte" system is said to vary considerably from that practiced by other somewhat similar processes, in that the moulds are of wood with inside faces of iron and stand the full hight of the wall. The concrete is mixed dry on the ground and then conveyed by an elevator to flues above the moulds; fed with water and the wet concrete is poured into the moulds in one continuous stream until the walls are filled in.

The mixture consists of one part cement, three parts sand and six parts of ¾-in. stone screenings.

These materials are measured out, then roughly mixed and placed at the foot of the elevator which, with its endless chain buckets, lifts it to the mixing trough located above the top of the moulds. As previouly intimated the material is elevated to the mixing trough in a dry state and the water is added from a tap which is under the control of an expert concrete mixer.

The moulds are of such a nature that when taken down they may be used repeatedly for other buildings. When removed the surfaces of the walls are scratched with steel combs in order to give a key for the plaster.

The reinforcement for foundations consists of half-inch steel rods all hooked together at points and turned corners. It is stated that for the walls ⅜ in., 5/16 in. and ¼ in. rods as desired are placed 18 to 24 in. apart, both vertically and horizontally and wired together at all intersections. These are put together on the ground and lifted bodily into position in the center of the mould space. They are held in place by distancing pieces of the wire at necessary intervals. The houses are plastered on the inside and "rough cast" on the outside.

Hollow Building Tile Makers' Association

Many of the larger concerns interested in the manufacture of hollow building tile have recently formed an organization known as the Hollow Building Tile Manufacturers' Association with permanent headquarters in Cleveland, Ohio. We understand that the product of the manufacturers interested represents between 2,000,000 and 3,000,000 tons of hollow building tile. The object of the new organization is to embrace the entire country as well as Canada, bringing into closer relationship all makers of hollow tile and through this means effecting an improvement in the conditions governing the manufacture, sale and use of fireproofing materials.

The officers elected for the ensuing year include the following:

President—J. A. Maahs, who is secretary, treasurer and general manager of the Pennsylvania Fireproofing Company.

Vice-President—W. C. Denison, who is president of the Ohio Clay Company.

Treasurer—R. E. Whitacre, who is president of the Whitacre Fireproofing Company.

Secretary—J. W. Rollinson, who is resident manager of the National Fireproofing Company.

St. Louis Sheet Metal Contractors' Association Elect Officers

At the meeting of the Sheet Metal Contractors' Association of St. Louis, Mo., held in December, officers for the ensuing year were elected as follows:

President.....R. E. Mackey
Vice-President.....E. B. Langenberg
Treasurer.....John Clemens
Secretary.....Otto E. Cluss

The officials were duly installed on January 9 on the occasion of the annual banquet, held at the Planters' Hotel, which was a most enjoyable affair.

Building Operations in Montreal, Canada

According to figures compiled by R. L. Werry, secretary of The Builders' Exchange, Montreal, Canada, the total number of permits issued for building operations in that city during the eleven months ending November 30, 1914, was 3,485, involving an outlay of $17,277,311. For the corresponding period in 1913 there were 3,552 permits issued calling for an expenditure of $25,723,867.

In discussing the situation Mr. Werry referred to the stagnation existing, pointing out that the war had eliminated almost all speculative building. As illustrating this point it may be stated that in November last permits were issued for buildings estimated to cost $364,000, while in November, 1913, the total was $4,000,000.

The New York State College of Forestry at Syracuse University announces the establishment of an Eastern Forest products laboratory to be located in the State Forestry Building, which is expected to be ready for occupancy in the summer of 1915. In the State Forestry Building there will be nearly 14,000 sq. ft. given up to experimental laboratories outside of laboratories especially intended for educational work of the students.

Portable Houses for the War Zone

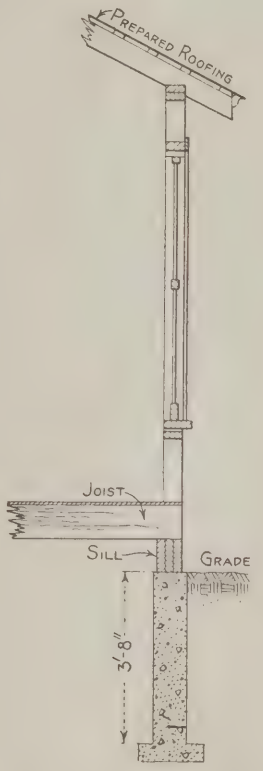
Drawings Showing a Typical Building Intended for Housing Soldiers of One of the Belligerent Nations

A SHORT time ago it was announced in the daily press that among the many orders which had been placed by belligerent nations for all kinds of American products was one for 600 portable houses for shipment to the war zone. Each house was to be 20 x 60 ft. in size and contain a single room, well lighted on all sides and with two doors at both front and rear. This order we are privileged to state was secured by the North American Construction Company, Bay City, Mich., which furnishes us with the particulars which follow relative to the construction of the houses in question.

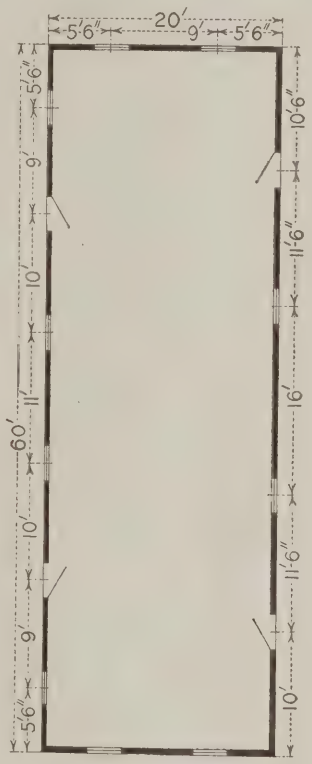
All side walls were covered with sheathing lumber over which was placed heavy building paper and this in turn covered with bevel siding, thus insuring warmth and strength. Each house was lined throughout with what is known as "Aladdin" plaster board which is made from details and specifications furnished by the concern. The roofs were covered with prepared roofing.

All the material for the houses was shipped, cut to fit and ready to nail in place, this including all nails, hardware, hinges, locks, glass and everything in proper lengths and sizes. Included in the outfit was a complete warm-air heating system. The elevations presented herewith indicate the general style of construction while the sectional view indicates some of the details.

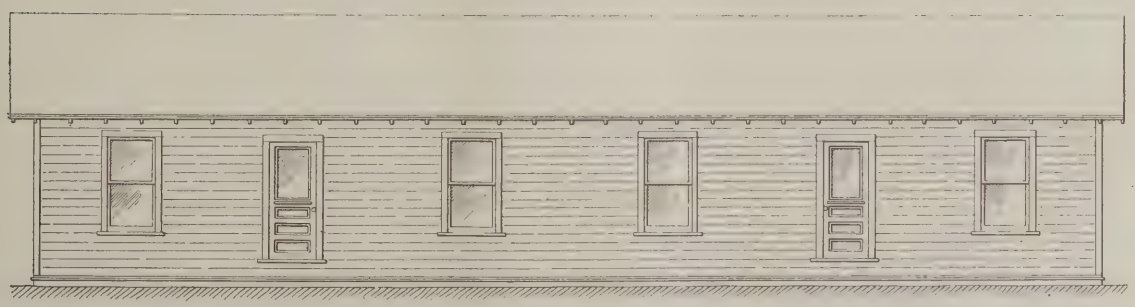
Left End Elevation.—Scale ⅛ In. to the Foot



Section Through Main Wall.—Scale ¼ In. to the Foot



Floor Plan.—Scale 1/16 In. to the Foot



Front Elevation Showing Position of Windows and Doors.—Scale 3/32 In. to the Foot

Portable Houses for the War Zone.—Plan, Elevations and Section

The trustees of the Cathedral of St. John the Divine, for many years past in process of construction on Cathedral Heights, New York City, have recently signed a contract with Cram & Ferguson, architects, for designs for the nave, the building of which will call for an expenditure of $1,000,000.

New Publications

The Book of Little Houses. Size, 4½ x 6¾ in.; 107 pages. Numerous illustrations. Bound in board covers. Published by The Macmillan Company. Price, 50 cents.

As indicated by its title houses of moderate cost are the subjects considered. Various types of dwelling are illustrated and described, the illustrations consisting of floor plans and a reproduction from a photograph of the exterior. In the description the author tells what ought to be the arrangement and equipment of a comfortable little home and in summing up says: "The intending house builder must use the best possible materials as an economy; must build a house in which work can be done easily, in which his children can grow up but not out of it, and in which his family will be safe. Such a house will cost money and much thought and the one accomplishes little without the other." In conclusion the sleeping porch is given a chapter and the author describes it "as it should be."

Specifications for Stucco "Stipple-Finish"

The question often arises on the part of the builder who is making use of stucco work in the exterior treatment of houses which he may have under construction as to the proper proportions of mixture to use in order to give the most satisfactory results. Complaint is often made that some time after the stucco has been applied there appears in the exterior surface hair-line cracks which soon develop into ugly fissures that seriously mar the appearance of the work and tend to bring it more or less into disrepute. The builder is naturally anxious to avoid any such contingency and to do work that will prove pleasing to his clients and redound to his own advantage as a contractor. For the purpose therefore of assisting him in making proper use of stucco as the outside covering of buildings the Sandusky Portland Cement Company has issued Specifications for white Portland cement stucco, fine stipple-finish, upon brick, stone, hollow tile, metal lath or concrete, which cannot fail to prove of wide interest. The point is made that the base upon which the stucco is to be applied must be rough, thoroughly wetted and still moist when each coat of plaster is applied.

The scratch coat should consist of one part of an approved Portland cement and three parts clean sharp sand.

The ground coat should be not less than three-eighths of an inch thick and should consist of one part of Medusa waterproofed white Portland cement and two parts of Tuckahoe (or equal) fine crushed marble.

The finish coat should be one-quarter of an inch thick and of the same proportions as the ground coat. The mixture should be applied before the final set of the previous coat so as to insure a perfect bond. The stipple should be evenly done with a whisk broom when sufficiently set to obtain a uniform surface.

Where two-coat work is desired the ground or finish coat should be ½ in. thick. The work must be thoroughly wetted with clean water at least twice each day for a period of one week.

On giving the work a "rough-dash finish" the first two coats should be the same as for fine stipple above noted. For the finish coat the mixture should consist of one part of Medusa waterproofed white Portland cement and two parts Tuckahoe (or equal) crushed marble, passing through ⅛ and stopping on a 24-mesh sieve. The material should be mixed wet and dashed on evenly with a wood paddle or stiff brush.

The work should be kept wet as mentioned in connection with the fine stipple work.

Building Construction in Washington, D. C.

According to the report rendered to Congress by the builders of the District of Columbia covering the year ending June 30, 1914, the estimated value of building construction including repairs during the year, but not including buildings under construction by the United States government, was $9,544,-302. This represents a decrease of $699,446 as compared with the preceding year. The number of dwelling houses constructed was 1161, a decrease of 397 under the preceding year and the number of business buildings constructed was 301, an increase of 5 over the preceding year. There were 34 apartment houses erected as against 14 the previous year and there were 4019 buildings repaired.

It is estimated that there are 6104 brick buildings and 26,089 frame buildings in the District of Columbia, of which number 1214 brick and 248 frame buildings were constructed during the year.

Cleaning Sandstone or Limestone Fronts

A builder down in Georgia desirous of ascertaining how limestone or sandstone fronts are cleaned, wrote to *The Painters' Magazine* for the information and received the following in reply. "If the surface is stained with dirt and soot clean this off by applying a strong solution of caustic soda or soda ash with long handle fiber brushes, letting this remain about fifteen or twenty minutes, then rinse with clear water, using a hose when possible, otherwise a large sponge. If the front is water-stained use rubbing brick, pumice stone or sandstone of fine grain with water in which oxalic acid has been dissolved. One pound of oxalic acid to one pail of soft water is sufficient. After doing this sponge off with clear water."

Mid-West Cement Show

The ninth annual Mid-West Cement Show will be held in the auditorium of Omaha, Nebr., March 2 to 6 inclusive under the auspices of the Mid-West Cement Users Association. During the Show the association will hold its convention as will also several other building trades associations. The secretary is Frank Whipperman, 28th avenue and Sahler street, Omaha, Neb.

William H. Davis, a retired stair builder, died January 5, at his home in Brooklyn, N. Y., at the age of 78 years.

Current News of Builders Exchanges

Holiday Festivities—Annual Meetings—Elections of Officers—Campaign to Increase Membership and Promote Foreign Trade

Annual "Smoker" of the New Orleans Contractors' and Dealers' Exchange

THERE were some things in the nature of a surprise which were not on the program at the annual smoker of the Contractors' and Dealers' Exchange of New Orleans, La., which was held on Monday evening, December 21. After J. H. Aitken, master of ceremonies, had introduced the new officers, Herman H. Thomas, president, whose likeness is here shown; Allen Tupper, vice-president, and James M. McGowan, treasurer, he commanded the directors to stand up. These, seated in a row, suddenly leaped to their feet with all sorts of contortions and evidences of astonishment on their faces. When the audience, which, by the way, was a large one and included a number of guests, saw that the directors had been made the victims of a current of electricity from wires running underneath their chairs, there was a roar of laughter and the joke was greatly appreciated. The current of electricity was, of course, perfectly harmless and only of sufficient strength to give a slight shock. The master of ceremonies, however, did not escape punishment, for when he had finished his pleasant little speech and sat down he hurriedly rose again for the reason that the wire had been extended to his own chair.

Prest. Herman H. Thomas

President Walter F. Jahncke's annual report gave a résumé of important events during the year, mentioning the co-operation received from the architects, contractors and building material dealers.

Secretary R. L. McChesney read the annual reports of the various committees, all of which gave encouraging accounts of the work accomplished during the year.

Mr. Aitken, as chairman of the Membership Committee, reported 258 names on the roster, an increase of 116 in the year. Financially the organization is in a flourishing condition.

Mr. Aitken, on behalf of the members, presented the retiring president, Walter F. Jahncke, with a beautiful gold-headed cane, which Mr. Jahncke accepted with words of appreciation, although he said that his work had been done for the good of the Exchange, and he did not expect any reward.

After the formal exercises there were music and vaudeville features and refreshments were served. The Exchange room was handsomely decorated with moss and plants and electric lights and fine American Beauty roses were in vases on the president's table.

"Christmas Party" at St. Paul Exchange

The members of the Builders' Exchange at St. Paul, Minn., spent a very enjoyable evening on the occasion of the Christmas party which was given in the rooms of the organization on December 18. There were nearly 240 present in the large meeting room, where a beautiful Christmas tree appropriately decorated and electric lighted had been erected.

Retiring President F. J. Romer welcomed the guests in a few well-chosen words, speaking of the spirit of the season and how it should prevail throughout the length and breadth of the land at all times. He was followed by President-elect A. P. Cameron, who expressed his appreciation of the honor paid him and asked for the co-operation of all. Mr. Romer was then presented with a handsome black leather satchel and the hope expressed that his days might be many and happy, and that the Exchange might always have the benefit of his advice and counsel.

The various new officials were then duly installed with appropriate ceremonies and more or less humorous comments. After this had been accomplished, valuable assistance being rendered by Charles E. Villaume, who was designated as "Officer 666," the chairman of each of the various committees was taken in hand and duly installed. After this titles and medals were conferred upon various members, each of whom was decorated with a badge showing his title. Then followed the presentation of prizes to the members of the athletic association. This being accomplished, the grand distribution for all present occurred, this consisting of regulation Christmas stockings properly filled with all sorts of good things.

The committee of arrangements was composed of Charles E. Villaume, Joseph Thomas, Robert Beler, C. R. Smith and W. J. Gross, while Secretary A. V. Williams was active in promoting good fellowship and seeing that everything went along smoothly.

Annual Meeting of Nashville Builders' Exchange

At the sixth annual meeting of the Builders' Exchange of Nashville, Tenn., the following officers were elected for the ensuing year:

President.....James A. Daugherty
First Vice President.....J. W. Patrick
Second Vice-President.....Joseph H. Peter
Treasurer.....W. H. Holt.
Secretary.....H. L. Parish

It is interesting to state that Mr. Daugherty was formerly secretary of the organization and that Mr. Parish was re-elected first vice-president. We understand that the exchange now has a membership of 125.

Thirty Years for the Chicago Builders' Exchange

The Builders' and Traders' Exchange of Chicago, Ill., has just issued its thirtieth annual official directory, a volume eclipsing all previous issues by a wide margin in many ways. The publication is a handsome 332-page book, bound in substantial cloth. It contains the following valuable fund of information to every member of the organization: Constitution and by-laws; alphabetical list and business classification of exchange members; rules of measurement for mason work; list of Chicago architects, list of members of other associations; various working agreements; full details of the Chicago building ordinance; mechanics' lien law; gas fitters' rules. In the front of the directory is a complete list of all officers since the exchange's formation in 1884. Officers for 1914, directors and standing committees are paged separately. Photographs of the executives are also included.

In his message to the members President John D. Corlett says:

"When we look back into past years and contemplate the roster of honored builders who were members of this Exchange, some of whom have gone to the unknown, we see many vast monuments to their honesty and integrity, and their proficiency in building for the future. Truly this Exchange can be proud of its founders, many of whom are still on the roll of membership and are the most prominent builders in the country.

"Today, as in the past, the Exchange stands for the benefit and interest of its members and the building industry in general. For years has it forged its way ahead, overcoming obstacles and paving the way to success, and today it stands stronger than ever, ready at all times to take up the cause of those engaged in building.

"Thirty years in itself is a lifetime, and the Exchange has seen many changes in the methods of construction and building; has seen the coming and going of many industries, but has ever kept abreast of the times, looking for advancement and new ideas.

"To those who are not members of this Exchange we point with pride to our record of thirty years and assure them that the same reasons for success are still being offered. Clean, pleasant quarters; adequate telephone service; free stationery; private figuring rooms; a complete list of Chicago architects; the working agreements of the different labor unions, and in our library will be found the best and latest literature and magazines pertaining to the building interests, also the daily building permits."

Annual Meeting of Fargo Builders' Exchange

The members of the Builders' and Traders' Exchange at Fargo, North Dakota, held their annual meeting January 7, when officers were chosen as follows:

President ..... H. Boerth
1st Vice-President ..... Harry Nolin
2nd Vice-President ..... Thos. Greenshields
Secretary ..... Victor H. Leeby
Treasurer ..... Thos. L. Sykes
Sergeant-at-Arms ..... Fred Bristol

The secretary presented a report showing the volume of business which passed through his office during the year 1914. The approximate value of buildings erected in Fargo exclusive of residence work amounted to $606,000 while the approximate value of residences erected was $360,000. The approximate value of buildings erected in the State of North Dakota, for which plans were exhibited in the offices of the Builders' Exchange and not included in the above figures, was $1,040,685. There were 76 plans filed in the offices during the year exclusive of residence work, and only four contracts for buildings erected in North Dakota were awarded to contractors residing in other states.

The present membership of the Exchange consists of 33 local and 47 non-resident members. During the past year 13 new members were added to the rolls. The prospects for a number of additions to the membership are excellent and it is hoped that the roster will show 100 members by the close of 1915.

Officers of Chicago Masons & Builders' Association

The annual meeting of the Chicago Masons' and Builders' Association took place in the Chamber of Commerce building on January 6, at which time the following officers were elected for service during 1915:

President ..... W. S. Joslyn
Vice-Pres ..... Robert Mole
Secretary ..... Fred Klippel
Treasurer ..... F. A. Siebold

There were also five directors elected for the ensuing year, and an Arbitration Committee consisting of two members.

Washington Builders' and Manufacturers' Exchange

The membership committee of the Builders' and Manufacturers' Exchange, 1220 New York avenue, N. W., Washington, D. C., and of which R. B. Cummings is chairman, has recently been reorganized for the purpose of inaugurating a campaign during January and February for the purpose of increasing the membership. It is the hope to add 75 new members during these two months, which will bring the names on the roster up to approximately 250.

Secretary Charles E. Welsh has just completed a compilation of an attractive classified list and telephone directory of the membership of the Exchange which is being distributed among builders, architects, real estate offices, and, in fact, among all those likely to be interested in any way in building in Washington and nearby cities. Secretary Welsh was in attendance at the recent conference of Secretaries of Builders' Exchanges held at Dayton, and also attended the convention of the National Association of Builders' Exchanges held in Columbus the latter part of January.

Realizing the opportunities for American commerce in South America and knowing that a knowledge of the Spanish language is a necessary part of the equipment to anyone who contemplates going to South America for business purposes, the Exchange, on January 4, established classes for the study of Spanish. Each member of the Exchange is entitled to one scholarship without cost and with no restriction as to the disposition to be made of it. S. J. Macfarren, who resided for five years in Mexico and South America, has charge of the Spanish classes. Sessions are held the first, third and fourth Mondays and the second Tuesdays of each month at 8 P. M. in the hall of the Exchange at the address given above.

Chicago Carpenters' Association Elects Officers

The annual meeting of the Chicago Carpenter Contractors' Association held in the Chamber of Commerce Building on Wednesday, January 6, was the occasion of a most enjoyable time. When officers had been elected the members sat down to well-filled tables which literally "groaned" under the weight of a variety of inviting comestibles. When the dinner progressed many old friendships were renewed while delightful strains of music were rendered by an orchestra.

The regular ballot was uncontested, and the nominees were elected as follows:

President ..... L. A. Ashbeck
Vice-Pres ..... J. P. O'Connor
Secretary ..... Frank C. Haeger
Treasurer ..... Harry Homewood

There were six members elected to the Board of Directors for a term of two years and one member for a term of one year. A Board of Arbitration consists of two members.

Officers of Minneapolis Builders' Exchange

At the annual meeting of the Builders' Exchange of Minneapolis, Minn., held on January 5, the following officers were chosen for the ensuing year:

President ..... Maurice Schumacher
Vice-President ..... John McDonald
2nd Vice-President ..... William Penn
Secretary ..... Eugene Young
Treasurer ..... C. F. Splady

In his anual address President Schumacher reviewed the work of the year and offered a number of suggestions which were very favorably received. Secretary Young presented his report which contained a number of interesting statistics and showed that the present membership was 283.

Annual Meeting of Birmingham Builders' Exchange

The annual meeting of The Builders' Exchange of Birmingham, Ala., occurred on January 11, when the following officers were chosen:

President ..... J. A. Millson
First Vice-president ..... W. A. Currie
Second Vice-president ..... James R. Payne
Treasurer ..... J. H. Eddy
Secretary ..... G. T. Stafford

There were also 14 directors chosen representing various branches of the building trades. The new officers and directors were installed on the 18th of January, at which time the retiring board served a buffet supper to the membership.

Members of the Detroit Exchange Celebrate

Members of the Builders' and Traders' Exchange of Detroit, Mich., laid aside business cares Thursday noon, December 24, and gathered in the quarters of the organization in the Penobscot Building to enjoy their annual Christmas celebration. Several addresses were made, numerous features of entertainment were provided, there were good things to eat and drink, and the occasion was one of social good cheer and fellowship.

Annual Review of Building Situation

Figures Showing Building Activities in Various Sections of the Country in 1914 as Compared with 1913

NOTWITHSTANDING the extremely conservative attitude of capital during the second half of the year just closed and the heavy falling off month by month of building operations during that period, the showing for 1914 is not as unsatisfactory when contrasted with the twelve months of the year before, as might naturally be expected. Reports which are available from 114 cities of the country show that the building improvements for which permits were issued last year were estimated to cost $734,557,047, while in 1913 the total was $792,361818, a falling off of only 7.29 per cent. Of the cities reportng, 60 showed ncreases and 54 decreases as compared with the year before.

For the sake of convenience in comparison we have divided the country into four sections and shall first consider the figures of some of the cities in the eastern states. Taking the 52 cities reporting we find that 25 showed increases and 27 decreases, with a loss as compared with 1913 of 11.35 per cent. The first of the tables presented herewith shows the estimated cost of the building improvements projected in each city.

Building in Greater New York

It will be seen from an inspection of the figures that a goodly portion of the decreased total for the past year in the Eastern zone was due to the heavy shrinkage of operations in the Borough of Manhattan, New York City, where 5122 permits were issued for improvements estimated to cost $56,353,871, while in 1913 there were 5223 permits issued for improvements estimated to cost $85,403,254. This shrinkage was felt more particularly in hotels, office buildings, stores and tenement houses. In the case of lofts, stores, etc., there were 34 planned in 1914 to cost $8,828,000, while in 1913 there were 46 such buildings planned to cost $13,228,000. There were 14 office buildings planned last year to cost $7,190,000, while in 1913 there were 20 planned to cost $19,790,000. In the case of tenement houses, which according to the interpretation of the New York Building Law is any structure housing three or more families, permits were issued for 133 costing $18,916,000; whereas in 1913 there were 158 buildings of this class planned to cost $22,267,200. In the way of places of amusement etc., 30 were planned last year to cost $1,739,000, while in 1913 there were 100 for which permits were issued estimated to cost $6,321,875. In the Bronx there was a heavy falling off, permits issued last year having been 3642 calling for an outlay of $17,676,370, while in 1913 permits were issued for 4120 buildings costing $21,701,453. In Brooklyn there was an appreciable increase in the value of building improvements and also in the number of permits issued. The latter were 11,445 involving an estimated outlay of $41,872,307, while in 1913 there were 10,962 permits issued for buildings to cost $34,762,506. In the Borough of Queens the activity last year was a little ahead of 1913, while in the Borough of Richmond there was a slight falling off.

Other Eastern Cities

In the city of Binghamton there were 1617 permits issued last year for buildings to cost $2,225,196, but these are not shown in the table presented herewith. A noticeable feature of the operations in Buffalo during 1914 was the fact that the work was scattered all over the city and none of the operations was of an unusual character. The high water mark in building operations in the city was reached in 1913. In New Haven the amount of building was the smallest in the last 5 years; while in the case of New London the figures surpassed all previous records. This was due to a number of large projects which were undertaken, such as the Plant Building, the Masonic Temple and buildings for the Connecticut College for Women, Erie, Pa., showed the largest building gain in its history last year. Increases in Pittsburgh were due, to a large extent, to the erection of the Masonic Temple, the Rosenbaum Department Store, the William Pitt Hotel, the Pennsylvania Railroad Station on the north side and the Schenley High School building.

CITIES IN EASTERN STATES

	1914		1913	
	Permits	Value	Permits	Value
Albany	3,307	$6,165,736	3,842	$9,272,410
Altoona, Pa.	....	1,077,725	....	1,016,430
Boston	....	24,325,340	....	17,463,330
Beverly	....	411,210	....	492,210
Bridgeport	1,032	3,734,474	....	2,951,647
Bristol, Ct.	....	269,328	....	416,813
Buffalo	3,979	10,709,000	3,977	13,109,380
East Orange	....	1,763,586	....	1,713,580
Erie	1,556	2,766,160	1,434	2,575,929
Fitchburg	331	659,986	286	680,563
Hartford	1,025	4,058,281	1,169	5,785,526
Haverhill	....	1,149,935	....	1,015,115
Harrisburg	572	1,269,500	....	1,467,040
Ithaca	....	1,104,987	....	740,000
Irvington, N. Y.	260	724,500	....	1,266,853
Jersey City	1,174	3,802,515	1,232	5,414,600
Lawrence, Mass.	236	1,306,295	258	869,229
Lancaster	388	689,956	341	688,629
Lynn, Mass.	310	1,736,555	383	1,500,968
Manchester	957	1,586,347	1,035	1,652,889
Montclair, N. J.	....	1,647,294	....	1,202,024
Newark	2,117	10,080,587	3,075	16,317,973
New Bedford	1,062	3,039,736	1,245	3,067,700
New Britain, Ct.	....	1,213,840	....	1,071,825
New Haven	1,136	4,379,842	1,100	4,790,151
New London	144	1,311,800	145	600,400
New York City:				
Manhattan	5,122	56,353,871	5,323	85,403,254
Bronx	3,642	17,676,370	4,120	21,701,453
Brooklyn	11,445	41,872,307	10,962	34,762,506
Queens	4,787	18,475,063	4,646	17,521,235
Richmond	....	2,272,758	....	3,377,099
Niagara Falls	....	1,219,062	....	1,355,821
Norwich, Ct.	....	512,527	....	671,350
Oneonta, N. Y.	....	423,250	....	354,900
Patterson	....	1,544,035	....	1,480,666
Philadelphia	....	35,419,605	....	38,763,850
Pittsburgh	3,522	18,144,672	3,455	15,570,905
Providence	....	7,501,000	....	7,128,800
Pawtucket, R. I.	....	1,148,977	....	1,134,000
Quincy, Mass.	835	1,417,443	685	1,158,220
Reading, Pa.	470	1,148,850	418	848,850
Rochester	....	8,733,257	....	9,642,124
Schenectady	....	1,537,403	....	5,156,955
Scranton	....	1,769,163	....	1,413,560
Stamford	489	1,612,621	477	1,305,000
Syracuse	....	3,412,184	....	5,200,768
Utica, N. Y.	....	1,786,580	....	4,452,947
Waterbury, Ct.	....	1,785,800	....	1,945,285
Wilkesbarre	1,014	1,143,238	554	1,922,348
Willimantic, Ct.	....	135,450	....	251,450
Worcester	....	5,567,477	....	4,902,613
York, Pa.	500	434,824	....	634,510

Coming now to the cities in the central portion of the country there are 34 reporting, and strange to say, the increases and decreases are equally divided; there being 17 of each. The loss for this section is slight being only 2.28 per cent. It is not strange that Chicago should show a lessened activity in building operations last year as contrasted with the year before as the brick strike which occurred in the Spring had an important bearing on the outcome. On the other hand, Cleveland shows an appreciable gain last year over the year before, this being due to important increases in the cost of public buildings, manufacturing plants and big apartment houses. Of the latter 325 permits were issued, call-

ing for an outlay of $4,306,000 as against 197 in 1913 costing $2,333,200. Of frame dwellings 2630 were planned last year to cost $8,262,910, while in 1913 permits were taken out for 2455 to cost $7,112,260. The class of buildings in which there was a heavy shrinkage was stores, the estimated cost of which last year was $1,237,100 as against $3,147,900 in 1913. With the exception of 1911, the year just closed was the most active in the building line that South Bend, Ind., has ever experienced. St. Paul showed an appreciable increase in operations as did Minneapolis and Columbus. The decrease in Dayton was not unnatural in view of the tremendous activity in building which followed the floods which wiped out so much of the city.

CITIES IN THE MIDDLE STATES

	1914		1913	
	Permits	Value	Permits	Value
Akron	....	$4,030,015	....	$5,243,315
Canton	....	1,409,245	....	1,006,025
Cedar Rapids	....	3,523,650	....	4,229,600
Chicago	....	83,261,710	....	89,668,427
Cincinnati	....	8,820,749	....	8,318,322
Cleveland	12,790	27,309,010	11,064	23,841,160
Columbus	....	6,885,065	....	5,508,408
Coshocton	....	118,765	....	5,700
Dayton	859	2,642,596	1,485	5,060,639
Des Moines	....	1,937,144	....	1,755,759
Detroit	....	28,427,140	....	30,434,380
Duluth	1,790	2,853,062	....	4,026,011
Evansville	1,388	1,331,186	....	1,786,503
Ft. Wayne	....	2,347,885	....	2,273,597
Grand Rapids	....	3,618,119	....	4,269,000
Indianapolis	5,693	7,933,552	5,400	9,301,973
Lincoln	459	1,006,187	491	1,678,350
Kansas City	....	10,204,970	....	10,579,162
Little Rock	....	1,503,173	....	1,333,323
Madison, Wis.	....	1,327,710	....	1,372,282
Milwaukee	....	10,442,519	....	13,590,084
Minneapolis	....	15,214,525	....	12,587,935
Omaha	....	4,610,456	....	4,110,733
Peoria	....	2,889,161	....	2,229,178
St. Joseph	....	627,574	....	876,003
South Bend	....	1,186,971	....	853,689
St. Louis	....	12,941,804	....	15,082,446
St. Paul	....	14,720,713	....	9,454,847
Sioux City	....	1,975,102	....	2,056,072
Springfield	....	1,056,320	....	804,014
Toledo	....	6,056,800	....	5,765,338
Topeka	....	547,280	....	928,767
Wheeling	....	1,128,535	....	530,535
Youngstown	....	3,051,418	....	2,849,006

In the case of the Southern section of the country from which there are reports concerning 20 cities we find a shrinkage last year of 6.29 per cent. as compared with the year before. There were 12 cities showing an increase and 8 a decrease. Among the important increases Baltimore stands prominent; the amount of building being the greatest of any year in the history of the city with the single exception of that following the great fire of 1904. The total shown does not include any costly skyscrapers or big hotels as none were erected; but the total is made up chiefly of manufacturing and building structures and dwellings. The important increase in the case of Wilmington, Del., was due to the permit for the new County and City Building estimated to cost $1,250,000. A feature of the 1914 building operations in Louisville, Ky., was the comparatively large number of structures ranging in cost from $20,000 to $130,000. The largest permit issued during the year was that for the new high school building to cost $158,000.

CITIES IN THE SOUTHERN STATES

	1914		1913	
	Permits	Value	Permits	Value
Atlanta	....	$4,564,387	....	$5,110,325
Baltimore	....	16,308,299	....	14,053,802
Birmingham	....	3,043,374	....	6,492,735
Chattanooga	....	1,056,077	....	1,037,080
Dallas	....	5,093,497	....	8,480,580
Galveston	1,315	1,526,140	855	1,488,779
Houston	....	3,803,049	....	5,432,265
Louisville	2,359	4,396,380	2,426	4,054,280
Mobile	221	573,135	186	607,145
Nashville	....	1,971,401	....	1,666,602
New Orleans	....	2,948,751	....	3,863,083
Oklahoma	....	1,972,442	....	174,727
Petersburg, Va.	....	1,647,295	....	1,202,025
Richmond, Va.	....	3,391,571	....	3,636,476
Shreveport	....	1,270,478	....	1,252,590
San Antonio	2,336	2,840,132	....	2,162,982
Tulsa, Okla.	....	1,546,550	....	1,517,119
Washington	....	7,655,660	....	9,272,156
Wilmington, Del.	577	2,519,443	701	1,832,852
Wilmington, N. C.	....	1,085,000	....	825,830

Taking some of the leading cities of the extreme West and the Pacific slope there is an indicated loss of 6.11 per cent. as compared with 1913. The increases in Denver's figures is due to no particular class of structure as the million dollar gain was distributed over practically every character of building construction. While the figures for Salt Lake City show no large permits to have been issued during 1914 the record made is regarded as very satisfactory, as it indicates a more normal growth of the city than has been shown for several years. Most of the permits called for modern homes ranging in cost from $2500 to $10,000. In San Francisco the conditions are regarded as fairly satisfactory when it is remembered that building activities incident to the Panama-Pacific Exposition have ceased. Last year there were 1920 permits for frame buildings to cost $6,697,723 and 157 for class "C" to cost $4,495,038. In Seattle a trifle less number of permits was taken out last year than the year before, but there is an appreciable increase in the amount of capital involved. The big gain was due to the value of a number of fireproof and semi-fireproof buildings and to the construction of churches, hospitals, theatres and other buildings of semi-public and public nature. There was, however, a less number of dwellings built, the permits taken out being 1737, calling for an outlay of $2,800,565, while in 1913 the total valuation of this class of work was $3,247,500.

CITIES IN THE EXTREME WESTERN STATES

	1914		1913	
	Permits	Value	Permits	Value
Eureka, Cal.	116	$253,224	102	$188,735
Denver	....	3,750,460	....	2,797,148
Los Angeles	9,979	17,361,925	16,442	31,641,921
Ogden	279	840,680	....	805,670
Salt Lake City	1,050	2,982,337	779	2,155,860
San Francisco	5,907	28,177,563	5,606	21,037,264
Seattle	9,104	12,664,970	9,597	9,321,115
Spokane	....	982,227	....	3,429,235

All things considered, the outlook for 1915 is regarded as fairly promising by architects, contractors and others connected with the building and allied industries.

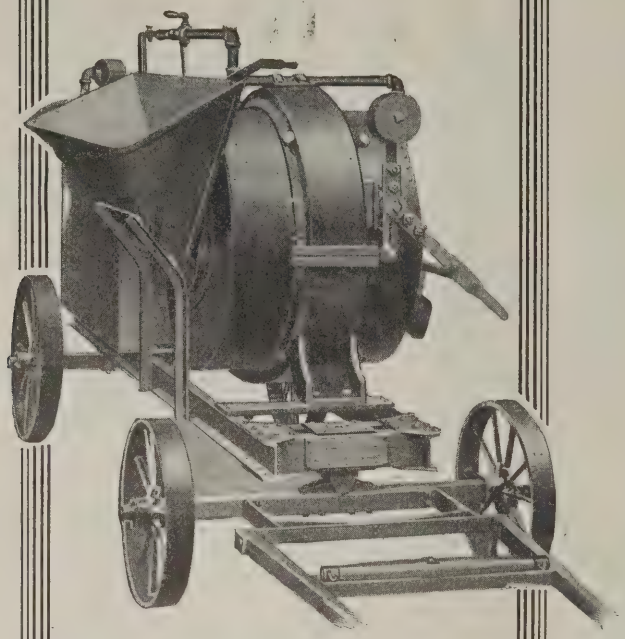
A New 11-Story Commercial Building

If present plans are carried to completion a new 11-story business building will rise on the site of the one-time Café de l'Opera, located just below the corner of Broadway and Forty-second street and running through to Seventh avenue, New York City. The new building will have a ground area of 11,250 sq. ft. with a frontage on Broadway of 92 ft., on Seventh avenue of 109 ft., and on the north side it will have a depth of 99 ft., and on the south side 124 ft. It will be in Italian renaissance style of architecture with a facade of Indiana limestone.

The site upon which the new building will rise has a rather interesting history. Many years ago it was occupied by the Rossmore Hotel which in its day ranked as one of the finest hostelries in the country. Afterward the name was changed to the Saranac Hotel which was closed during the panic of 1907, and after several years of unoccupancy, the Café de l'Opera Company was formed and Henri Pruger of London and Paris came over to take the management. It had, however, a comparatively short career and later it was occupied as the Café Martin. The occupants of the new building will be Brokaw Brothers.

Metal Lath by Weight

At a recent meeting of the Associated Metal Lath Manufacturers, Youngstown, O., a resolution was passed to the effect that in the future all metal lath would be designated alone by weight, and in a Metal Lath Hand Book now on the press the Association recommends that in all Specifications metal lath be required to be painted, if not galvanized, and to weigh not less than 3⅜ lbs. per sq. yd.

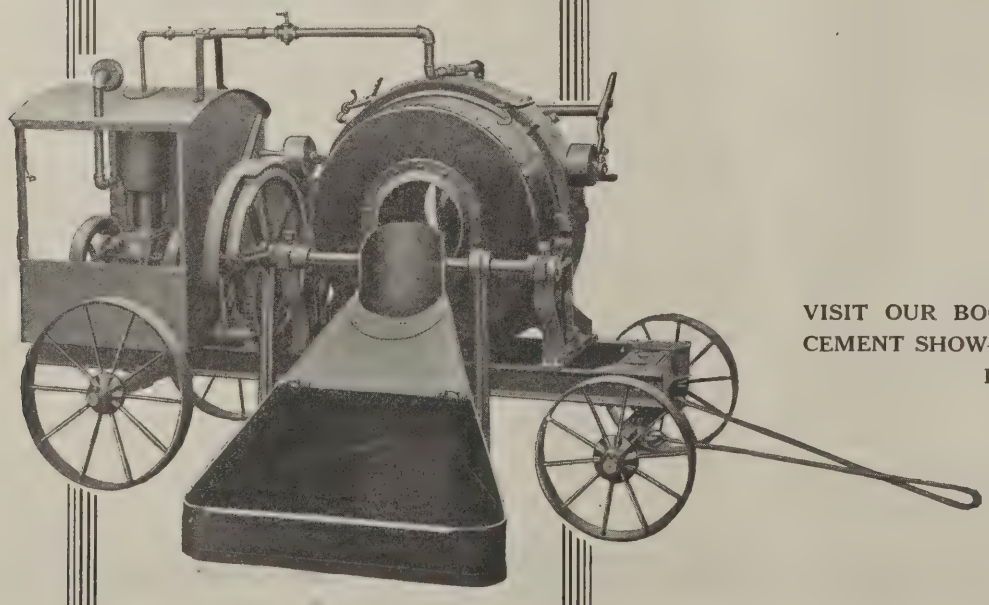


$246 F. O. B. Factory

Smith Mixerette on steel truck, with 2 H.P. gasoline engine, and steel house. Mixer equipped with waist high, gated batch charging hopper.

Smith Mixerette with ground level power charger. This loader is gear driven. It lifts easily and rapidly without straining the mixer.

$315 F. O. B. Factory



EFFICIENCY PLUS—and The SMITH MIXERETTE

The following partial specifications show the real efficiency of the Smith Mixerette for the small concrete job. Read them carefully. You'll realize then what a dandy little mixer this is.

Enclosed gear ring—Big drum ring and driving pinion enclosed and protected against dirt and dust. Rings fit snugly into casing, the machined surfaces forming a perfectly true sliding bearing. Pressure grease cups lubricate the sliding bearing. The big drum gear splashes through an oil bath on every revolution.

No Main Rollers, Shafts or Boxes—Gear casing forms pedestals which are securely fastened to truck frame.

Ropeless Power Charger—Gear driven skip eliminates hoisting cables, sheaves and drums. Lifts easily and smoothly without the twisting, jerking motion common to pivot type loaders.

Low Feed Level Batch Hopper—This hopper is only 3 ft. 10¼ inches above ground. With its low flaring opening it can be loaded with ease.

Truck—4 inch steel channel sills, 2 inch square steel axles, 20 inch and 26 inch wheels.

Capacity—5 cu. ft. loose material, 3 cu. ft. mixed concrete per batch, 5 cu. yds. per hour.

Efficiency Plus—Back of the Smith Mixerette are 14 years of experience in building mixers for every class of work large and small. Write for special Proposal and Catalog No. 115-C.

The T. L. SMITH COMPANY

3120-C Thirty-Second St. MILWAUKEE
1341-C Old Colony Bldg. CHICAGO

VISIT OUR BOOTH AT THE CHICAGO CEMENT SHOW—COLISEUM—FEB. 10-17 BOOTH 93

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Blystone Mixer for Concrete, Plaster and Mortar

The proper mixing of concrete, plaster or mortar is a feature of the building business upon which the success or failure of the work very largely depends, and it is therefore quite essential that the builder possess an equipment which will in all respects give him entirely satisfactory results. In the execution of his building contracts, not only is he desirous of making a profit, but his reputation for doing good work is at stake and obviously he is anxious to please his clients,

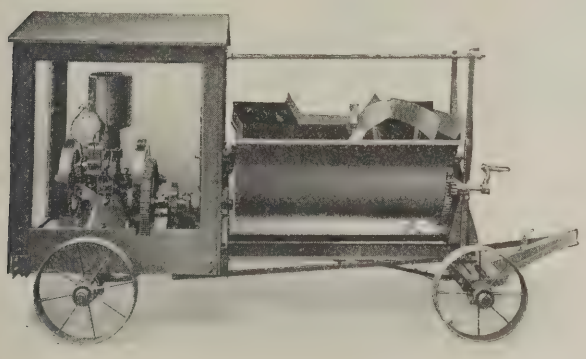


Fig. 1—Blystone Mixer for Concrete, Plaster and Mortar

for it is in this way that the foundation is laid for a large and growing business. While he may be obliged to pay a little more for a good machine than for a poor one, yet in the long run the results accomplished will far more than compensate him for the added expense. In the building of houses or other structures there are frequently occasions when the builder finds it desirable to possess a machine that will not only mix the concrete used on the job, but also the plaster and the mortar, and he is therefore likely to be interested in the apparatus which we illustrate in Fig. 1. This machine is not only available for mixing concrete, but without any change of equipment it will mix with equal facility plaster and mortar. One of the special features of its construction is the open drum made of high carbon steel which enables the operator to see what he is doing. He can also readily note just when a sufficient quantity of water has been added to give to the concrete the proper constituency. The foundation on which is based the success of this machine, known as the Blystone Batch Mixer, is the patented reverse-spiral arrangement of the shovels, the blades of which are made of 60 carbon steel. The construction is such that with every revolution of the shaft the batch is not only turned completely over twice, but is shoveled to one end of the drum and back again. The action of the shovels keeps the machine practically clean, and by simply tilting the drum to dumping position it is an easy matter to wash it out with the hose. The machine is made in one size only, and with a capacity of ¼ cu. yd. of loose material per batch. The mixer is equipped with a 4 h.p. gasoline engine, although in cities where electricity is available a motor can be utilized for operating it. As shown in the illustration, the outfit is mounted on a strong frame made of 4 in. channel steel and heavy castings, thus adapting it to hard usage. This same machine which mixes concrete also handles hard wall plaster and mix mortar for blacklayers, thereby enabling general contractors to use the same machine for all three purposes. The point is made by the Blystone Manufacturing Company, 115 Day street, Cambridge Springs, Pa., that this machine is now used in over 500 foundries in the United States mixing core sand, which service requires the most thorough mixing conceivable as flour, molasses, core compound, etc., are mixed through dry sand at the ratio of 60 to 1. A great many customers of the company are using this machine for plaster, mortar and concrete on one job and they speak in high terms of the satisfaction which it has given. The mixer is easily transported short distances by hand, or it can readily be attached behind a wagon. The special aim of the maker has been to produce a distinctive mixer to meet the requirements of the building contractor, the block, brick and tile plant, as well as of the sidewalk and curb contractor. In the improved Blystone Batch Mixer the company feels that it has accomplished this end.

Catalog of Plastergon Wall Board

There has just been issued from the press by the Plastergon Wall Board Company, 102 Fillmore avenue, Tonawanda, N. Y., a very attractive catalog setting forth the merits of Plastergon wall board, its application and decorations. The illustrations are excellent examples of the engravers' art and represent for the most part interiors of all kinds wherein plaster board has been used to excellent advantage and with pleasing decorative effects. In Fig. 2 we show a dining room interior which admirably illustrates the very excellent manner in which the board is utilized for the purpose of finishing a room of this character. Emphasis is laid upon the adaptability of this wall board also for booth construction. Instructions are given for applying Plastergon wall board, and how to decorate it, and these are

Fig. 2—Dining Room Interior Showing Effects Produced by the Use of Plastergon Wall Board

followed by painting specifications. The entire makeup of the catalog is exceedingly neat and attractive, and a copy of it will be sent to any architect, builder or prospective house owner who may make application for it. Among the closing pages are to be found a number of letters from some of the many who have made use of Plastergon, the letters coming from all parts of the country.

Disston's Diamond Anniversary

As users of Disston products, many readers of *The Building Age* will be interested in the development of this concern from an obscure beginning to its present prominence as saw and tool manufacturers. The founder, Henry Disston, accepted some tools, steel, etc., in lieu of salary when, in 1840, the firm of saw makers, for whom he had worked for seven years, failed. With a small furnace which he made himself and with coal he carted in a wheelbarrow, the first Disston saw was made in a small cellar. He overcame by sheer force

Disston's Diamond Anniversary—Fig. 3—View of the Original Plant As It Appeared in 1840

of quality the existing prejudice against tools of domestic manufacture. He sometimes had to take as little as 1 per cent. profit; but the material and workmanship he put into his saws eventually were recognized and created a strong demand for his product.

From that time on expansion was rapid. With the growth of the business, new quarters and additions to the plant soon became inadequate, and in 1871 ground was purchased for an entirely new plant. With subsequent additions totaling some 275 acres, this is the site of the present plant. In 1854, to avoid the flaws common to the imported steel previously used, Henry Disston undertook the manufacture of steel. This was the first crucible saw steel melting plant in this country. A file works followed in 1866 to supply the large quantities of files used in the saw plant. Gradually the manufacture of a wide variety of tools was assumed. Today the plant comprises 58 buildings, covers 50 acres of ground and employs 3600 men.

When Henry Disston died in 1878, his sons, who had been taken into the business, succeeded him and his descendants are today at the head of the business. It is interesting to note that a score of Disston employees have been with the company over 50 years, and that in several instances three generations of the same family work side by side. "Good steel and honest work,"

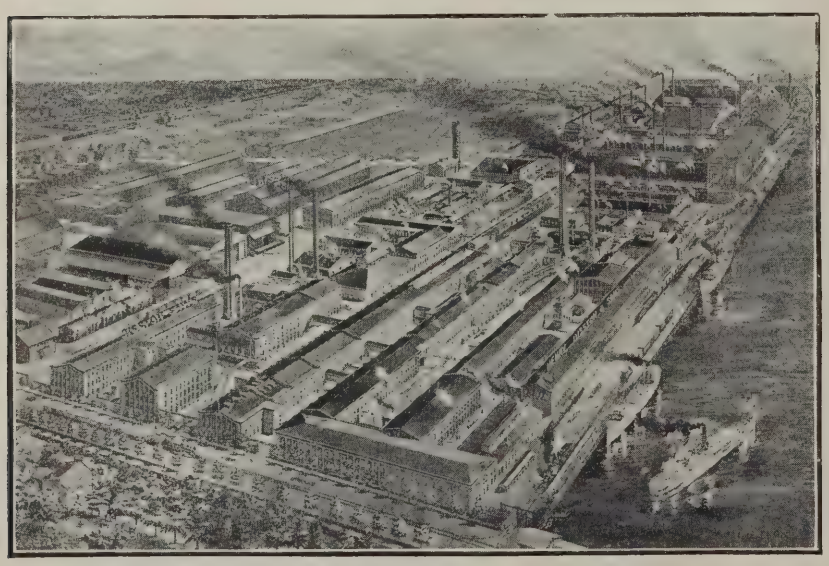


Fig. 4—The Mammoth Works of Henry Disston & Sons at the Present Day

Henry Disston's own explanation of his success, is a fundamental factor of the Disston policy. As they express it: "Three-quarters of a century's reputation for quality is too valuable an asset to be jeopardized by inferior products." In Fig. 3 we show the original plant as it appeared in 1840 and in Fig. 4 is a bird's-eye view of the present works.

The Stanley Bench Bracket

Among the new tools which have just been placed upon the market by the Stanley Rule & Level Company, New Britain, Conn., is the bench bracket known as No. 203, which we illustrated in Fig. 5. This tool is of such a nature as to instantly commend itself to the carpenter and cabinet maker, the builder, the woodworker, and in fact to all interested in carpentry of any kind where a bench is necessary. To utilize the device it is simply necessary that one or more holes not smaller than 1 in. be bored in the front of the bench. The shape of the tool is such that when the jaw or nose is put through the hole it is automatically held in place, and by means of the screw clamp the board that is being worked upon is quickly and firmly secured. Among other purposes for which the bracket is readily adapted are holding a short board or box end so that it can be sawed at any angle as for mitering, dove-tailing, etc.; for holding a long board, use being made of two brackets as when a bench vise is not readily available; for use in connection with a bench

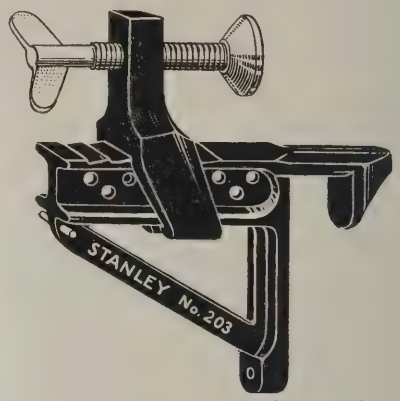


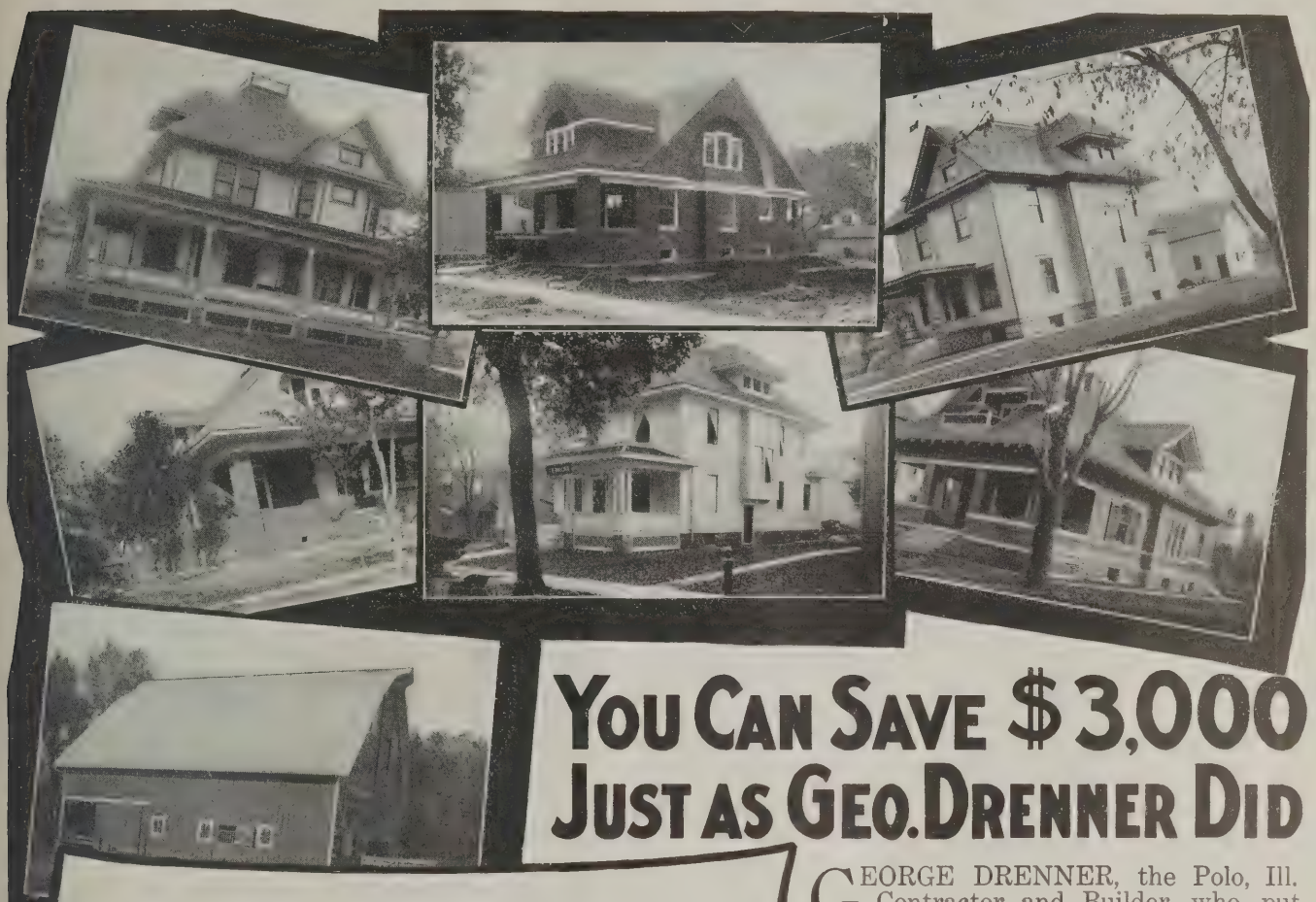
Fig. 5—General View of the Stanley Bench Bracket

vise, and again for holding a door or window firmly in place while it is being planed to fit or mortised for lock or butts. The body of the bracket is made of iron japanned and the clamp is strong, well threaded and nickel plated.

A Treatise on Red Gum

"Red Gum Facts" is the title of an interesting sixteen-page booklet issued by the Gum Lumber Manufacturers' Association, 1339 Bank of Commerce & Trust Building, Memphis, Tenn., which provides a fund of information on what is termed America's "Finest Cabinet Wood." Statistics taken from the United States Forest Service Reports for the year 1912 indicate that the consumption of Red Gum by woodworking industries in twenty-two states was 332,630,415 ft., board measure. Two of the most important uses of Red Gum are for doors and interior trim finish. Finished in its natural color, or stained, it is very attractive, and when properly seasoned fulfills every requirement for these purposes. The natural color of Red Gum is a soft, rich, reddish brown, and its qualities in this respect make it especially appropriate for interior finish and for the furniture of churches. It is also adapted for use as flooring, ceiling and siding. Among the pictures presented is one representing an all-wood interior showing the peculiarly pleasing and attractive effects to be had with Red Gum panelling and interior cabinet work. The picture is the same as that which appeared in *The Building Age* some months ago in connection with the displays at the Forest Products Exposition. This at-

(*Continued on page* 84)



YOU CAN SAVE $3,000 JUST AS GEO. DRENNER DID

GEORGE DRENNER, the Polo, Ill. Contractor and Builder who put up these six houses and this barn, bought every stick of the material from Gordon-Van Tine. Read his letter, it contains food for thought. On $10,000 worth of material he saved $3,000. That is a saving of about 30%. Now, $3,000 is a nice profit in itself. But $3,000 **additional** profit is pure, extra velvet. That's what George Drenner made through dealing with Gordon-Van Tine—all his ordinary profit **plus a handsome $3000 bonus.** He eliminated the middleman. He bought on our money-saving "mill-to-user" plan instead of through some local dealer. He put into his own pocket the $3000 profit that the local dealer would ordinarily have taken.

You can do the same. You don't need to split your profits with anyone. There's no reason why you should pay a heavy tribute to your local lumber yard for doing nothing. You can deal with us just as well as George Drenner did. We ship to you anywhere, no matter where you live and guarantee safe delivery and absolute satisfaction or money back. Try us.

GEORGE DRENNER
CONTRACTOR AND BUILDER

POLO, ILL. November 10, 1914.

Gordon-Van Tine Co.,
Davenport, Iowa.

Gentlemen:

Am mailing you today photographs of some of the buildings which I have erected this year in Polo. These buildings have been built with Gordon-Van Tine material and I am so very much satisfied with the treatment that you have accorded me and the quality of goods that I have purchased from you that I feel it due you to tell you.

I have bought from you in the past fourteen months a little over $10,000.00 worth of lumber and millwork and I figure that I have saved about $3,000.00 on this material.

Considering the big saving that I made together with the splendid service and very high grades, I cannot help but be satisfied.

You are perfectly at liberty to use these photographs and this letter in any way you desire. And I wish to add that this letter comes from me unsolicited.

Sincerely yours,
Geo Drenner

Write FOR OUR 5,000 Bargain Catalog NOW

GET this big, illustrated, 156 page price-making volume. A veritable Builders' Encyclopedia. Packed from cover to cover with money-savers. Lumber, Millwork, Roofing, Builders' Hardware, everything. Over 5000 extraordinary bargains. Sold by mail only. All at wholesale prices. Large or small orders receive equal attention. Prompt shipment and safe delivery guaranteed. Satisfaction or money back—you are the Sole Judge. Over 10,000 Contractors and builders deal regularly with us. Our regular plans and blue prints cost you nothing. Or our architectural staff will draw special plans to your instructions if you wish. Cost but a fraction of what local architects would charge. Our free estimates are "Guaranteed Right"—No Extras. Send now for this great 5000 Bargain Catalog, tell us what you want and let us give you a figure on your needs. Put us to the test.

GORDON-VAN TINE CO.
749 Federal Street, Davenport, Iowa

tractive book also contains interesting chapters on the care of hardwood doors and trim; kiln drying; finishing, etc. Letters of recommendation from some of the users of Red Gum are reproduced among the closing pages of the volume. We understand that samples will be sent to any architect or builder who may be sufficiently interested to make application for them.

The "Little Devil" Concrete Mixer

A very interesting folder replete with illustrations showing the "Little Devil" concrete mixer under varying conditions has just been sent out by the Chicago Builders' Specialties Company, Old Colony Building, Chicago, Ill. In all there are twelve illustrations in which this mixer can be seen working full capacity in the following construction operations: Silo building, foundation work, laying of sidewalks, concrete floors, grouting and underground conduit work. Each photograph is accompanied by a short description of the job, and by the name of

Fig. 6—The "Little Devil" Concrete Mixer in Use in Connection with the Building of Sidewalks

the contractor. The "Little Devil" is shown mounted on two wheels, complete with charging spout. The convenience of the discharge at the end is an economical arrangement for directing the concrete directly into the place desired. Another picture shows a 12 x 50 ft. silo construction by the use of a "Little Devil" mixer. Under these conditions it is provided with a hoist attachment with a separate clutch and brake. The company states that the "Little Devil" complete equipment weighs but 2100 lbs., that it is sturdy and strong, and its reliable construction assures the building contractor of little cost for repairs. It is equipped with a 3½ h.p. gasoline engine, well balanced, and guaranteed to run under any conditions. The engine is enclosed in a steel house, special attention being called to its convenient location. In Fig. 6 of the engravings we show the mixer as it appeared in use by a contractor in connection with the building of concrete sidewalks.

Something About Carborundum

A vest pocket booklet measuring 2¼ in. square, entitled "The Romance of Carborundum," has just been issued by the Carborundum Company, Niagara Falls, N. Y., and contains six chapters on the discovery, process of manufacture and uses for carborundum. It was in 1893 that Edward Goodrich Acheson, located in a little shop in Monongahela City, Pa., was experimenting with an electric current, some clay and coke, when he discovered carborundum crystals. He had a small bowl—such as plumbers use—and into this he placed some clay and crushed coke. Into the mixture he thrust a wire from which a connection was made to one pole of a dynamo. The heat generated by the electric current fused the two ingredients in the bowl, and when the wire was withdrawn the trained eye of Mr. Acheson discovered some minute crystals adhering to it. These tiny jewel-like bits were found to be amazingly hard and sharp. A few simple tests revealed the fact that these crystals had wonderful abrasive properties—that they were second only to the diamond in hardness and sharpness and that they were destined to revolutionize the grinding world. That was

(*Continued on page* 86.)

the beginning of the meteoric commercial career of carborundum, and now at the company's plant the annual output is 12,500,000 lbs. The carborundum furnaces are thirty in number, electrically heated. When the ingredients for carborundum are filled in the furnace bed the current is turned on and a heat of approximately 7,000 deg. F. passes through the crude materials. After thirty-six hours of burning the crystals are formed, and they pass through several purifying and other operations before being dressed for their various uses. Carborundum products include all kinds of sharpening stones, grinding wheels, valve-grinding compound, and other forms of sharpening or hardening metals. The carborundum plant contains a floor space of over 13 acres, in which is contained an equipment of modern machinery easily capable of producing the company's yearly output of 12,500,000 lbs. of carborundum products.

The Kolesch Builders' Level

A level which has been designed especially for the use of builders, contractors and architects for leveling and plumbing walls, as well as for obtaining the lines and levels for buildings, etc., is illustrated in general view in Fig. 7 of the cuts. It is known as level No. 7860 and is being introduced to the trade by Kolesch & Co., 138 Fulton street, New York City. This instrument is provided with lenses of the best domestic manufacture, and the telescope which is about 12 in. in length has a magnifying power of 19 diameters. The objective is 1⅛ in. and has a rack and pinion movement. There is an adjustable eye piece for focusing cross

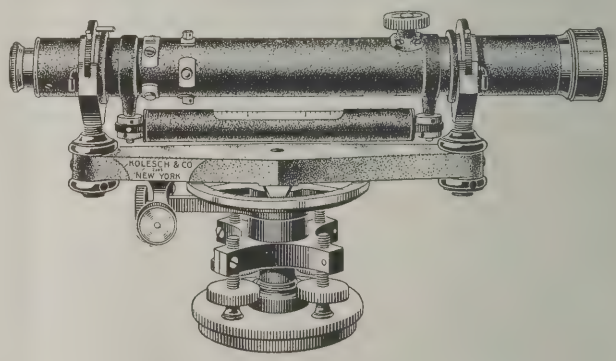


Fig. 7—Appearance of the Kolesch Builders' Level

hairs and a fine bubble of 60 seconds sensitiveness graduated on the glass is attached to the telescope. The level is also provided with an improved device for locking the clips in the Y's. The horizontal circle of 3 in. is held in place by a friction clutch and can be set at zero at any given point. There are 4 leveling arms and the weight of the instrument without the tripod is about 5 lbs. The instrument is sent out in a finely polished box with plumb bob, adjusting pins, book of instructions and tripod complete.

Characteristics of "Stonekote"

A very attractive catalogue of 78 pages illustrating and describing the merits of "Stonekote," a plastic Portland cement for rough cast and flat surfaces, and illustrated by numerous half-tone engravings of buildings in connection with which the material has been used, is being distributed by the Garden City Sand Company, 709 Chamber of Commerce, Chicago, Ill. The point is made that there is nothing that lends itself so well to the artistic in building as the colors and shades that may be obtained by the use of "Stonekote" Portland exterior, which may be blended to any desired shade and which, it is claimed, will withstand the ravages of time and weather. Some of the effects produced by "Stonekote" are illustrated by nine colored panels, each of which shows a different grain of finish, and any one of which can be had in 50 shades each of red, brown, buff or gray, and in pure white, also in greens. The photographic reproduction shows the grain surface reduced to half its actual size. The examples include one of Caen stone;

(*Continued on page* 88)

one of China Wall finish; two of float finish, and five of rough cast. The catalogue is gotten up with a great deal of care and attention to details and the enterprising architect and builder cannot fail to be interested in what is contained within the covers of the little work. Accompanying the catalogue is a little pamphlet entitled "A 20th Century Home," and which consists of the story of a woman's home-making, showing the results of her study of the best materials and methods used to-day for building the ideal home. In looking it over one would naturally expect to find somewhere in the story reference to the use of "Stonekote," and in this he would not be disappointed, for the house in question is built of hollow clay tile covered with three layers of "Stonekote"; three sides of the grounds were surrounded by a rough cast 5-ft. fence of buff colored "Stonekote"; over the gates were arches of the float surface "Stonekote"; the walks at the rear of the house were of "Stonekote" flooring; the driveways were of dark red "Stonekote" flooring, and even the flower boxes were of this material.

An All-Steel Portable Trestle

The folding steel trestle shown in Figs. 8 and 9 have just been placed on the market by the Economy Manufacturing Company, 217 Chamber of Commerce Building, Chicago, Ill. In Fig. 8 it is shown ready for use,

Fig. 8—The Trestle Set Up Ready for Use

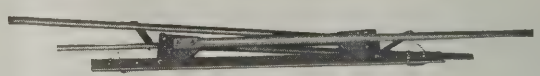


Fig. 9—As It Appears When Folded

An All-Steel Portable Trestle for Builders' Use

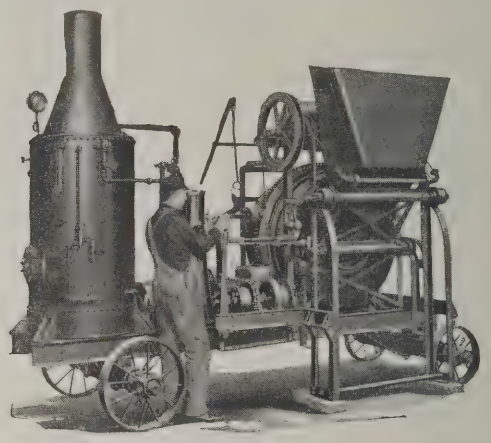
while Fig. 9 shows it closed for storing or transportation. The manufacturer emphasizes the fact that the construction of this horse, or trestle, is substantial in that the steel tubing used for the legs is securely riveted where connection is made to cross pieces. When set up it is very rigid, assuring the workman of security at all times. When opened it is securely locked. Though the illustrations do not show this feature, the company states that cast shoes are to be installed on the legs in the new models. This trestle is of exceptionally light weight, but this in no wise detracts from its efficiency. Its practicability has been demonstrated by the test of actual service. Its compactness makes it especially convenient for the building contractor to ship any number of them from job to job without much cost or trouble in assembling. The trestles are supplied in two sizes—either painted or galvanized. Both types are 5 ft. wide, and the hights are 5 ft. and 4 ft. 6 in. respectively. Other sizes can, however, be furnished on special order.

New Line of Smith-Chicago Mixers

After a careful survey of the situation and taking into consideration all the points learned during the past 15 years of mixer designing the T. L. Smith Company,

(*Continued on page* 90)

3120-A Hadley Street, Milwaukee, Wis., has developed the new model of Smith-Chicago concrete mixer illustrated in the accompanying engravings. While the old type of Chicago mixer had a great many features which brought it into prominence and made it an attractive and economical machine for the average contractor, still like other non-tilting mixers it involved a compromise in its construction. It had been impossible to project the discharge chute very far into any non-tilting mixer, and it was necessary to move the batch over toward the discharge side. The first compromise in all non-tilting machines occurs here, as the mixing efficiency of the drum is materially affected. The ideal mixing action calls for a reciprocal side-wise movement of the batch, just as long one way as the other. This is impossible with the short discharge chute unless the speed of discharge is sacrificed. If in order to secure a fast discharge the batch is heaped over to the discharge end it becomes impossible to prevent the machine from splashing. This involves another compromise, the speed of discharge having to be sacrificed to prevent splashing; in other words, the designers of non-tilting machines have been confronted with the problem of building a machine which would mix well, discharge well and still not splash. The result was the actual machine would always fall a little short in many respects.



New Line of Smith-Chicago Mixers—Fig. 10—General Appearance of the Mixer Ready for Use

In the new model Smith-Chicago mixer the company claims to have a machine wherein all of the compromises referred to are avoided. This is accomplished by having a very long and exceedingly steep discharge chute which projects two-thirds of the way through the drum. The length and steep angle of this chute are made possible by the concave face of the drum. With this chute the Company has been able to locate the blades centrally with equal angularity on both sides. The blades are scoop-shaped with high converging sides which cause the batch to be poured to the center of the drum. The action of these blades combined with the action of the drum itself produces an action of the mass which distributes the load evenly and gives a theoretically correct and efficient mix without splashing. At the same time the chute is long and steep enough to dis-

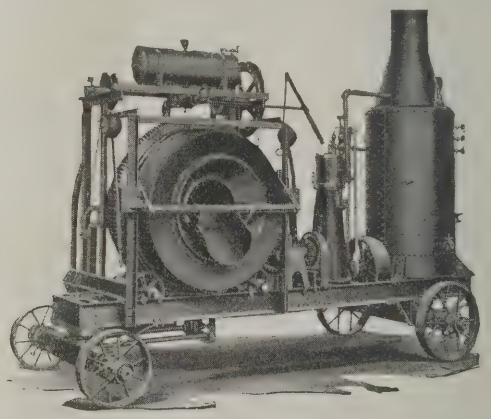


Fig. 11—Mixer Mounted on Steel Truck With Chute Shown in Discharging Position

(*Continued on page 92*)

charge the entire contents of the batch in the space of from 15 to 20 seconds. In Fig. 1 the Smith-Chicago mixer is shown on steel truck with steam engine and boiler and equipped with power charger. It will be seen that when in a discharging position the skip assumes a vertical attitude. The vertical acting power charger used on the machine operates easily and quickly. The skip is carried by four rollers which travel on curved guides. The wide nose of the skip projects well into the drum, thus preventing any spilling. The steep discharge angle of the skip combined with the long sloping sides as shown in Fig 10, provide for a fast, clean discharge and prevent clogging. All Smith-Chicago loaders are equipped with an automatic knock-off to disengage the clutch when the skip has reached its highest position. This makes an effectual safeguard against accident and its use cannot fail to be appreciated by contractors. In Fig. 11 the mixer is shown mounted on steel truck with steam engine and boiler and with power charger and enclosed water tank. The chute is shown in the discharging position.

A New Portable Electric Drill

The latest type of portable electric drill, equipped with a universal motor that operates on both direct and alternating currents is shown in Fig. 12 of the cuts. The tool is said to be a great time and labor saver for the contractor, and where current can be obtained this claim is strikingly demonstrated by the largely increasing use to which it is put. Special bits are furnished for wood boring and for drilling holes in metal, the wood boring bits running as high as 2½ in. in diameter. The tool, which is made by the Standard Electric Tool Company, Woodworking Dept., Cincinnati, Ohio, is equipped with ball bearings throughout, all bearings being encased in grease in dustproof chambers. The motors are formwound and impregnated in Bakelite, thus insuring against all forms of motor troubles, such as short-circuits, grounds and burn-outs. The manufacturer claims that an operator with an electric drill is frequently able to do the work formerly accomplished by five or six men on jobs where a large amount of wood boring and metal drilling is required. The tool described is offered in various styles, and is furnished with a spade handle, as shown in the illustration, or with a breast plate, as may be desired.

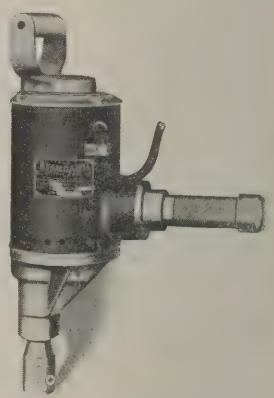


Fig. 12—A New Portable Electric Drill

New Plant of Sykes Metal Lath & Roofing Company

In order to meet the growing demands of its business the Sykes Metal Lath & Roofing Company has completed a new factory at Warren, Ohio, involving a cost of $500,000 and devoted exclusively to the manufacture of sheet metal products. The self-furring lath of the company has proven very popular with contractors and builders, and preparations have been made to meet the still larger demand which is expected for it during the ensuing year. This increase in plant was predicated to some extent upon the fact that in 1914 the company sold more than twice as much metal lath as was made by it in 1913. An idea of the popularity of the lath may be gathered from the fact that one contractor recently made use of it in connection with the erection of 140 houses, and it has also been used by the United States government for post office construction. The company gives employment to more than 500 men, and on January 1 removed its offices from Niles, Ohio, to its new plant at Warren, Ohio. The company is sending to architects and builders who may be interested a free sample of its lath or roofing, as well as a copy of its "Specification Book on Metal Lath."

(*Continued in page* 94)

The "Bulldog" Sash Cord Fastener

The latest candidate for popular favor in the way of a sash cord fastener is that which is illustrated in the accompanying engravings. It is known as the "Bulldog," is made of the highest grade of bright strip steel electro copper plated and is referred to by the makers as a great saver of time and cord. It is said to be universal in its application and can be applied to all sizes of sash cord from 3/32 to 12/32 of an inch diameter, without the use of pliers or other tools, nails or screws. In fact the fingers are the only appliances necessary for the purpose. It is stated by the makers, the Allen-Sponsel Company, 195 Pearl street, Hartford, Conn., that the fastener can also be used on all sizes of sash chains in the same manner as on cords, and at the weight ends as well as at sash ends of cords and chains. Fig. 13 represents a view, full size, of the "Bulldog" sash cord fastener; Fig. 14 shows it applied to the cord, while Fig. 15 shows its appearance when applied to sash weight. The point is made that by spreading the "Bulldog" fastener and boring a 1 in. hole in the sash Nos.

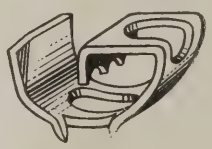


Fig. 13—The "Bulldog" Fastener, Full Size

Fig. 14—The Fastener Applied to Sash Cord

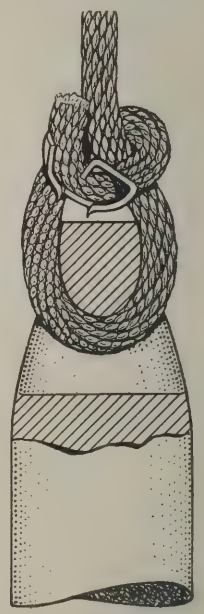


Fig. 15—The Fastener Applied to a Sash Weight

The "Bulldog" Sash Cord Fastener

10 and 12 sash cord may be used. The claims made for this fastener are, among others, that it provides maximum distance for travel of weights and at times may save the necessity of lead weights; it saves one-half the time in application; saves cord over the old method of tying knots, and the saving in time and cord more than pays for the fastener.

Painting Specifications

After giving the matter a great deal of attention, extending over a long period of time, the New Jersey Zinc Company, 55 Wall street, New York City, has evolved a form of painting specifications, the objects of which are two-fold. In the first place, it is becoming more and more apparent to property owners that the painting of structures of all kinds is far too important and vital a matter to be treated in any but a serious and scientific manner. In the second place, it seemed desirable to gather together in a practical form typical formula which have the support of years of successful practice both in manufacture and application. The formula given in the specifications has been the subject of careful study in the Research Laboratory of the company and has been made the subject of actual painting experiments ranging in scale from boards measuring a couple of square feet in area to entire buildings. The specifications briefly consider the principles underlying the composition of a ready mixed paint, the pigments, and the vehicle, which for exterior work is given as good linseed oil. The specifications for interior work

(*Continued on page* 96)

deal with three classes of paints which are distinguished by the kind of surface they give when dry. The company is sending out with the specifications a copy of a very attractive pamphlet addressed to the trade and entitled "One of Your Problems and the Way Out."

Stanley's Wrought Steel Garage Door Set

There has just been placed upon the market by the Stanley Works, New Britain, Conn., a wrought steel garage door set known as No. 1776-J1 which embodies features of convenience and utility likely to command more than passing attention. The extent to which the automobile is now being used, more especially in the suburban and country districts, calls for housing accommodations for the cars and garage door sets of the character indicated cannot fail to prove highly advantageous to the country builder who is called upon to construct garages of all kinds. The set in question consists of a 6-in. wrought steel chain bolt, 3 pairs of 10 in. extra heavy T hinges, a 6-in. foot bolt, a size 4 thumb latch and a size 4 handle, all provided with necessary staples, plates, screws, etc. In regard to the chain bolt one indication of its quality is the Stanley Sherardized spring, the claim being made that the progress absolutely prevents rust and breaking. The bolt may be reversed by removing the set screw from the bolt proper, then turning the bolt around and replacing the set screw in the opposite side. The plate of the 6-in. foot bolt is of the same size and design as the chain bolt, it being 5 in. long and 2 in. wide, so

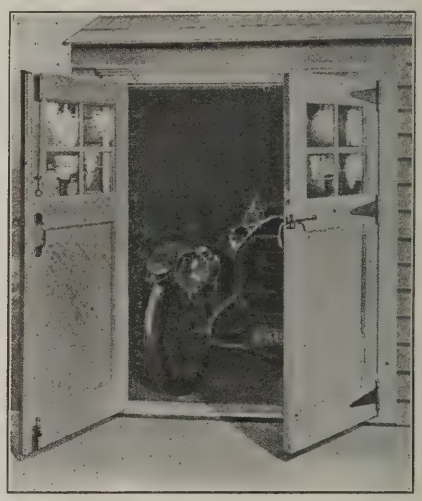


Fig. 16—Stanley's Wrought Steel Garage Door Set

that when used together the bolts have a neat appearance. The cap and release are of solid bronze. The rectangular floor plate has oval-shaped hole to take care of shrinkage in the door. The hinges have reversed pads so as to permit application to the jamb of the door. The width of the strap at the joint is 3⅛ in. and the length of the joint 7 in. The wrought steel thumb latch is the same in size as the handle or pull which is applied to the inside of the opposite door for use in drawing the door shut. The former is fitted with padlock eyes so that the doors can be securely locked. The complete set shown in use in Fig. 16 is finished in a dead black japan, thus giving the hardware a neat appearance. The gross weight of the set is 20 lb. and it is sent out in a strong Stanley telescope box measuring 12¾ x 7¼ x 2⅞ in.

Merits of Compo-Board

The North Western Compo-Board Company, 5778 Lyndale avenue, north, Minneapolis, Minn., is distributing an attractive folder entitled "The Wood Core Wall Board," otherwise known as compo-board. The company points out that it is not recommended for outdoor use but is often so utilized. One of the illustrations in the folder shows the Bulletin board of the Philadelphia "North American," which is made of compo-board and has been used out-of-doors for five

(*Continued on page* 98)

years. It shows that when given reasonable protection it does not shrink or warp even under the severe atmospheric tests to which the compo-board is subjected; that it is strong, stiff and durable; that it has a perfectly smooth surface; so much so that by painting it was used as a blackboard in this particular case. The folder also enumerates some of the very many uses of compo-board, the number being too numerous to mention at this time. Besides making an ideal material for walls and ceilings in homes, compo-board can be utilized in transforming barren attic and basement space into comfortable rooms as well as for lining summer houses, garages, etc., etc.

H. B. McMaster Joins Berger Manufacturing Company

H. B. McMaster, Commissioner for the Associated Metal Lath Manufacturers, who has been directing cooperative work of the metal lath industry since 1910, has resigned his position to become manager of branches for the Berger Manufacturing Company, Canton, Ohio. Mr. McMaster went to Youngstown at the time of the organization of the General Fireproofing Company, of which he was secretary when he resigned in 1908 to become manager of sales for the Rod & Wire Department of the Youngstown Sheet & Tube Company. He left that concern in 1910, and aside from his work with the Metal Lath Association was manager of the Ward Nail Company, in the reorganization of which he took part, and during 1914 had charge of the Bureau of Development organized by the Association of Sheet & Tin Plate Manufacturers. Mr. McMaster's connection with the Berger Manufacturing Company will begin on the first of February.

Sanitas—The Modern Wall Covering

We have received from the Standard Oil Cloth Company, 320 Broadway, New York City, copies of some of the very attractive pamphlets which it is sending out regarding the merits of Sanitas as a wall covering. It is made of strongly woven cloth foundation, finished in oil colors with designs reproducing the best tapestry leather, fabric, Japanese grass cloth and imported wall paper effects. The claim is made that Sanitas will not fade, that it may be readily wiped off with a damp soft cloth, that dirt cannot penetrate the surface of it and that it is being used on the walls of the finest homes in the cities as well is in the modest cottage or bungalow occupied by people of taste. It is readily adapted for use in every clime as it is not affected by atmospheric conditions. Sanitas is put up in factory rolls 12 yd. long and 48 in. wide, containing 16 sq. yd. In connection with the pamphlets which are being sent out there is a pocket following the last page of text containing samples of decorative and glazed Sanitas wall covering, also a few reproductions of seasonable papers in both styles. Accompanying the pamphlets is a third containing testimonial letters from some of the many who have made use of the company's product.

Florence Heaters

At this season of the year when so much attention is being given to the heating question, many of our readers are likely to be interested in an illustrated catalogue of 40 pages issued by the Columbia Heater Company, Kokomo, Ind. It is known as "Catalogue F" and illustrates and describes the leading lines of Florence heaters and boilers. These heaters are said to be of simple construction, contain comparatively few parts and are offered in sizes adapted to meet varying requirements. Considerable space is given in the catalogue to the subject of steam boilers and steam heating, but the company points out that this should not indicate that it favors steam heating to that of water heating. The company has overcome the cause of many troubles and annoyances incident to many steam boilers and emphasis is laid upon the claims made for its boiler as a hot water heater. The illustrations which are presented include sectional views of the heaters, thus affording the reader an idea of the internal construction, such as waterways, fire travel, etc.

(*Continued on page* 100)

The Pull-Easy Nail Collars

One of the latest candidates for popular favor in the way of a saver of labor, time and lumber is what is known as the Pull-Easy Nail Collar, illustrations of which are presented herewith. These collars are made from steel and to fit all sizes of nails. A general view of a collar is shown in Fig. 17, while Fig. 18 shows it fitted over an ordinary wire nail, holding the head of the nail out from the surface of the wood so that it can easily be pulled. The large flange at the collar is stated to increase the drawing power of the nail, this collar leaving the head of the nail projecting far enough out of the wood, as shown in Fig. 19, so that the claw of a hammer or nail puller can easily catch it as indicated in Fig. 20. The Wagner-Behm Company, 20 East Jackson Blvd., Room 1201, Chicago, Ill., makers of the Pull-Easy Nail Collar, states that it is used in combination with common wire nails in constructing concrete "forms," scaffolding and in all other work


Fig. 17—The Collar

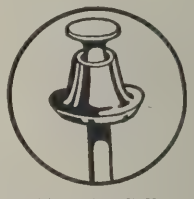


Fig. 18—The Collar on a Nail


Fig. 19—In Place


Fig. 20—In the Claw of a Hammer

The Pull-Easy Nail Collars

where wire nails are used for temporary purposes. The nail collars are made in three sizes, the first of which fits five sizes of common wire nails, while each of the second and third fits four sizes of nails. We understand that a sample of this nail collar can be obtained by any interested reader of *The Building Age* who may make application for it.

Fiberlic Building Board

A building board which embodies in its construction some rather interesting features is known as Fiberlic, the raw material being liquorice root. The fibers of this are long and very tough, and after the liquorice extract and the resinous matters have been removed a strong fiber of pure cellulose is obtained. When made into Fiberlic building board the results are a board which is uniform and homogeneous in composition. The board is dense and rigid and possesses a finished surface which is perfectly adapted to the approved methods of decoration. The point is made that while Fiberlic will smoulder when strongly heated with a bare flame it is most difficult to actually ignite, and that being a homogeneous board it resists attack by vermin. The Fiberlic Company, Camden, N. J., emphasize the fact that it is made in three good workable thicknesses —⅛ in., ¼ in. and ½ in. Any reader of *The Building Age* who may be interested in securing a sample of Fiberlic can readily do so by complying with the conditions presented in another part of this issue.

TRADE NOTES

John W. Haggart has recently opened an office at Room 6, Buckland building, Woonsocket, R. I., for the practice of architecture, and is desirous of securing samples and catalogs of manufacturers of building materials.

(*Continued on page* 102)

The card calendar for January which is being sent out by the Richards-Wilcox Manufacturing Company, Aurora, Ill., is thoroughly in keeping with previous examples of the series issued by this enterprising concern from month to month. The picture panel is entitled "Sincerity" and is of a nature to instantly rivet and hold the attention of the beholder. Upon the back of the card "Sincerity" is defined as "a much prized trait of character in man and woman and which is also found in manufactured things." The latter refers to the R-W door hangers, grindstones and specialties which have "won a permanent place on many hardware men's lists because of sincerity."

The Diamond Metal Stamping Company, Columbus, Ohio, issued on January 1 an attractive greeting to its friends in the trade wishing them health, happiness and prosperity. At the same time attention was called to the merits of the "Diamond" flexible metal weather strip and to keep them in mind when in need of goods of the character indicated. Attached to the "greeting" was a likeness of Charles J. Parsons, the general manager of the company.

The Samson Cordage Works, Boston, Mass., has been distributing a rather unique desk or table calendar for the new year, and of a size to make it very convenient for reference. It consists of a piece of heavy cardboard measuring 4 in. in hight by 4⅞ in. in width, provided with a metal loop for hanging it up, and with a movable back so that it may rest upright on table or desk. The face of the cardboard represents various sizes, one placed above the other, of Samson sash cord, which is embellished with a *fac-simile* of the trade mark of the company and its name in raised white enamel letters. Attached to the card is the calendar proper, consisting of a leaflet for each month. On the back of the card reference is made to the various lines of braided cord and cotton twine which the company is prepared to furnish. Samson spot sash cord is an extra quality, warranted free from imperfections. The colored spots in the cord are the maker's trade mark, used only in this quality to distinguish it from the common cords which are referred to as wearing out quickly by abrasion.

Lansing-Company, Lansing, Mich., is directing the attention of building contractors to the advantages of a small concrete mixer owing to the ease with which it may be moved about or from job to job, while requiring very little space, and at the same time is readily set up, no expert operators being necessary to run it. A small machine of this kind is also a good mortar mixer, thus enabling the builder to mix mortar for his work as well as the concrete. In this connection emphasis is laid upon the merits of the "Little Builder" mixer made by the Lansing-Company—a concern that has been engaged in the manufacture of machinery for 34 years.

There has just come to hand a copy of the *Neponset Review*, published by the employees of Bird & Son, East Walpole, Mass., and while it is primarily issued in the interests of Neponset products yet there is contained a great deal of matter that is of general interest. One of the pictures is a group of the Chicago sales force, the page upon which it appears being devoted entirely to the subject of sales, the matter being contributed by different representatives of the company.

The Shelby Spring Hinge Company, Shelby, Ohio, is distributing with "Best Wishes" among its friends in the trade a blotting pad for desk use. The pad consists of three sheets of blotting paper of different colors bound to a celluloid panel representing an interior view wherein the door is equipped with the Shelby "Chief" double acting door check and surface floor hinge.

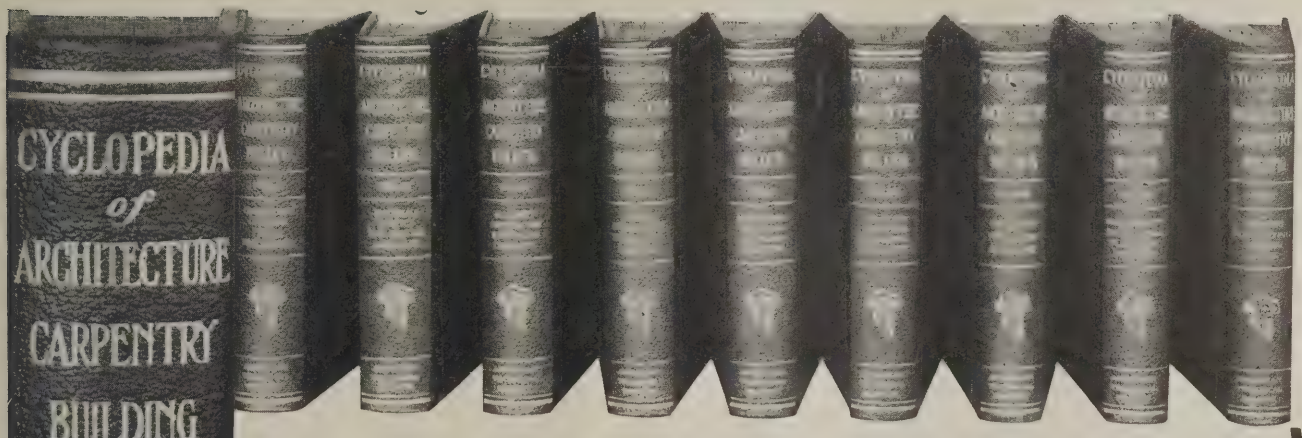
G. A. Moore has opened an office at 4017 South Thompson avenue, Tacoma, Wash., under the style and title of G. A. Moore & Co., for the practice of architecture. He will be glad to receive catalogs and samples from makers of building materials and supplies.

Arrangements have been completed whereby R. M. Nicholson will take charge of the advertising of the

(*Continued on page* 104)

FREE

224 page Plan Book and year's Consulting Service given absolutely FREE with this set!



This is one of the most attractive offers ever made. We give free to every purchaser of our newly revised **Cyclopedia of Architecture, Carpentry and Building,** a copy of **"Modern American Homes,"** the most complete and up-to-date plan book procurable. It contains plans and specifications for 168 different structures, including excellent exterior and interior views, detailed estimates, etc. Designed by the leading architects of this country, it includes city, suburban and country homes, bungalows, summer cottages, tent houses and camps, also apartment houses, garages and various public buildings. Contains 224 pages, 9½ x 12¾ inches, and 426 illustrations. Printed on heavily enameled paper and substantially bound. With this great plan book in your shop or office you are prepared to figure on any job, no matter how large. No need for the prospective builder to consult an architect when you can offer him his choice of practically every type of the modern American home. This saving of the usual architect's fee should get you the business.

In addition to this we give free with each set a year's consulting membership in the *American Technical Society*. Through this service you have the assistance of the most expert architects, structural engineers and draftsmen in America. They are no farther from you than the nearest mail box. They stand ready to solve your perplexing problems, to offer suggestions, to point out the things you should avoid. In fact they enable you to compete with the biggest and most experienced men in the construction field.

The Newly Revised Cyclopedia of

Architecture, Carpentry, and Building

This is the clearest, most practical and complete work ever published on the practice and possibilities of the modern building trades. It covers everything from cottage to skyscraper —from the plans to the complete structure. It includes wood, stone, steel and reinforced construction; estimating and contracting; a study of the Greek and Roman orders; interior finishing and decorating; and modern house lighting and sanitation. The work of forty experts, it can be depended upon to give you the information you desire on any and every subject.

The ten large volumes are handsomely bound in half red morocco, gold stamped, and contain 4,760 7x10 inch pages; 4,000 illustrations, full page plates, building plans, diagrams, etc.; hundreds of valuable tables and formulas, carefully cross-indexed for quick, easy reference.

Partial Table of Contents

Mechanical, Freehand, Perspective and Architectural Drawing, Lettering, Pen and Ink Rendering, The Orders, Superintendence, Strength of Materials, Masonry, Reinforced Concrete, Carpentry, Steel Square, Stair - Building, Hardware, Steel Construction, Roof Trusses, Practical Problems, Estimating, Contracts, Specifications, Building Law, Sanitation, Sheet Metal Work, Electric Wiring and Lighting.

Send for this great combination today

In order that you may judge for yourself the value of the big plan book and this wonderful reference work, we will send the complete eleven volumes to your home or office for seven days' free examination, express charges fully prepaid, Look them over carefully at your leisure—make use of them at your work for a full week—then if they fail to meet with your expectations they may be returned at our expense and you won't be out a penny. If you keep them, send us $2.00 within seven days and $2.00 a month until the specially reduced price of $24.80 on the Cyclopedia has been paid. Remember—the consulting membership and plan book are included absolutely free of charge.

Can you afford to let $2.00 a month stand between you and hundreds of dollars in increased profits? The consulting membership alone is worth many times the first cost of the books. Decide today to equip your shop or office with this business getting combination. Fill in and mail the coupon—now!

AMERICAN TECHNICAL SOCIETY
CHICAGO, U. S. A.

MODERN

COMBINATION OFFER COUPON

American Technical Society,
Chicago, U. S. A.

Please send **Free Plan Book,** also Cyclopedia of Architecture, Carpentry and Building for seven days' examination. I will send $2.00 within seven days and $2.00 a month until I have paid $24.80 for Cyclopedia **(Plan Book and Consulting Membership included free),** or notify you and hold books subject to your order. Title not to pass until fully paid.

Bldg. Age, 2-15

NAME .....

ADDRESS .....

As I have had no previous dealings with you, I refer you to

.....

.....

Berger Manufacturing Company, Canton, Ohio, handled prior to December 1 by G. P. Blackiston. In the interval the advertising was handled by R. L. Krughbaum, who will now continue his work as Promoter of Sales.

The Milwaukee Post Mold Company has been incorporated with a capital stock of $5,000 by G. N. Kenyon, A. A. Rehfeld and C. H. Juergens, attorney, to manufacture metal forms for casting concrete posts and similar material.

An attractive 32-page booklet entitled "Bouquets" has just been issued by the Koehring Machine Co., Milwaukee, Wis., manufacturer of concrete mixers. It contains more than two hundred complimentary letters from users of "Koehring" mixers in thirty-two states, alphabetically from Alabama to Wisconsin. Each story is briefly presented. On the title page is says: "A bunch of violets and a concrete mixer at first thought might seem to bear little relationship to each other, but this is a case where the unexpected happens. And the word 'bouquet' has more than one significance—it means a compliment—a statement of praise and commendation —as well as a cluster of flowers, so you see we have brought the connection pretty close."

United States Gypsum Company, 205 Monroe street, Chicago, Ill., has just issued from the press what is known as the "Red Book"—a little work that is full of information of value to architects, building contractors, plastering contractors, engineers and others. It is in fact a text book of United States Gypsum products and a copy of it will be sent free to any member of the classes indicated above who may apply for it.

So much has been said about war orders in the daily press that it is refreshing to note a big piece of business that is not of this nature. We have received from the North American Construction Company, Bay City, Mich., a picture of a special train of 15 cars of typically "Made in America" goods speeding on its way to a large manufacturer for use in America. It is one of four similar special train loads all shipped within 20 days on a rush order. The train shown in the picture contained 12 "Aladdin" houses, the rush order consisting of 61 houses to be sent to Southern Virginia.

Kolesch & Co., 138 Fulton street, New York City, are directing the attention of builders to its level No. 7860, which is especially valuable for plumbing and leveling walls as well as giving lines and levels for buildings. A 336-page catalog has been issued by the company and will be sent to any builder or contractor who may ask for it on his business letterhead.

Builders and carpenter-contractors are likely to be interested in an offer which is being made by the Isolated Electric Plant Company, 67 West 106th street, New York City. It relates to a complete electric lighting plant of sufficient power for 30 lamps, thus especially adapting it for isolated dwellings or other buildings where a public service system is not available. The plant includes dynamo, switchboard, silent running gas engine, belt, storage batteries, lamps, etc. The claim is made that it is easy to install, occupies but little room and no expert is required to look after it.

A most interesting account of the history of Sargent & Company, New Haven, Conn., appeared in a recent issue of one of the New Haven papers, the story tracing the course of the business from a very small begining one hundred years ago until it now requires one of the largest industrial plants in the country to supply the demand for the various lines of hardware turned out by this enterprising concern. Among the illustrations is one showing a birdseye view of the company's mammoth plant and another is a picture of Joseph B. Sargent, who for years was at the head of the concern.

Those readers of *The Building Age* who are considering the question of adding to their office equipment a typewriter machine, cannot fail to be interested in the offer that is being made by Harry A. Smith, Room 731 at 231 North Fifth avenue, Chicago, Ill. Not every

(*Continued on page* 106)

man feels like purchasing a machine on a strictly cash basis, and it is to meet this condition that Mr. Smith guarantees to send an up-to-date L. C. Smith Model No. 2 Standard Visible Machine for a nominal sum per month. The initial payment constitutes the first installment on the final purchase price. It is also stated that this model will be sent on five days' free trial complete with ribbons, tools and instructions.

F. E. Myers & Bro., Ashland, O., is distributing with their compliments a poster calendar for 1915 which is the most striking and effective they have issued for a long time. It has an artistic head and is printed in type to be clearly visible at a considerable distance and will at the same time bear close inspection. The concern has been sending out calendars in this form for nearly 30 years and have become so well identified with it that many dealers have used it throughout the entire year as a selling medium because the illustrations of the manufacturers' goods are so clear and distinct that many customers select from them the style they desire. We understand that something like 35,000 of these poster calendars are being sent out and a sample will be mailed to any builder asking for it.

H. D. Jenkins, Chicago manager for the Sandusky Portland Cement Company, Sandusky, Ohio, has instituted a more aggressive sales policy and has accordingly leased more commodious quarters at 748 Otis Building, Chicago, Ill. Mr. Jenkins was formerly located at 211 Chamber of Commerce Building. The company's policy in the past was to sell the Consumers Company only, but in future it will distribute its products widely among dealers in the Windy City. In this new departure Mr. Jenkins is confident that 1915 will be as excellent a year as was 1914. He calls attention to the fact that the Sandusky Portland Cement Company has two mills located near Chicago, one at Dixon, Ill., 98 miles distant, and one at Syracuse, Ind., 115 miles away. The near location of these two mills on large railroads insures prompt shipments and quick deliveries of all orders, large or small.

The Chicago Portland Cement Company, 30 North La Salle street, Chicago, Ill., has just issued from the press a very attractive pamphlet of 32 pages showing by word and picture the adaptability of Portland cement concrete for structures of an artistic effect. The example of the beauty and utility in concrete which is illustrated and described is the Midway Gardens of Chicago, a structure which is doubtless one of the most unique architectural conceptions in the world. It was designed by Frank L. Wright, and the concrete work was executed by the Mueller Construction Company.

The Oak Flooring Bureau, 895 Hammond Building, Detroit, Mich., is distributing an illustrated folder carrying pictures of a few of the very many buildings in which its oak flooring has been used. Reference is made to the advantages of this kind of floor covering and the statement is presented that oak flooring is made in seven grades, "representing different prices to fit the pocketbook or condition under which they are used." One page of the folder is devoted to an enumeration of the uses of the different grades of oak flooring.

H. B. Fuller, 186 to 190 West Third street, St. Paul, Minn., is distributing an attractively illustrated folder showing some of the many uses to which the Fuller All-Steel Adjustable Scaffolding is readily adaptable. The merits of the scaffolding are concisely set forth and emphasis is laid upon the fact that it can be used for high as well as low work and for big jobs as well as little ones.

TABLE OF CONTENTS FOR MARCH, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, MARCH, 1915

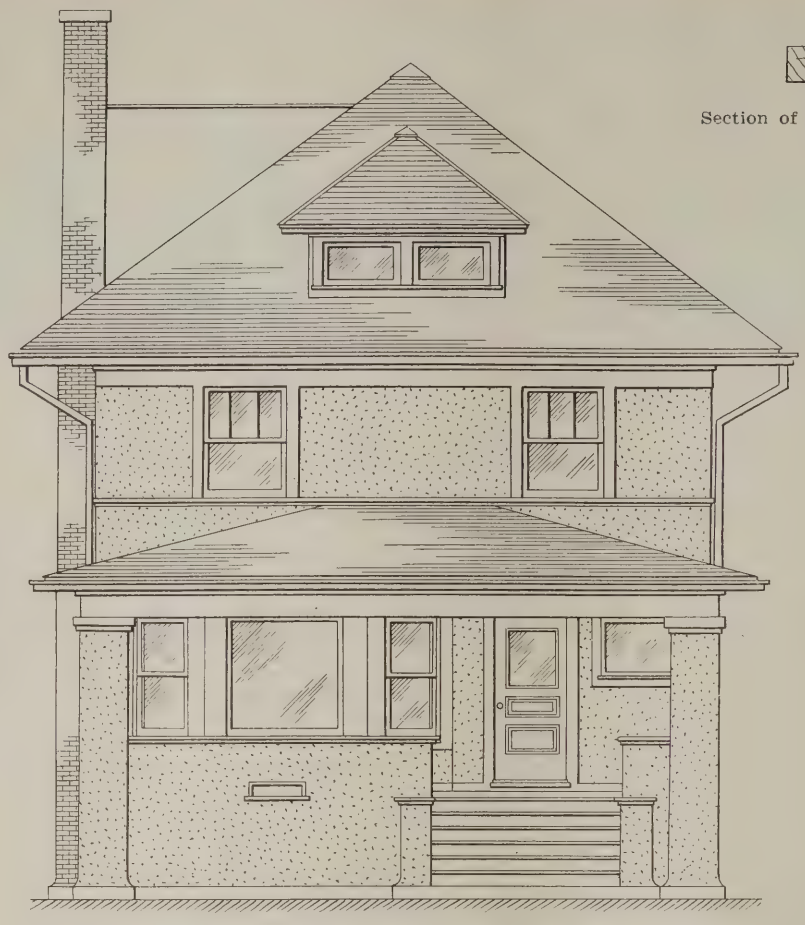
Heating a Suburban House by Furnace

Detailed Description of a Modern $4,500 Seven-Room Dwelling—The Warm Air Equipment and Its Cost

IN these days when the building contractor faces keen competition, he is always on the alert to discover some method whereby he can reduce his costs and at the same time maintain the maximum percentage of efficiency in his work. One of the most important items in this connection concerns the heating system. Many instances might be cited where the installation has been entirely satisfactory to the owner in the initial cost and expense of operation and repair, with the result that the building contractor has benefited to the extent of having his work recommended to prospective home builders not alone in his vicinity but elsewhere.

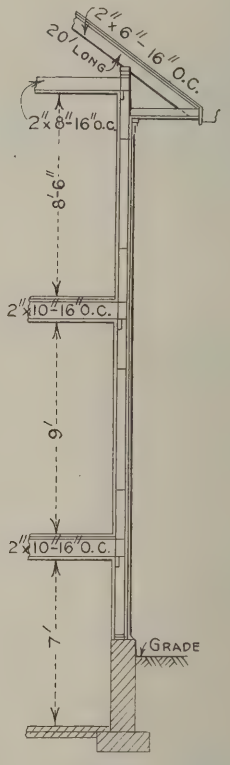
Residence of Mr. F. S. Collins at Berwyn, Ill.—Architect J. E. Knudsen, Chicago, Ill.

In selecting the type of heating apparatus there are many essentials to be considered, and they may be enumerated as follows: Cost of heater; economi-

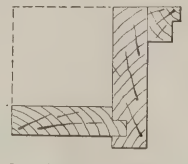


Front Elevation—Scale ⅛ In. to the Foot

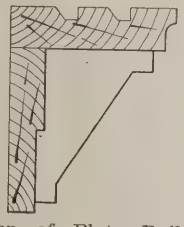
Section of Side Casing—Scale 3 In. to the Foot



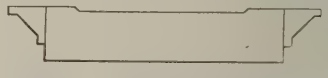
Section Through Main Wall—Scale ⅛ in. to the Foot



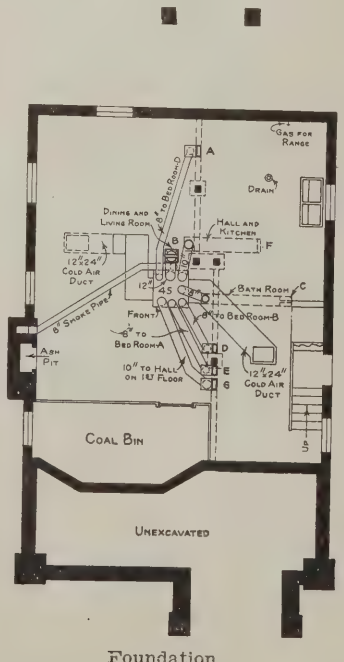
Half Section of Beam Ceiling in Dining Room—Scale 3 In. to the Foot



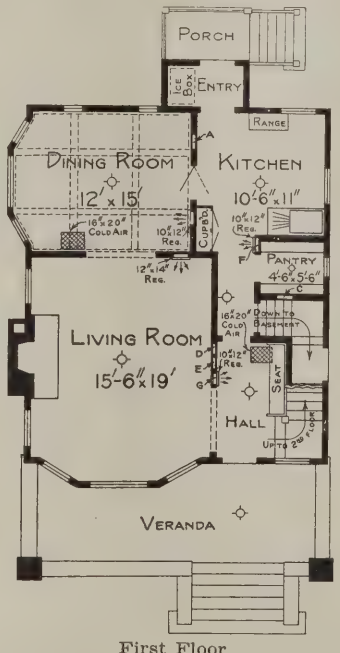
Section of Plate Rail—Scale 3 In. to the Foot



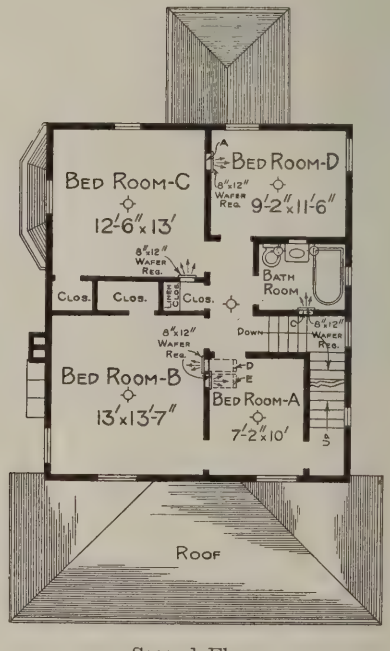
Detail of Vertical Panel Strips in the Dining Room Fastened in Place with Brass Screws After Burlap Is Put On



Foundation



First Floor
Scale 1/16 In. to the Foot



Second Floor

Heating a Suburban House by Furnace—Elevation, Plans and Miscellaneous Constructive Details

cal fuel consumption; simplicity in operation; general construction and cost of upkeep and approximate life under ordinary conditions. Another important point is the provision for humidifying apparatus whereby the home shall be supplied with the amount of moisture conducive to good health.

The house forming the basis of this article was chosen especially for its practical illustration of an efficient furnace equipment embodying the principles outlined in the foregoing paragraph. From the half-tone engraving on this page it will be seen that the house is a two-story structure with stucco exterior. It occupies a corner lot in a Chicago suburb, and has a southern frontage. The floor plans show a very compact arrangement on the first and second floors, while the various pictures which were taken specially for *The Building Age*, afford readers an excellent conception of the interior arrangement and finish as well as an idea of the heating installation in the basement.

The house measures approximately 31 ft. in length and 27 ft. in width. From the first floor plan it will be seen that there are three doors which give access to the front hall, kitchen and basement, respectively. The front door leads directly to an unusually distinctive and artistically designed hall, which is shown in one of the pictures. The hall and stairway which lead to the upper quarters are amply lighted by two windows, one to the east of the front door and the other on the east side of the house so located that it sheds an abundance of natural light at the top of the first flight. The picture also shows a paneled hinged seat in the reception hall adjacent to the telephone.

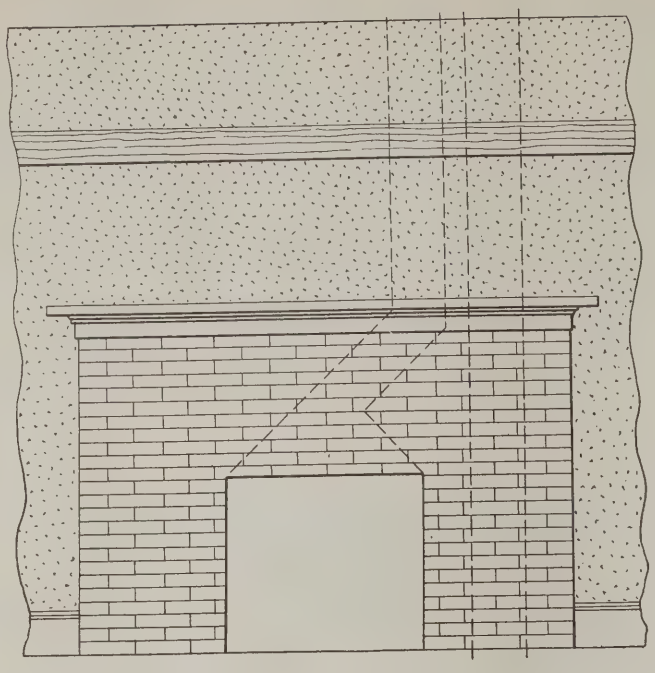
The living room has dimensions of 16 ft. 3 in. by 17 ft. 9 in., and a comfortable fireplace situated on its west side. Beyond this room is the dining room, which in turn gives access to the kitchen. On the second floor are three bedrooms, one sewing room, and the bathroom.

The foundation walls and piers are not less than 4 ft. below the finished grade. Foundations beneath the front porch were omitted, and in their place were substituted three substantial concrete piers with the necessary footings. The piers are 8 x 8 in., and the footings in every case 16 x 16 x 10 in.

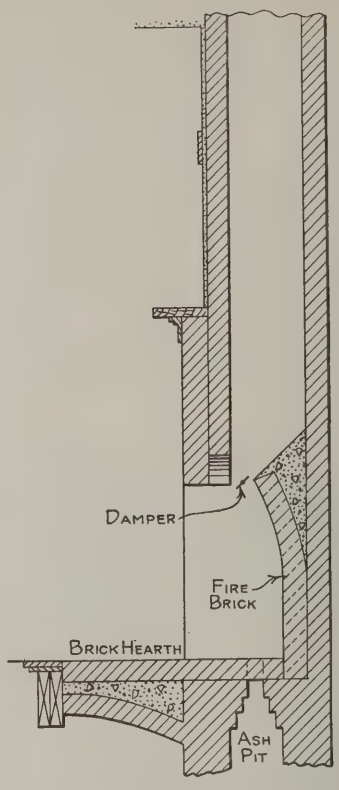
Heating a Suburban House by Furnace—The Main Hall and Stairway Showing Hinged Seat

All concrete work was composed of one part of fresh "Universal" Portland cement, three parts of clean coarse sand, and five parts of crushed stone. The foundation walls were given an exterior cement plaster finish ¾ in. thick, composed of one part "Universal" Portland cement and two parts sharp torpedo sand.

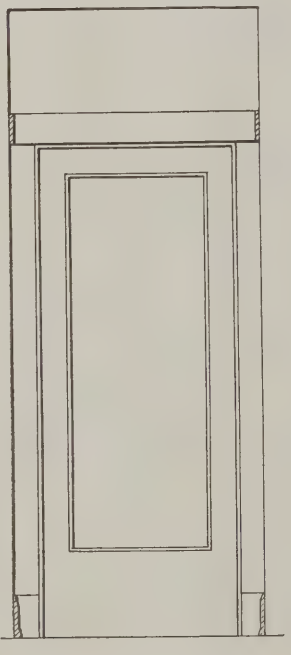
Where no particular lumber was specified a good quality of No. 1 yellow pine was used throughout. The framing timbers were 2 x 4's and joists 2 x 10's, the studding, rafters, etc., being set 16 in. on centers. The exterior frame was sheathed with No. 2 common matched sheathing boards, laid close, and well nailed to all studding. The outside surface was then covered with heavy tarred mineral wool roofing felt, all joints being lapped at least 6 in., and



Elevation of Fireplace and Mantel in the Living Room—Scale ⅜ In. to the Foot



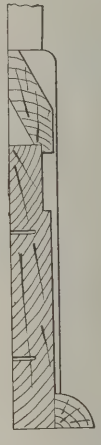
Vertical Cross-Section of Fireplace and Mantel in the Living Room—Scale ⅜ In. to the Foot



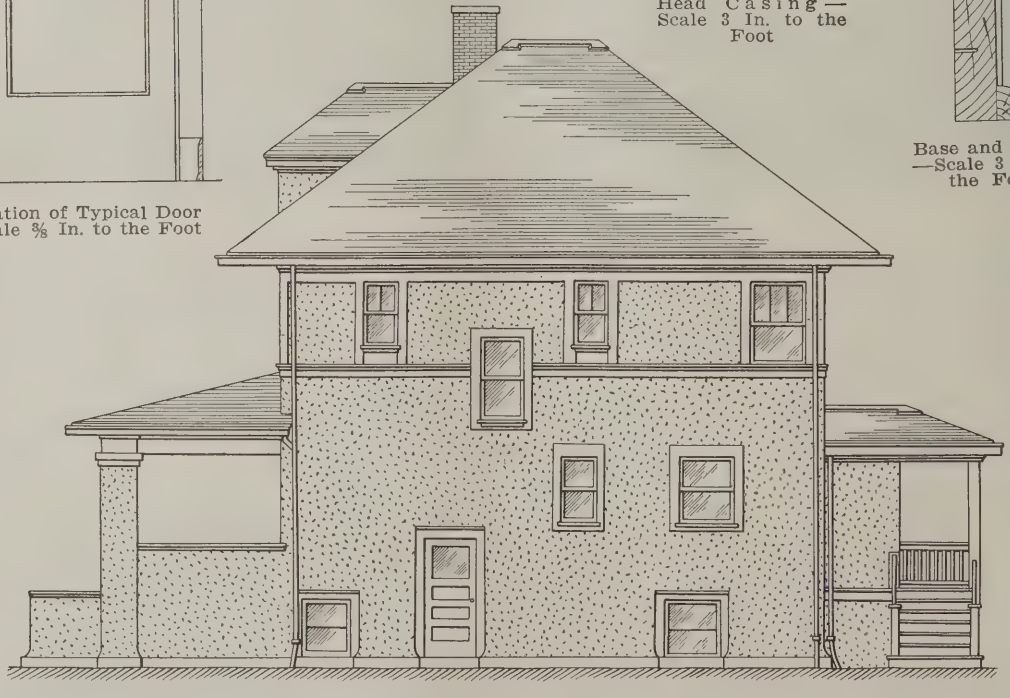
Elevation of Typical Door —Scale ⅜ In. to the Foot

Continuous Trim in Living and Dining Rooms and Reception Hall—Scale 3 In. to the Foot

Head Casing—Scale 3 In. to the Foot



Base and Plinth —Scale 3 In. to the Foot



Side (Right) Elevation Showing Grade Entrance to Cellar—Scale 3/32 In. to the Foot

Heating a Suburban House by Furnace—Side Elevation and Miscellaneous Constructive Details

run in under all casings, as well as lapping all angles and corners.

The exterior vertical wall surface was lathed by first stripping it with 1 x 2 in. furring strips placed 16 in. on centers. This was then covered with 7/8-in. No. 1 white pine lath laid 3/8 in. apart, with joints broken every seventh lath. All work in this connection was well nailed in place with best quality galvanized nails to every vertical furring strip and made secure to all angles and corners.

The plaster finish consisted of three-coat work. The first was one of a good brown hair mortar, and the second a "rough-cast" Portland cement finish. The dash coat was stained with a dark brown fast waterproofed color.

The cellar floor has a 4-in. grouting applied over a bed of clay, the mixture being composed of one part "Universal" Portland cement, two parts clean sifted sand, and four parts small broken stone. The top surface of 3/4 in. was composed of one part "Universal" Portland cement and two parts clean sand, thoroughly mixed when dry and properly tamped with water and spread to a true surface, slightly pitched to the floor drain.

The main roof and those of the front and rear porches, as well as the dormer and bay window on the west side, are covered with 16-in. Oregon cedar shingles exposed 4 1/2 in. to the weather.

All lumber used in exterior finish was white pine, well fitted in place, properly primed and painted with selected colors.

The front and rear porches have 1 1/4 x 3 in. matched and dressed white pine floors with 7/8-in. yellow pine ceilings. Exterior steps have 1 3/8-in. treads and 7/8-in. risers.

All brick used in unexposed places was a good quality hard burned product laid in fresh lime and sharp sand mortar. In the exterior brickwork for the chimney and fireplace, a $22 selected quality was used throughout. All smoke flues are lined with fireclay, and a dead air space is allowed between the brick and flue lining in all parts of the chimney which are outside of the building. All exposed joints are neatly struck.

All inside walls and ceilings on both floors are lathed and plastered two-coat work. The first consisted of an even mixture of good quality brown hair mortar, and the final coat was a plaster of Paris hard finish, with selected tints for each room.

The cement, wainscoting in the kitchen and bathroom is 4 ft. 6 in. high, and the bathroom is marked off in blocks to imitate tile.

Heating a Suburban House by Furnace—The Living Room Looking Toward the Dining Room

The floors are double, the under one in the first, second and attic story rooms being matched No. 2 common fencing timber covered with building paper. The rear entry, as well as the living and dining room bays, have three thicknesses of tarred roofing felt between the floors.

The finish flooring in the reception hall, living and dining rooms is 7/8 x 1 1/2 in. face, red oak. In the kitchen, pantry, and hall leading from the kitchen to the reception hall the finish flooring is 7/8 x 2 1/4 in. face maple.

The bedrooms, closets, and hall in the second story have a finish floor identical with that in the living and dining rooms.

The front door is of red oak 1¾ in. thick. Other outside doors are of white pine. Interior doors which face hardwood trim are veneered with the same wood, and are 1⅜ in. thick.

The sash throughout are of 1⅜-in. white pine. Window frames are 1¾ in., rabbeted ½ in., of the same material as the sash.

The trim in the reception hall, living and dining rooms, is red oak. The remainder of the house is finished with a good quality of birch, except one bedroom which has a mahogany finish, and the bathroom, which is finished in white enamel.

The main stairway is of red oak, with 1⅛-in. treads and ⅞-in. risers, housed, glued, and keyed into wall and face stringers. The seat in the reception hall is built of red oak, is hinged and has a paneled oak back and front. The wall under the stairs is faced with a paneled design in red oak.

Cellar and attic stairways are constructed with 1⅛-in. maple treads and ⅞-in. yellow pine risers.

All interior oak finish and doors were given one coat of the Standard Varnish Co.'s "Kleartone" oil stain, which was lightly wiped when set. One coat of white shellac was then applied, and the final treatment consisted of two coats of "Elastic" No. 2 hard oil finish. The birch woodwork also had an initial coat of "Kleartone" oil stain, followed by a thin coat of shellac and two coats of "Elastic" No. 2 hard oil finish.

All oak floors, treads and risers of the stairway are finished with a good paste filler, one coat of S. C. Johnson & Sons' "Underlac" and one coat of their floor wax. The maple floors in the pantry, kitchen, and kitchen hall are finished with one coat of Johnson's No. 1 floor finish.

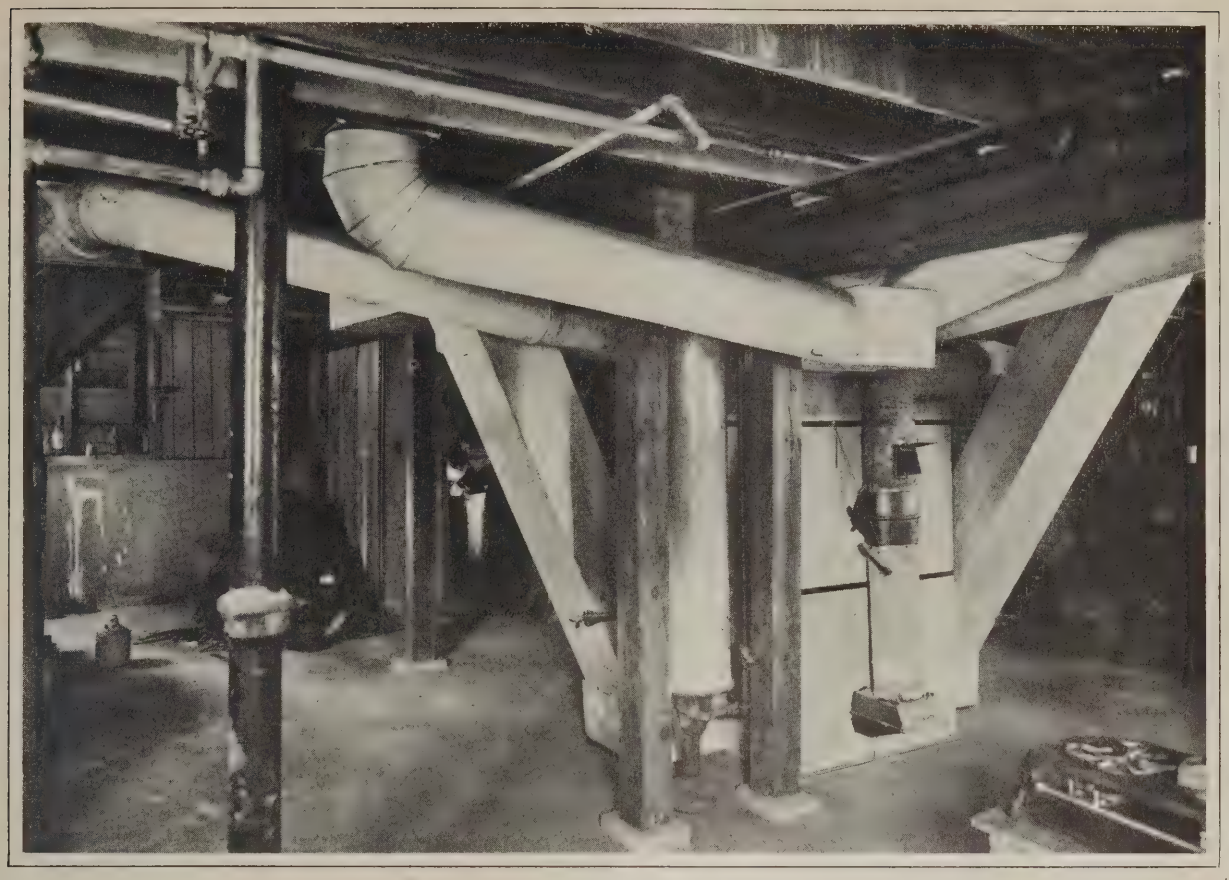
The kitchen is provided with a sanitary steel locker, and the bathroom is equipped with a steel medicine cabinet, both made by the Hess Warming and Ventilating Co., Chicago, Ill.

Plumbing fixtures are of modern types made by the Western Company, Chicago, Ill.

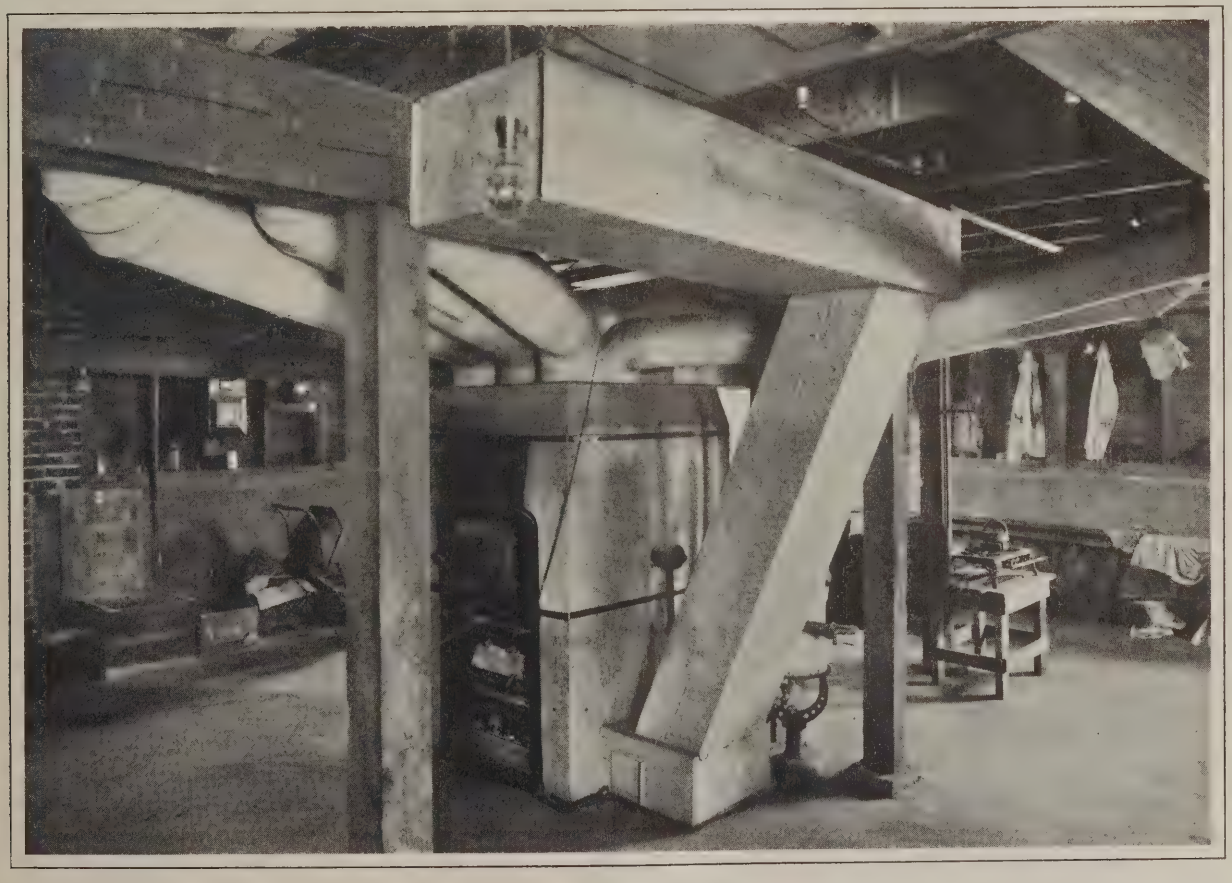
The house is wired for electric lighting and piped for gas. In the living and dining rooms clusters of five globes are provided, the rest of the rooms having single brackets distributed at the most advantageous points.

The basement plan reproduced herewith shows that the furnace equipment has been installed in the centre of the building in order that all supply pipes may be limited in their length. The location of the furnace and distribution of warm air pipes and cold air ducts are also shown in the pictures. The furnace installed in this residence is what is known as a "Leader," made by the Hess Warming & Ventilating Company, 1210 Tacoma Building, Chicago, Ill. It is designed to heat buildings which have a cubical content from 9000 to 15,000 cu. ft., according to the type of the structure, arrangement of rooms, exposures and climate. In this connection it may be stated that this residence has an approximate cubical content of 10,000 ft. and has been warmed satisfactorily

Heating a Suburban House by Furnace—Looking into Dining Room with the Kitchen Beyond



A Rear View of the Warm-Air Furnace Showing Smoke-Pipe Connection, the "Runs" to Some of the Stacks, the Hot-Water Boiler for Supplying the Plumbing Fixtures of the House, Also a Glimpse of the Cold Air Duct at the Right



Heating a Suburban House by Furnace—Another View of the Heater Showing the Feed Doors, the Piping System, and the Large Cold-Air Duct from the Front Hall

without any excessive coal bills being incurred.

The "Leader" furnace is all-steel construction and has double outer casing, which tends to prevent loss of heat in the cellar. The warm air delivered to the various rooms is pure and moist because of the fact that the furnace has welded joints to keep out dust and gases. Directly above the feed door is a large water pan, and in this large chamber over the fire the air is forced to evaporate a proportionate amount of water. In the house described herewith a cold water connection is carried from the main to a point directly over the water pan door, and a faucet supplies any amount of water that may be desired.

No outside air is supplied directly to the furnace, but two cold air ducts 12 x 24 in. make connection with wooden cold air registers in hall and dining room. Each cold air register measures 16 x 20 in.

The first floor with three rooms and reception hall is warmed with pipes and registers as indicated in the table below:

Living Room	12 in. warm air pipe	12 x 14 in. wall register
Dining Room	12 in. warm air pipe	12 x 12 in. wall register
Kitchen Hall	10 in. warm air pipe	10 x 12 in. wall register
Reception Hall	10 in. warm air pipe	10 x 12 in. wall register

The pipe supplying the 12 x 14 wall register in the living room continues to the second floor, where it warms bedroom "C." Four additional stacks of the sizes indicated are carried directly from the furnace to the upper quarters and distribute the warm air to the various rooms through registers, as shown in the following table:

Bedroom A	8 in. warm air stack	8 x 12 in. wafer register
Bedroom B	8 in. warm air stack	8 x 12 in. wafer register
Bedroom C	12 in. warm air stack	8 x 12 in. wafer register
Bedroom D	8 in. warm air stack	8 x 12 in. wafer register
Bathroom	8 in. warm air stack	8 x 12 in. wafer register

The basement plan shows the smoke pipe to be 8 in. in diameter. The registers throughout are of types made by the Tuttle & Bailey Manufacturing Company, New York City. On the first floor the company's special sidewall registers with an oxydized finish have been installed, and black japanned wafer wall registers are used on the second floor.

The equipment complete with all piping and registers represents an investment of $140, and its efficiency has been demonstrated by the test of actual service to the satisfaction of the owner and of the furnace maker.

The house described herewith was built for F. S. Collins, at No. 7019 Thirty-fourth street, Berwyn, Ill., from plans drawn by J. F. Knudsen, 1102 Tacoma Building, Chicago, Ill., at a cost of $4,500.

The building contractor superintending its construction was John Nystrom, of Austin, Ill.

Competitive Bidding for Building Contracts

The question of competitive bidding as applied to building construction is one that is perennially open to discussion, and it is not to be supposed that a practice which has been in existence, it might well be said, since and before Noah's Ark came off the ways, is to be changed except through the gradual and positive realization by one and then another interested individual that it is a custom "more honored in the breach than the observance," says Secretary Sayward, of the Master Builders' Association of Boston, in his "Monthly Letter." If this conclusion is reached, it must be supplemented by the fact that there is some other better method available. Such a method exists, is in use, and will probably become more and more the practice. I refer to "Cost-plus-a-fixed-sum."

Undoubtedly many conservative contractors of the older school hold that contractors must compete together so long as the owner insists on bowing down to that ancient idol, "the lowest price." That the "lowest price" thus secured is not the *best* price for the owner and in the end proves to be far from lowest price and does not represent the value that it has on paper, I have long contended. Furthermore, I believe that the "Cost-plus-a-fixed-sum" method, in proportion as it becomes more thoroughly and widely applied, will effect a competition among builders of great advantage to the owner and not ruinous to the contractor, as is the general tendency of "competitive estimating."

Competition under "cost-plus-a-fixed-sum" is competition "before the fact"; viz., before the owner comes forward with his proposition to build. That is to say, builders will have been demonstrating in structures which they have already erected how *economically*, speedily, and effectively they can serve the owner. Some will be able to do this more cheaply and better than others. Hence there will be a very real competition in which builders will vie with one another for the favor of owners who are to build in the future. There likewise will be a very notable cutting of cost to the owner, and it will be *a cost that will stay cut* because there will be no temptation to "skin the job" in order to avoid loss on the contract.

Such cost cutting as I have just indicated will be a direct result of the builder's endeavor to win a reputation for doing work economically and effectively. Contractors are nowadays making careful studies of the most effective way to perform work, an interesting example being the recent demonstration by one of the members of the association of a saving of 7 cents in cost per cubic foot of brick laid, effected largely by improved methods of transportation of material to the stagings. This cutting of cost would seem to be particularly a corollary and accompaniment of the "cost plus a fixed sum" method. It may, of course, be effectively and properly used in connection with ordinary competitive work. In that method, however, the contract price is always hanging over the builders' head, and, as already indicated, a careless, indolent or unscrupulous contractor is open to the temptation to save himself or add to his profits by skimping work and materials, by "skinning" subcontractors, or by other illegitimate practices, rather than by cutting cost through improved methods.

In addition to the advantages accruing to the owner, from the builder's point of view the "cost plus a fixed sum" method is acceptable by reason of cutting overhead expense in figuring work which he does not secure, removal of disputes over extras, establishment of more cordial relations between owner, architect and builder, and stimulus to perfect more efficient methods of working which must necessarily act to increase the builder's confidence and self-respect. The subcontractor and material man will likewise benefit through the removal of temptation to "skin" them in effort to recoup by the general contractor.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

IN Fig. 42 is a beam loaded so there is a tendency to bend, which tendency is resisted by compression in the upper fibers and tension in the lower fibers. This is shown graphically by the two triangles, the horizontal shading representing the compressive stress and the vertical shading representing the tensile stress. The stresses happened in this case to be equal as the material is uniform and equally strong in tension and compression, the beam being of uniform cross section. The overlapping portions of the triangle cancel each other, which leaves the triangles shown in Fig. 43.

Because of this canceling out of common factors some writers say the resisting moments in a beam act about the neutral axis, but the statement is not correct. In a few cases no error is introduced by acting upon the assumption that the moments balance about the neutral axis but the statement is

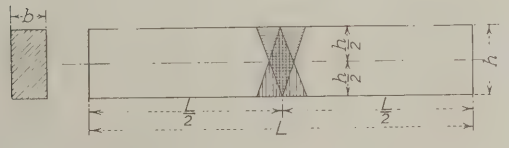


Fig. 42—Compressive and Tensile Force Triangles in a Beam

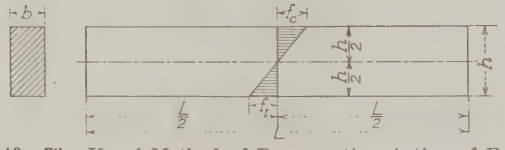


Fig. 43—The Usual Method of Representing Action of Resisting Forces in a Beam

Design of Beams, Girders and Trusses

not true for all cases so should never be used, as it may introduce error.

In Fig. 43 let the small f stand for the fiber stress, that is the unit stress, which is generally expressed in pounds per square inch. Then f_c = unit compressive stress and f_t = unit tensile stress. When the stresses are equal the letter f is used without a subscript.

All forces must act through the center of gravity of bodies or areas in order to effect a movement of the whole without turning it, as about an axis. The center of gravity of a triangle is one-third the distance from the base. In Fig. 42 the triangle on one side of the neutral axis has a hight equal to one-half the total hight of the beam, therefore $\frac{h}{2}$ is represented by —. The width of the triangle at the base is represented by the unit stress at that place, f. The triangle is a force triangle and the area is equal to the total force exerted on it. This area is found by the ordinary rule for areas of triangles: Half the base multiplied by the hight, or

$$A = \frac{f}{2} \times \frac{h}{2} = \frac{fh}{4}$$

The length j is known as the moment arm. The moment arm is the distance between the centers of gravity of the tension and compression members. The lower triangle is the compression member, if we assume the beam to be a frame, and the upper triangle is the tension member, the neutral plane being the dividing line. Since the forces act at a point and this point is the center of gravity of the member then the total force in compression, $\frac{fh}{4}$, acts to balance the total force in tension, $\frac{fh}{4}$, with a moment arm $= 2 \times \frac{2}{3} \times \frac{h}{2} = \frac{4h}{6}$.

The moment arm times the compressive (or tensile) force gives the moment of resistance per unit of breadth,

$$M_r = \frac{4h}{6} \times \frac{fh}{4} = \frac{fh^2}{6}$$

This reasoning has been based on a breadth equal to 1, or unity. To make practical use of the expression the breadth, designated by b, must be introduced. This gives the expression for the moment of resistance of a beam of homogeneous material and rectangular cross-section commonly seen in textbooks,

$$M_r = \frac{fbh^2}{6}$$

Some writers use d (depth) instead of h (hight), but as d is used these days to indicate the depth from the top of a reinforced-concrete beam to the center of gravity of the steel reinforcement (the real depth of a reinforced-concrete beam) the letter

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 31 of the February issue.

h is preferred when the total over-all hight or depth of a beam is meant. In a reinforced-concrete beam the concrete below the center of the steel is used solely for bond and protection and is not considered in computations to ascertain the strength of the beam.

The moment of resistance of a rectangular beam of homogenous material is said to be "the section modulus times the fiber stress." This means that the expression

$$S = \frac{bh^2}{6}$$

is an expression *denoting the effect of the shape of the beam* or the resistance it offers to destruction by loading. No matter what the material or what the stress used the effect of the shape is the same and this is called the "section modulus," the word "modulus" meaning "measure." It is, therefore, the measure of the resistance of the shape.

Every shape has a section modulus designated by S in the steel manufacturers handbooks. The calculation of the section modulus for a beam with rectangular cross-section has been given, as it is the most simple section to handle without confusing the reader with the mass of figures necessary.

To compute the section modulus for any shape first assume some axis passing through the center of gravity. Then divide the area into any number of layers desired by lines parallel to the axis. Find the area of each layer and the distance from the axis to the center of gravity of each layer. Multiply each layer by the square of the distance from the axis to the center of gravity of the layer and add the products. Thus is obtained the Moment of Inertia, an expression denoting the disinclination of the body to move as a whole, which disinclination must be overcome before any stress is set up. The Moment of Inertia divided by the distance from the axis to the highest stressed fiber gives the Section Modulus.

For a rectangular beam the moment of inertia is

$$I = \frac{bh^3}{12}$$

and this divided by the distance from the neutral axis to the most distant fiber gives the section modulus

$$S = \frac{bh^3}{12} \times \frac{2}{h} = \frac{bh^2}{6}$$

the distance from the neutral axis to the skin being

$$\frac{h}{2}.$$

The section modulus is dependent entirely upon the shape and is independent of the weight of a beam and of the strength of the material in the beam. Tables giving the section modulus when once computed are good for all time. In steel manufacturers' handbooks tables are given of the section moduli for every shape rolled so the proper beam may be selected when the bending moment is known and the fiber stress is known.

Let M = moment (bending moment = resisting moment) in inch pounds.
S = section modulus in inches.
f = allowable fiber stress in pounds per square inch.

then $M = Sf$ and $S = \frac{M}{f}$

A common method for finding the Moment of Inertia and the Section Modulus for T sections, L's, etc., is to first assume a rectangular section having dimensions equal to the extreme outside dimensions of the shape. Find the properties (i.e., I and S) for this rectangular section. Next take each hollow portion considered as a smaller rectangular section and find the properties. Adding the results for each of the pieces cut away and subtracting the sum from the properties for the entire section the properties are found for the remainder.

Example. What is the section modulus for a hollow rectangular section having an outside width of 8 ins. and an outside depth of 12 ins., the thickness of the shell being 1 in.? Axis horizontal.

S (for entire section) =

$$\frac{bh^2}{6} = \frac{8 \times 12 \times 12}{6} = 192$$

S (for interior section) =

$$\frac{bh^2}{6} = \frac{6 \times 10 \times 10}{6} = 100$$

S (for metal section of hollow shape = 92 ins.

Example. What is the section modulus for a T-section 12 ins. deep over all with an extreme width of 8 ins. and with stem and flanges each ½ inch thick? Axis horizontal.

$$S \text{ (for entire section)} = \frac{bh^2}{6} = \frac{8 \times 12 \times 12}{6} =$$

192 ins.

$$S \text{ (for section on one side)} = \frac{3.75 \times 11 \times 11}{6} =$$

75.625 ins.

Multiplying by $2 : 2 \times 75.625 = 151.25$ ins.

The S for the section $= 192 - 151.25 = 40.75$ ins.

In Fig. 42 and Fig. 43 the triangles do not represent an actual movement or lengthening on the tensile side or shortening on the compressive side. They are force triangles which represent the *amount of resistance* to lengthening or shortening. The fiber stress is called by some writers the "skin stress," a very good term, for it is actually the stress in the outer skin, which is assumed to have no thickness or has an infinitesimal thickness. The stress varies uniformly as a straight line to zero at the neutral axis. Therefore on each layer between the skin and the neutral axis the stress is less than that assumed in the computations. The total stress is equal to the average stress multiplied by the distance from the neutral axis to the skin.

(To be continued)

A Modern Brick-Veneer Frame Church

A Building Which Was Erected Under Three Contracts: Foundation, Superstructure and Heating—Some Interesting Figures of Cost

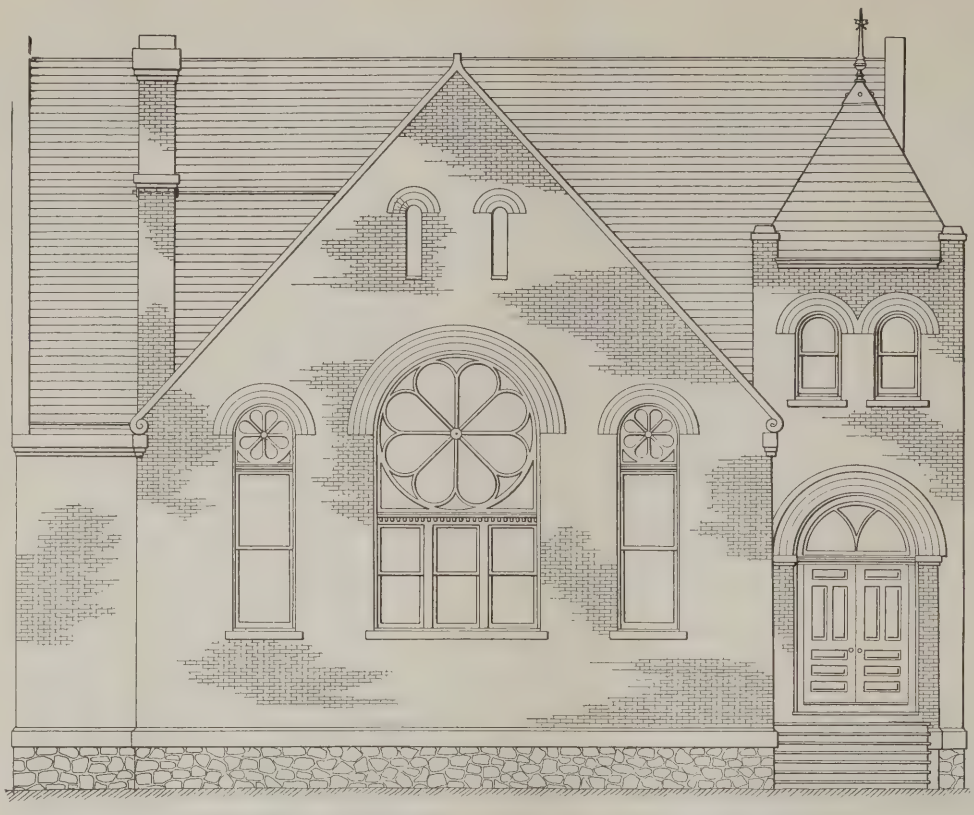
IN many parts of the country the brick-veneered form of construction is very popular by reason of the fact that a building so put together is less expensive than one entirely of brick, yet at the same time, it gives a more solid and substantial appearance than if it were wholly of frame. Another point is the reduced cost of heating in the winter months, and the more comfortable temperature within during the hot summer months. A good example of a church building constructed with a veneer of brick upon a frame superstructure is illustrated upon this and the pages which immediately follow. A feature of the work is that it was done under three contracts—one covering the foundation; another the complete superstructure, and the third the heating.

A Modern Brick-Veneer Frame Church—Edgar A. Payne, Architect, Carthage, Ill.

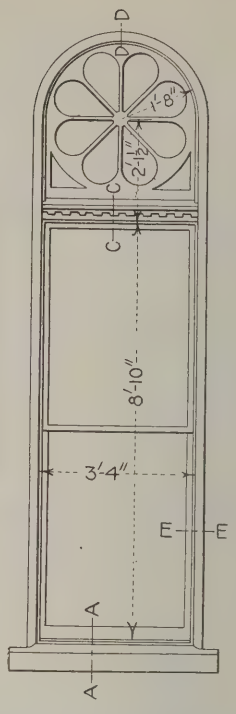
The half-tone engraving upon this page shows the general appearance of the church as it was actually completed, while the floor plan upon another page shows the interior arrangement except that the front was reversed and the vestibule placed on the opposite side, thus putting the chapel at the right of the entrance instead of to the left as now appears on the plan. Both the auditorium and the chapel are reached from the vestibule, the two rooms being separated by rolling partitions. Directly in the rear of the pulpit or rostrum is the baptistry, with dressing rooms on either side, and direct entrance to each from out-of-doors. The various details which are presented clearly indicate some of the more important features which will interest the builder.

According to the architect's specifications the foundations are of local rubble stone, 18 in. thick to grade, faced both sides and neatly pointed. The portion of the foundation walls exposed above grade is faced with pitched face range work with level beds and square joints.

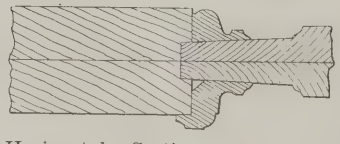
The contract for the superstructure included all materials and labor of every kind required to fully equip the building above the foundations, except the heating, as shown on the drawings. The timbers are of well seasoned pine and of sizes shown on the vertical and longitudinal sections of the church. The roof trusses of the main building are of selected yellow pine timbers, each member being made continuous by overlapping at the joints. The ceiling joists are run horizontally from truss to truss and set in gains in the outside member of the truss.



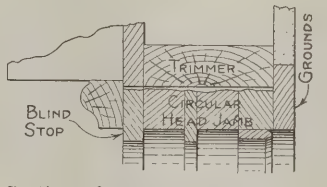
Front Elevation of the Church—Scale 3/32 In. to the Foot



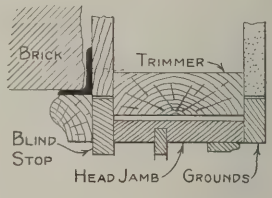
Elevation of the Smaller Windows in Front and Sides — Scale ¼ In. to the Foot



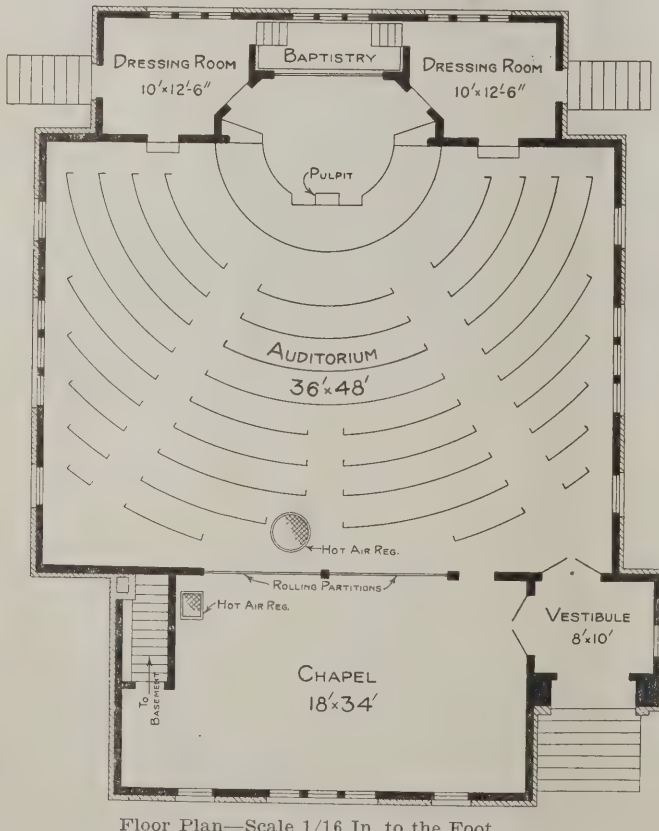
Horizontal Section of Front Doors—Scale 3 In. to the Foot



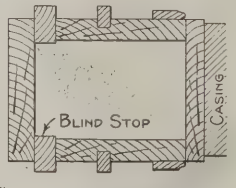
Section of Head on Line D-D of the Elevations—Scale 1½ In. to the Foot



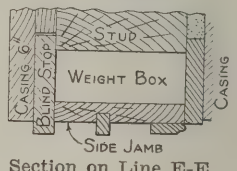
Details of Head of Square Top Window Frames



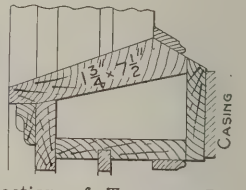
Floor Plan—Scale 1/16 In. to the Foot



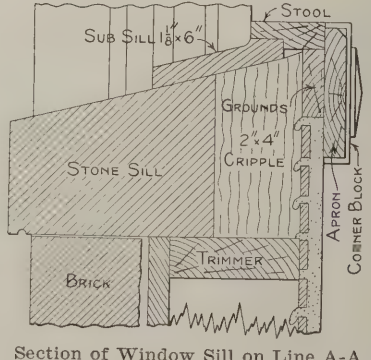
Section Through Mullion on Line B-B of Elevation of Large Window—Scale 1½ In. to the Foot



Section on Line E-E



Section of Transom Bar on Line C-C



Section of Window Sill on Line A-A of the Elevations—Scale 1½ In. to the Foot

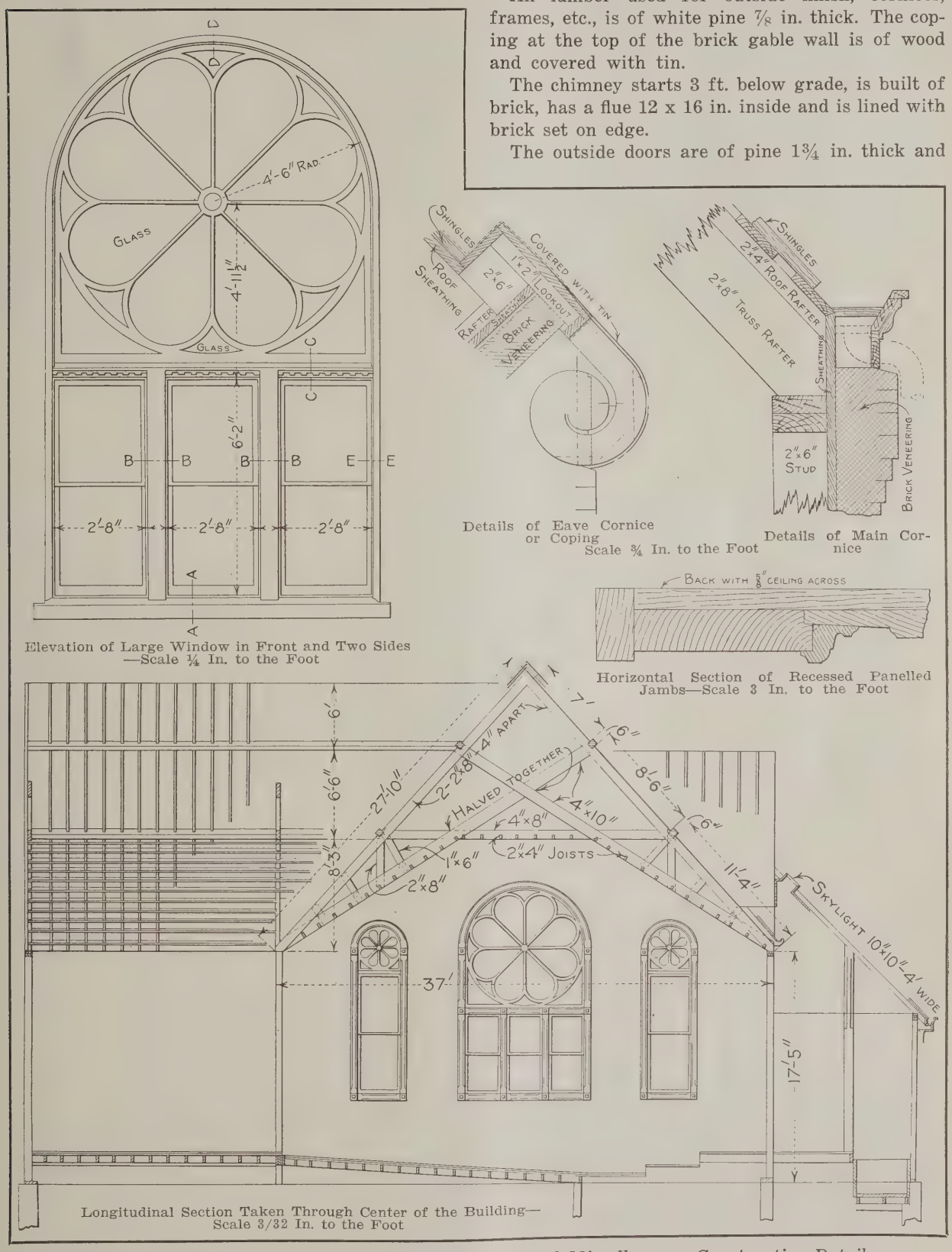
A Modern Brick-Veneer Frame Church—Plan Elevation and Miscellaneous Constructive Details

All outside walls are covered with shiplap sheathing put on diagonally and covered with heavy building paper. The outside of the entire building is veneered with selected red brick of an even color and tied every sixth course to the wall by having shingles exposed 5 in. to the weather. The hips are covered with galvanized iron hip shingles and the ridges are finished with 3-in. galvanized iron ridge roll. The valleys are lined with 14-in. tin. The eaves have secret gutters lined with tin.

All lumber used for outside finish, cornices, frames, etc., is of white pine ⅞ in. thick. The coping at the top of the brick gable wall is of wood and covered with tin.

The chimney starts 3 ft. below grade, is built of brick, has a flue 12 x 16 in. inside and is lined with brick set on edge.

The outside doors are of pine 1¾ in. thick and



Elevation of Large Window in Front and Two Sides —Scale ¼ In. to the Foot

Details of Eave Cornice or Coping Scale ¾ In. to the Foot

Details of Main Cornice

Horizontal Section of Recessed Panelled Jambs—Scale 3 In. to the Foot

Longitudinal Section Taken Through Center of the Building— Scale 3/32 In. to the Foot

A Modern Brick-Veneer Frame Church—Section and Miscellaneous Constructive Details

30d cut casing nails driven into each stud. The window sills are of Bedford stone of shape and size as shown by the details.

The roofs are covered with 1 x 6 in. sheathing boards placed 3 in. apart and covered with red cedar

panelled with raised mould outside and flush mould inside. The recessed jambs for the entrance doors are also panelled and moulded to correspond with the doors. A horizontal section through this panelling is given among the details. All inside doors

are flush moulded and have rabbeted frames. The windows have box frames made as shown in the details, and are hung with weights on braided cotton sash cord. The glass for the basement windows is plain, double strength, while that of all other windows and transoms is of art leaded stained glass.

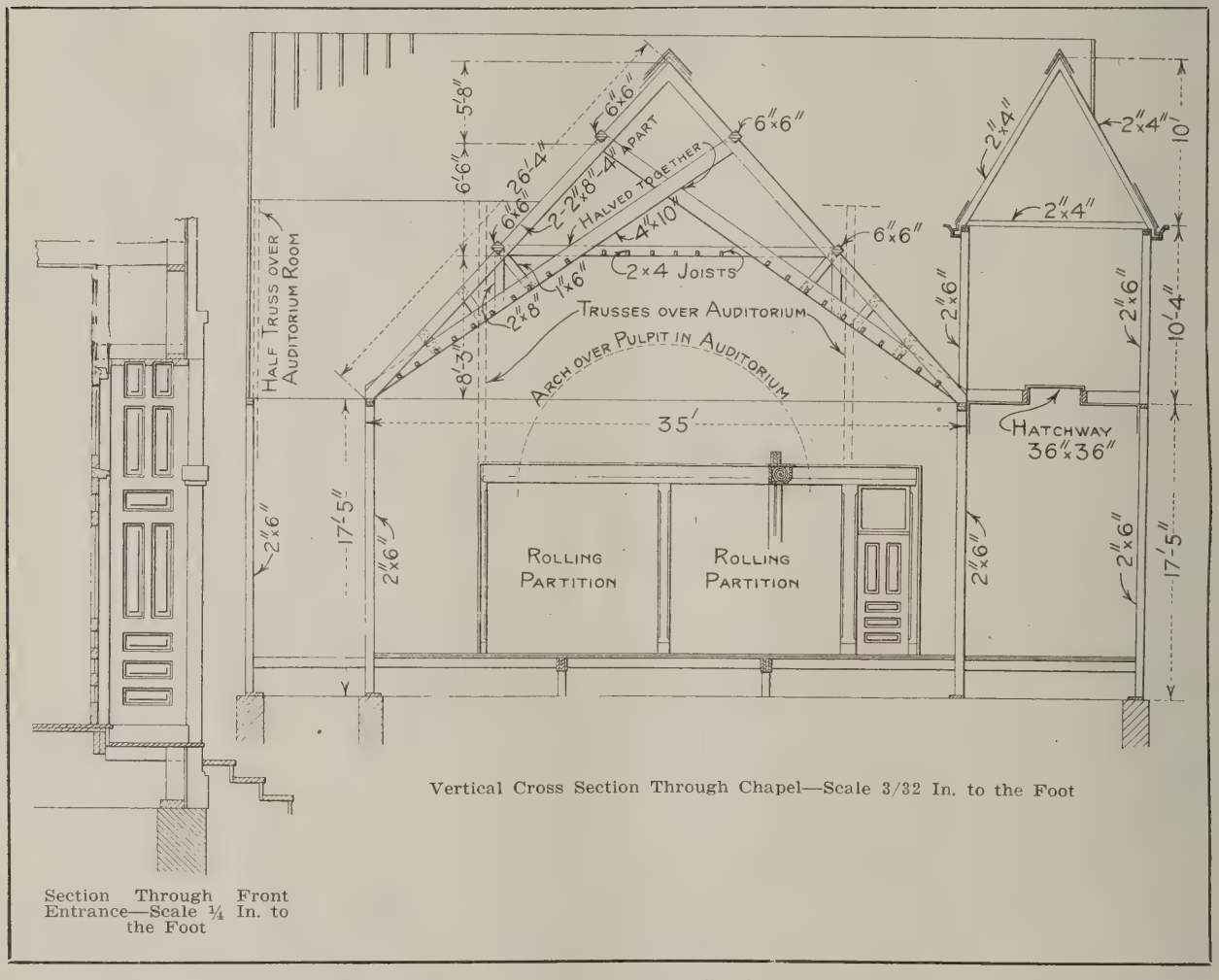
The floor of the auditorium is "bowled," the first section next to the rostrum being level, and the balance rising from the rostrum toward the rear and sides at the rate of 5/8 in. to the foot. The joists are framed into girders supported on 6 x 6 in. posts. The girders are built up of selected 2 x 10-in. stuff sized and dressed to even thickness. The floors in the auditorium and chapel are lined with shiplap sheathing placed diagonally on the joists, while the finish floors are of 4-in. Southern yellow pine. The interior trim is of selected Southern yellow pine, smooth wrought and finished natural with Berry Bros. varnish. The hardware is plain old copper sand-finish bronze of uniform design throughout.

The building is painted outside in three-coat work with "Dutch Boy" lead and oil.

The building is heated by means of hot air, a Round Oak furnace made by the Estate of P. D. Beckwith, Dowagiac, Mich., being used for the purpose.

The total cost of the church building was $4,698, apportioned among the three contracts as follows: Foundation, $497; superstructure, $3,987; heating, $214.

The brick-veneered frame church here shown was erected at Plymouth, Ill., in accordance with plans and specifications furnished by Architect E. A. Payne of Carthage, Ill., who had direct supervision of the work.



Vertical Cross Section Through Chapel—Scale 3/32 In. to the Foot

Section Through Front Entrance—Scale 1/4 In. to the Foot

A Modern Brick-Veneer Frame Church—Section and Miscellaneous Constructive Details

Methods of Estimating

A building contractor in discussing methods which make for profit or loss in estimating says that before any contractor can estimate intelligently he must first know the exact cost of his goods. Right here is the weakness in a good many offices. Cost prices are frequently made up from lists prepared a few years ago, before wages and cost of materials went skyward. Or, often, contractors carelessly add to a former cost list the approximate percentage of increase; a computation that is frequently in error and set altogether too low.

Contractors themselves do not agree upon the best way to go at the estimating proposition. Many contractors, and successful ones, too, instead of figuring the net cost of work and then adding percentage of profit, simply figure every item, gross (cost plus profit); the total of all items added forming the sum of the complete bid.

Other contractors maintain that the only correct way is to take the net cost of each item, add these together and then add the percentage of profit. There are advantages to each system and no doubt exponents of each system will continue to do it their own particular way.

Convention of Builders Exchanges

Action Taken of Vital Interest to Architects and Builders of the Country—Old Officers Re-elected

WITH an organization doubled in strength since its last annual session, the National Association of Builders Exchanges held a very successful convention in Columbus, O., January 26th, 27th and 28th. Action of vital importance to the architects, builders and engineers of the country, as well as to the public was taken. The most important topic on the program was that relating to the standard documents of the American Institute of Architects upon which a report was presented by the special committee of the association as the result of several conferences with a similar committee of the Institute in Philadelphia. This report was ratified and the committee was continued for the purpose of further conferences in the expectation of having the new General Conditions ready for final adoption by April 1st. The report indicated that a spirit of fairness is manifested on both sides and that the ultimate conclusions will be more nearly equitable and just than those which have prevailed heretofore in the relationship of the three principal factors in building operations.

In addition to this subject, the convention considered a number of other matters and was characterized by an earnestness which marked it as thoroughly businesslike from start to finish. For the first time a duly accredited delegation was present from New York City and on the roster of attendance were found other representatives who have not been identified with the association heretofore.

According to a statement made by President Lewman, the association now represents a constituency of builders' organizations with an individual membership of over eight thousand.

HARRY L. LEWMAN OF LOUISVILLE, RE-ELECTED PREST. NATIONAL ASSOCIATION OF BUILDERS EXCHANGES

The Opening Session

The opening session of the convention was called to order in the assembly room of the Virginia Hotel on Tuesday afternoon, January 26th, at 2 o'clock, by President H. L. Lewman of Louisville. The invocation was pronounced by Dr. Washington Gladden of Columbus. An address of welcome on behalf of the State of Ohio was then made by Hon. Frank B. Willis, newly elected Governor. Among other things, the governor said:

"It has occurred to me that this organization, made up of representatives of many of the states, will certainly be able to make some contributions not only toward the erection of better material structures, but also toward the general benefit of society. I think that the men who build better homes for the people are upbuilders of the race and public benefactors. The kind of houses in which we live and our environment have a tremendous influence upon our national and civic life. The character of a people is shown by the kind of buildings it erects. For instance, in India the architecture suggests mystery; in Egypt, power and majesty; in Greece it is beauty and symmetry; in the Gothic art of Europe, an enlivened sense of religious devotion. Of what does our architecture speak? One thing it suggests is comfort, another convenience, and still another utility. The ordinary man nowadays can live in much greater comfort than the rich knight and lord of one hundred years ago.

"May I suggest to you with no desire to emphasize undesirable conditions that the problem of unemployment is now prominent in many cities. There are thousands of honest men and women who want work and cannot get it. If you can accelerate building operations, I ask you to do so now and help in the solution of this problem. As we build structures of steel and stone, let us all remember that when these have crumbled to dust there will still remain the more lasting and enduring thing—human character."

Colonel Barger, Director of Public Safety, extended the welcome of the city in the absence of the mayor who was ill. A response on behalf of the association was made by Henry Otis, president of the Detroit Builders and Traders Exchange. Brief remarks were made by John W. Boren, representing the Ohio State Association of Builders Exchanges and by Edward A. Roberts, secretary of that organization, who spoke for the building interests in a way to command close attention.

The balance of the session was devoted to the announcement of convention committees of which there were 13 in number.

The Second Session

The features of the morning session on Wednesday were the address of the president and the report of the Standing Committee on Contracts and Specifications. Vice-President John Trainor of Baltimore then took the chair and President Lewman read his annual address.

President Lewman's Address

In reviewing the past activities of the National Association the president pointed out that the results accomplished were beyond the hopes of even the most optimistic and that the increase in membership had been 100 per cent. He said that the members and the building interests generally now realize more fully than ever before the importance and necessity of hav-

ing national organization and co-operation if they are to guard against the many abuses prevailing in the building business. As a result of this general awakening the movement for equitable contract conditions is now recognized as a fixed and live business issue. Many evils have already been corrected in harmony with it and the use of drastic discretionary provisions and illogical contract conditions have materially decreased.

The greatest factor in the year's progress, the president stated, and one which will eventually produce the most beneficial results, has been the realization of the

VICE-PREST.—JOHN TRAINOR OF BALTIMORE

GENERAL COMMISSIONER—I. H. SCATES OF BALTIMORE

members of the National Association of their great organized strength and the results to be obtained by wielding it with equity and prudence. It is now clear that the solution of many problems seriously affecting the interests of the members can only be attained through national organization and co-operation. As local exchanges assemble individual interests for mutual protection and benefits, so the National Association converges all these units into a whole in order that its influence may be powerful in promoting and protecting all interests which are beyond the scope of individual action.

"It demonstrates the necessity for, and assists in the successful operation of our local exchanges.

"It fraternalizes our exchanges, placing them in contact with matters that concern their interests and forms a bond of union that is important and of great benefit to our business.

"It creates a medium by which matters of general interest can be conducted.

"It keeps us in close contact with modern methods by the interchanging of ideas at our yearly meetings."

President Lewman pointed out that two years ago the movement was launched for the reform of contract conditions and it is now established on a sound basis with confident assurances that the members will shortly see the full and complete realization of their hopes. He referred to the recent joint meeting in Philadelphia of a committee composed of representatives of the American Institute of Architects and of the National Association of Builders' Exchanges when it was agreed to recommend the principles of the movement to the respective associations. The contentions of the association for reform have been adopted by many architects outside of the Institute and have met with great favor and strong endorsement by owners, real estate interests, and in fact, practically all business interests that come in contact with construction.

In passing to the consideration of the new matters which should engage the attention of the association the president laid stress upon the grave and difficult task confronting it in maintaining the new conditions which have been created. He stated that Article X of the new contract documents means "arbitration" of all questions except a few excluded details. Many architects have already reached the conclusion that the interests of the owner, contractor, and architect are alike advanced by general arbitration of all questions. A minority still insist that the architect should have full control over all the rights of the contractor and be able to make or break him without control of any impartial board of arbitration. It is possible under this Article for an architect who is unfair to the owner and building interests to insert in his specifications a provision giving him the final right to interpret the meaning of the plans and specifications without appeal. An act of this nature would be contrary to the spirit and true intent of Article X, as this would change its basic provision of "arbitration" to "his interpretation without appeal," which completely reverses its motive and principle.

We have been met in such a spirit of fairness by the best of the architects that we cannot believe such a course to represent the preponderating view of the profession and wish first to see if architects will not generally construe this arbitration clause broadly, or at least be educated in a comparatively short time to practically general arbitration. There are two ways in which this attitude can be greatly assisted. The first is by showing our own good judgment by working under arbitration clauses. Some architects have expressed the fear that building operations will be impeded by unnecessary demands for arbitration, but placing the burden of expense upon the loser prevents this. It is our part to show that this fear is unfounded, as it really is.

We can take another step forward by appointing a committee of arbitrators in each Exchange and requesting the local Chapter of American Institute of Architects or the local Society of Architects to appoint a like committee. Then the Exchange should ask the architects to provide in the specifications that the arbitrators shall be chosen from these committees. "I am satisfied," the president said, "that the use of such means will lead the fair-minded architects to give full scope to arbitration in the contracts.

"Our present efforts should be educational and we look for such success in this direction as to render unnecessary any further appeal to the legislatures to prohibit discretionary clauses, such as was recently so enthusiastically voted by a large majority of their members in two states.

"I think the question of the proper relationship and conduct of business between the contractor, sub-con-

SECRETARY—J. M. VOLLMER OF LOUISVILLE

TREASURER—G. C. SCHROEDER OF GRAND RAPIDS

tractor and material men should be vested in a special committee for consideration and recommendation at the next meeting. This furnishes a field for thoughtful, careful work.

"The appointment of a committee on the standardization and definition of materials for use in specifications and commercial dealing is of no less importance. Our business should be built around the framework of accurate description. It is high time that we eliminate

the common phrase, 'of the highest grade, as directed by or to the satisfaction of the architect.' We should have the grade, quality and all essential conditions accurately defined in writing instead of in some man's mind for future interpretation."

The president recommended the appointment of a publicity committee, with power to edit a paper, if it can be done without expense. He also suggested the appointment of a finance committee, a committee on extension of membership, and that the association seriously consider and take steps to provide some definite ethics governing competitions and the awarding of contracts, particularly the question of compensation for bidders when proposals are invited and the improvement abandoned.

He said committees should be appointed to confer with the National Credit Men's Association, The Surety Association of America, the Insurance Underwriters, and Building and Loan Associations in order to further mutual interests. A committee should be appointed properly authorized to incorporate the National Association of Builders' Exchanges. He emphasized the importance of endeavoring in every reasonable way to trade among the members, to follow the principles of reciprocity wherever practicable and that the organization show more of the fraternal spirit in dealing with each other's business interests.

Panoramic Picture Showing a Few of the Delegates at the Recent Convention of Builders' Exchanges held in the City of Columbus, Ohio

Report on Contracts and Specifications

At the conclusion of Mr. Lewman's address, which was given liberal applause and a standing vote of thanks, the report of the Committee on Contracts and Specifications was presented by Herbert J. West of Baltimore, former president of the association and chairman of this committee. This report was received with marked interest by the convention, covering as it did the negotiations with the American Institute of Architects for better conditions in the performance of building work. Reference to this conference appeared in the issue of *The Building Age* for November last. The committee recommended the passage of a resolution directing that it be empowered to continue negotiations with the American Institute of Architects in regard to the Standard Documents.

The Third Session

In the afternoon an address on "Better Contract Conditions" was given by William B. King of Washington, D. C., general attorney of the associa-

tion. In the course of his remarks Mr. King said:

"It is a recognized fact that building contracts are full of uncertainties. These, unfortunately, by the terms of the contract, are decided at the discretion of the architect. When a contract is signed, it ought to provide for absolute equality. If it does not do this, it fails of its object. In many critical places the existing form thus fails. Contracts should be framed on the basis of right not on the basis of arbitrary power. At the conference held in Philadelphia last September with representatives

A Trio of Interested Attendants

of the American Institute of Architects, we found no less than two hundred faults in existing forms of contracts.

"At the conclusion of the meeting lasting two days an agreement had been reached on sixty-three articles of joint regulations. The document is in many respects a compromise of conflicting views. The architects abandoned some positions and we abandoned some. In making many of these compromises I believe that we were substantially right. We feel that if this new form of contract and standard documents is adopted it will be found to have many points of improvement and be vastly better than the present Uniform Contract or any of the local agreements existing in various cities. The fact that the American Institute at their last national convention invited a representative of this association to deliver an address, showed a spirit of consideration for the rights of builders, which, to my mind was very significant. An important matter we are working to correct is the relationship between general and sub-contractors. It is our effort to cause a regulation that will provide for the general contractor submitting a list of sub-contractors for each job to the architect before the contract is signed. Some objections have been raised to arbitration of the architect's decisions on the score that this will complicate building operations, but experience shows that arbitration insures against unjust actions or such as call for arbitration. I believe that we are in a fair way to have a form of contract that will afford equal rights to the owner, architect and contractor."

A resolution receiving the report and referring the same to the board of control for further consideration preparatory to the meeting with the architects in Washington early in March was adopted unanimously.

An address by John Trainor, vice-president of the association on "Relation of General Contractors, Sub Contractors and Material Dealers," created considerable enthusiasm. Mr. Trainor advocated a code of ethics for adoption by all exchanges to regulate dealings between these elements in building operations. He said that every local exchange should work for clean plans and specifications on the principle of the square deal. He urged that preference be given to exchange members in awarding contracts, fostering a spirit of co-operation. In concluding he advocated arbitration of difficulties as a means of encouraging harmonious relationship and just treatment.

The Banquet

The annual banquet of the association was held in the main dining room of the Virginia Hotel at 6:30 o'clock on Thursday evening with an attendance of almost two hundred persons including many ladies. Officers of the association and a few invited guests occupied places at the speakers' table. The affair was informal and sociability was fostered by the appointment of a host at each round table.

For the speaking program President Lewman introduced Col. John Y. Bassell of Columbus, honorary member of the association, as toastmaster. The first speaker was Mr. Trainor of Baltimore, who paid a tribute to the association and especially complimented the ladies. He extended an invitation for the next convention to be held in Baltimore, "where reside the handsomest ladies in the world outside of Columbus." Other speakers were: George C. Schroeder of Grand Rapids, W. B. King of Washington, Herbert J. West of Baltimore, S. F. Bennett of Baltimore, J. M. Vollmer of Louisville, E. R. Embry of Washington, E. T. Thurston of San Francisco, A. H. Shanks of Grand Rapids and Charles A. Bowen of Detroit. Commissioner Scates concluded the program with a plea for reciprocity and the exemplification of the spirit of the golden rule in all dealings among builders.

The Fourth Session

A lively discussion over a recommendation from the finance committee to increase the per capita tax to fifty cents characterized the session on Thursday morning. A strong element in the convention felt that this recommendation should not carry but that the tax should be left at the present figure, namely twenty-five cents. It was finally ordered that the per capita tax should remain as at present. Some additional source of revenue is anticipated which may afford needed funds for the organization.

Goodbye But Not Farewell

To the Delegates and Visitors to the Fourth Annual Convention of the National Association of Builders' Exchanges, Hotel Virginia, Columbus, O., Jan. 26-27-28, 1915

Cartoonist Ireland's idea of the ONLY BIG BUILDERS, who were not represented at this Great Convention, because the boats on the River Styx make no return trips.

Invitations for the next convention were received from Baltimore, whose spokesman was Vice-President Trainor; from Indianapolis, whose attractions were presented by C. C. Pierson, and Grand Rapids, represented by Charles H. Alden. Considerable excitement was created by the delegations favorable to each of these cities. In taking the vote it was announced that each exchange would be entitled to one vote for every ten members enrolled. On this basis the result was as follows: Baltimore, 283; Grand Rapids,

123; Indianapolis, 14. Although the vote favored Baltimore, there was a very friendly feeling for Grand Rapids, with assurances that the next convention would probably favor the Michigan City.

Election of Officers

So much time was taken up with the foregoing matters that it was necessary to hold an extra session in the afternoon when officers were elected and a small amount of routine business yet remaining was concluded. By unanimous action the officers for the last year were re-elected. These were:

President...H. L. Lewman, Louisville, Ky.
Vice-Pres...John Trainor, Baltimore, Md.
Gen'l Com'r...I. H. Scates, Baltimore, Md.
Secretary....J. M. Vollmer, Louisville, Ky.
Treas.G. C. Schroeder, Grand Rapids, Mich.
General Counsel..W. B. King, Esq., Washington, D. C.

The board of control was increased by the addition of the names of Henry G. Otis of Detroit, J. T. Rose of Atlanta, I. H. Scates of Baltimore and C. J. Kelley of New York.

On invitation of the management of the Panama-Pacific Exposition in San Francisco, the week of October 18th was designated as "American Builders' Week," at the Exposition.

The delegates to the convention were profuse in their thanks to the Columbus Builders & Traders Exchange for the splendid arrangements made for their entertainment.

National Conference of Secretaries of Builders' Exchanges

A national conference of secretaries of Builders' Exchanges was held in Columbus, Ohio, on January 25th preceding the convention of the National Association of Builders' Exchanges. It was originally intended to hold this conference in Dayton, but it was found more convenient to the secretaries to meet in the convention city. The attendance was not as large as at some previous conferences, due to the fact that many of the men were busily engaged in their home cities and coudd not get away and to other causes. The sessions were held on Monday and were presided over by Charles Elmer Smith, secretary of the Master Builders Exchange of Philadelphia and president of the association.

There was no fixed program, but a general round table discussion was had of topics connected with the work of these active managers in their various localities. It was decided to take an expression of opinion relative to holding the national conferences in the future during the summer months, when the secretaries can give up the necessary time from their regular duties to a larger extent than during the winter months.

The secretaries who registered at the Columbus conference were as follows:

Prest. Chas. Elmer Smith, of Philadelphia, Pa.
Sec'y W. A. Phelps, of Dayton, O.
H. R. Brady, of Buffalo, N. Y.
J. A. G. Badorf, of Kansas City, Mo.
Lee Parrish, of Nashville, Tenn.
A. H. Shank, of Grand Rapids, Mich
E. M. Tate, of Pittsburgh, Pa.
Charles A. Bowen, of Detroit, Mich.
R. L. McChesney, of New Orleans, La.
P. A. Bendfeldt, of Richmond, Ind.
Jno. A. Hauck, of Indianapolis, Ind.
Chas. E. Welsh, of Washington, D. C.
I. H. Scates, of Baltimore, Md.
Clark Shelly, of Omaha, Neb.
J. Y. Gamble, of Alliance, O.
A. J. Fowler, of Scranton, Pa.
W. J. Albrecht, of Toledo, O.
R. B. Thomas, of Lima, O.
Clarence Metters, of Columbus, O.
R. E. Rutherford, of Newark, O.
J. M. Vollmer, of Louisville, Ky.
Wm. J. Woolley, of Evansville, Ind.

The new president of the association is W. A. Phelps of Dayton, Ohio.

New York's Building Outlook

According to some of the speakers at the recent dinner of the New York Building Material Dealers Exchange, Greater New York and vicinity is likely to witness greater prosperity in the building industries in 1915 than has been the case in several years past. Among the speakers was ex-State Senator John B. Rose, president of the Greater New York Brick Company, who voiced the prevailing sentiment in the following words:

"Building construction has not been what it should have been for almost a decade, but lately we have been noting a change for the better. Builders who have projects under way have been inquiring for prices for great quantities of materials, and in a tone that seems to imply an impending boom in the business.

"In addition, prices for building materials are away down. They are lower than they are likely to be again for a decade. It seems to us that it is the right time for building projects to go ahead."

Others who spoke noted signs of an increase in building activity. The men at the dinner represented interests which handle annually $150,000,000 worth of building materials in New York City.

Piling Slate

For the purpose of avoiding breakages in piling slate say 10 x 20, the following rules have been drawn up by the Standard Slate Corporation:

1—Lay strips, or preferably a board, so as to keep the slate from the ground and to keep the pile even, equalizing weight.

2—Lay a pile of slates 10 inches high flat on the boards.

3—Stand a row of slates on edge against this pile, allowing them to stand as nearly straight up and down as possible.

4—Start the second tier with a pile 20 inches high of slates laid flat. This pile should be placed on the slates which stand on edge.

5—Then put a row of slates as per rule No. 3, putting two rows of strips or laths underneath.

6—Put a third tier on top. It is not wise to stack slate higher than three tiers.

7—On top of the last tier lay a row of slates, laid flat. Cover these with two or three more rows, laid so as to cover the joints.

This makes a good, solid pile, protected from getting dirty, and the breakage saving will more than pay for the care taken.

Model Design of Minnesota Farm House

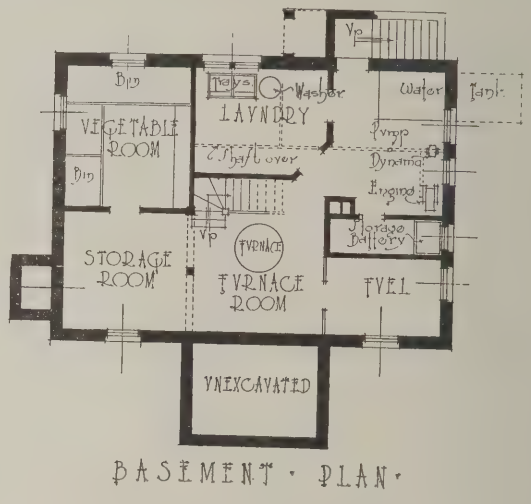
Drawings Awarded First Prize in Competition Conducted by Minnesota State Art Commission — Cost $3,500

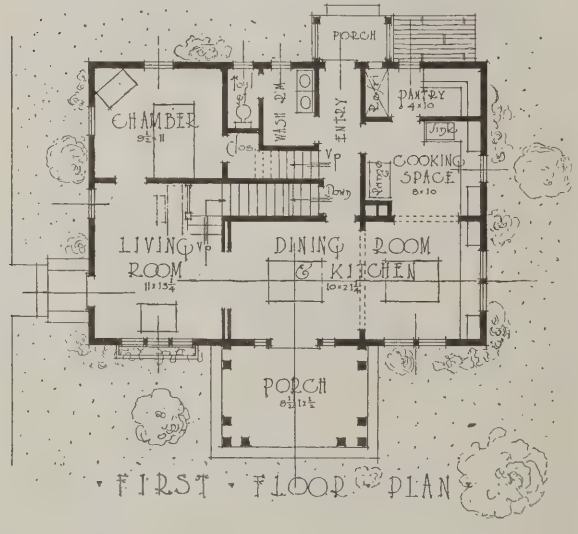
IN its effort to solve many practical problems and demonstrate that art can be made a part of every-day life as well as to meet the needs of people both in the rural districts and the city the Minnesota State Art Commission, which is a department of the state government and of which Maurice I. Flagg is the director, recently conducted a competition in model farm houses to cost not in excess of $3,500 each. It is interesting to announce that Minnesota is the first state to institute a competition of this nature, and in order that the problem might be made a practical one and set forth as clearly as possible the requirements of a farm house the Art Commission invited Minnesota farmers to formulate the requirements of, and specifications for, a model farm house. When all the plans had been submitted the award was made by a committee consisting of a farmer, a teacher of home economics and an architect.

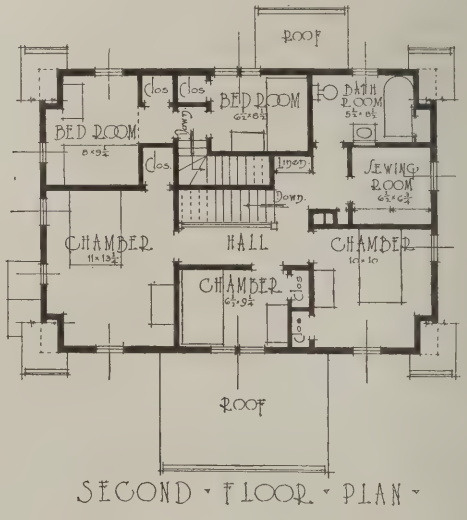
The design awarded the first prize is shown upon this and the facing page, the architects being Hewitt & Brown, of Minneapolis, Minn., whose drawings, in the opinion of the judges, most nearly provided for a model farm house at the required cost. The specifications submitted with this design required that the basement walls and floor should be of concrete; that the superstructure be of frame construction; that the exterior be overcoated with cement applied to metal lath; that use be made of stock lengths of lumber and that all bearing partitions should be so placed as to be above one another, and that the roof should be covered with shingles, preferably stained. It was also provided that the interior plaster work should be sand finished and tinted; that the finish in the living room and dining room should be of oak or birch and in the other rooms spruce, pine or fir, stained to suit the preference of the builder; that the lighting should be electricity, the current to be generated by a small dynamo driven by a gasoline engine and from a storage battery, the engine to be connected with a shafting to drive pump, air compressor and laundry machinery; and that a hot-air furnace should be provided for heating and ventilation.

It was further required that the plumbing should be concentrated and that the sewage disposal should be by means of a home-made septic tank. With the exception of the blinds, which were to be painted green, the exterior wood work was to be stained brown in color.

The estimated cost of $3,500 includes all plumbing for laundry, kitchen, bath room and wash





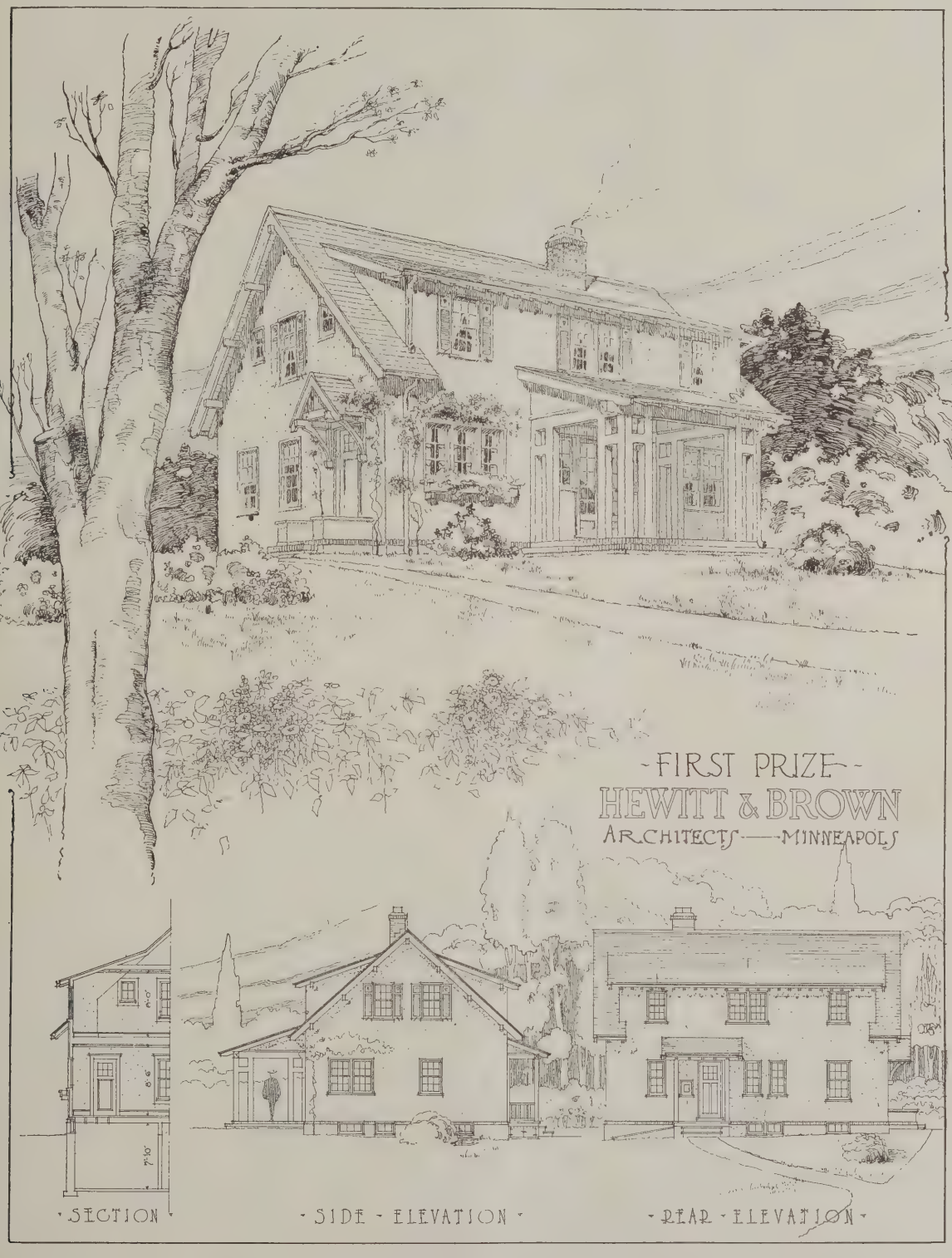


Model Design of Minnesota Farm House—Floor Plans—Scale 1/16 *In. to the Foot—Architects Hewitt & Brown, Minneapolis, Minn.*

room, as well as wiring for electric lighting, but does not cover the cost of the engine, the dynamo or storage battery.

One of the conditions of this contest, and a very important one in connection with a house of this kind, was that a wash room be provided on the first floor for the farm hands, so that it would not be necessary for them to pass into the kitchen to contact with the farm help in passing from one floor to the other.

The location of the house is assumed to be on a partly wooded knoll near a country road and adjacent to other farm buildings. There is a basement under the entire house providing space for heating, water supply and lighting purposes as well as for storage rooms.



Model Design of Minnesota Farm House—Various Elevations and Section

wash and be in the way of the housewife or domestic just at meal time when she obviously would be very busy. A separate stairway was provided leading from the wash room of the farm hands to their bed rooms on the second floor, thus giving the family privacy and eliminating intimate

As will be seen from an inspection of the plans there are on the first floor a commodious dining room and kitchen combined, a living room, a cooking kitchen with pantry and space for a refrigerator which can be iced from the outside porch if desired, a wash room and toilet for the farm hands.

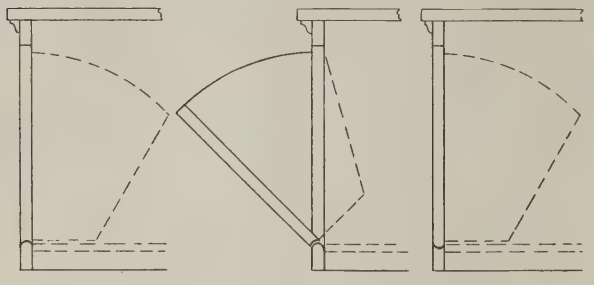
On the second floor are five bed rooms each with clothes closet, a bath room and a small sewing room. Two of the bed rooms are for the use of the farm help, and, as already intimated, are separated from the others, being approached by a separate stairway already referred to leading to the wash room. Just opposite the sewing room and near the door to the bath room is a linen closet.

The methods of heating and lighting as well as the character of the plumbing are determined by the limit of cost. The house is figured on a basis of 15 cents a cubic foot of space, with the porches estimated at one-fourth of total cubage, which is given as 23,280 cu. ft.

Constructing Flour Bins

In view of the discussion which has been running through recent issues of the paper on the above subject the following comments by a correspondent of the *Wood Worker* telling how flour bins should be built are likely to prove interesting:

Not very long ago we were given a job of building a case containing a number of flour bins for a bakery. We understood the fact that a flour bin is so constructed that it tips out of the case. In laying this job out we figured that the proper way was to allow the front to extend about ½ in. below the bottom of bin and shape a concave on bottom end of front, this to set on the base rail, which we shaped a half-round on its upper edge, as shown in Fig. 1. This looks all right on paper, but we found that it would not work. The bin would tip out all right, but would not go back into its proper place.



Constructing Flour Bins

The trouble can be readily seen in Fig. 2. The bin, in tipping out, would ride up to the top of the half-round on the inside and down on the outside. We made up our minds that it was against the law of nature to expect a flour bin to ride down, and, in tipping back, to climb back up again, so we tore off the fronts, also the base.

The construction was changed by shaping a new base rail with a concave on its edge and a half-round on bottom end of front, as in Fig. 3, and no further trouble was experienced.

Novel Scheme of Ventilation

In connection with a recently erected six-story reinforced concrete building forming part of an industrial plant in Detroit the system of ventilation centers upon the columns which support various parts of the structure. These columns are hollow, are of large diameter and are used as ducts through which the purified air, cooled in summer and warmed in winter, is forced downward from fans on the roof. The magnitude of the service required from the system may be gathered from the size of the building, which has nearly 1,000,000 square feet of floor area and encloses over 11,000,000 cubic feet of space, and from the fact that the wall area has 65 per cent. of window, which means a considerable wastage of heat in the winter months.

The plant is divided up into eight units, located in eight pent-houses on the roof. In each pent-house is a 6 ft. by 3 ft. centrifugal fan, an air heater (or cooler), with 10,000 square feet of surface, and an air-washing chamber 11 ft. high by 12 ft. wide and 10 ft. long, fitted with water sprays and baffle plates. The air is forced at a pressure of 2 in. or water down the duct in the center of the concrete columns.

In order that the distribution may be equal on all six floors the area of the duct must be less at the bottom of the building than at the top, and this fits in very well with structural necessities, as the column walls have naturally to be stronger at the lower levels.

The apertures which admit the fresh air into the rooms are located in the sides of the pillars at about 8 ft. from the floor level, and are in every case directed towards an outside wall, so as to break up the stream of cold air which, in winter, hovers around the windows, and ensure an equable temperature throughout the rooms.

Normally the air required for circulation is drawn in by the fans from the outer atmosphere, but means have also been provided whereby, when desirable, the previously warmed air can be drawn in again after its passage through the shops, and recirculated after washing and re-heating, and exhaust ducts for this purpose have been fitted in the ceilings of the various rooms above the craneways.

The hot water used for heating the air is obtained from the jackets of the large gas engines which drive the works.

An English Summer Lodge

Scattered through the British Isles are many striking examples of summer homes or country mansions as some might term them, but few perhaps are more interesting than the striking example of this sort of construction which we present on the facing page. The two pictures represent a summer house built a few years ago at Chalfont St. Giles in Buckinghamshire, England, in accordance with plans prepared by Architects Forbes & Tate. The views represent the entrance front and the garden front, and afford an excellent idea of the style of architecture, together with various details of commanding interests. It is known as Pollard's Wood Grange and stands in surroundings of silver birches.

The exterior "rough cast" work is silver gray in color and the louvred shutters and exterior wood work are painted a blue gray. The roof of the Lodge is thatched in reed thatching, experts in this sort of work having been secured in Norfolk and taken to the site especially for this job. The external walls are in grooved fletton bricks, lime washed with a band of split flints under the eaves. The kitchen yard is screened from the garden by a rough chalk wall.

The Garden Front of an English Summer Lodge at Chalfont St. Giles, Buckinghamshire, England

An English Summer Lodge Known as Pollards' Wood Grange, at Chalfont St. Giles, Buckinghamshire, England—The Entrance Front—Forbes & Tate, Architects

A Country House with Stucco Walls

An Interesting Example of Domestic Architecture Designed for Erection on a 50-Ft. Lot

WE have taken for the subject of our colored supplemental plate this month a country house having exterior walls covered with stucco and a roof of shingles. The house has been designed for a lot having a frontage of 50 ft., which will allow for a driveway to a garage at the rear of the lot should the owner desire to erect one; also the porch can be extended at one end to form a *porte cochere* so that one may enter the auto directly from the porch and still be under cover.

The Stucco Finish

It is intended that the exterior walls be treated to a rough "pebble dash" stucco finish tinted a light cream color, while tile of green color are to be set in the stucco where shown. The roof is to be covered with white cedar shingles exposed 5½ in. to the weather and with a heavy joint every third course. According to the specifications of the architect the shingles are to be dipped in a stain of dark green color before they are laid. The trim and window sash are to be painted white and the shutters are to be green.

One chimney serves for the furnace in the cellar, the kitchen range and the fireplace in the living room. The chimney is of brick, starting from a concrete footing, and is brought out at the center of the roof. Where exposed to view it has a stucco finish. The flues are lined with vitrified flue lining.

There is a cellar under half the area of the house which contains large furnace and store rooms.

All footings and foundation walls are to be of concrete mixed in the proportions of one of cement to three of sand and five of broken stone.

All framing timbers are to be of spruce, the corner posts being 4 x 6 in., the girders 6 x 8 in., the plate 4 x 6 in., laid flat; the first floor beams 2 x 10 in., and the second floor beams 2 x 8 in., placed 16 in. on centers. All floor beams are to be stiffened with 2 x 4 in. cross bridging spaced 6 ft. apart. The studding are to be 2 x 4 in., placed 16 in. on centers. The rafters of the main roof are to be 2 x 8 in., and of the dormer roof 2 x 6 in., placed 20 in. on centers. The porch ceiling and floor beams are to be 2 x 6 in., also placed 20 in. on centers.

Exterior Frame and Floors

The exterior frame of the building is to be covered with 1 x 9 in. Hemlock sheathing laid diagonally and covered with building paper. Over this is to be placed 1 x 2 in. furring strips 12 in. on centers, and to these will be nailed spruce lath to which the exterior stucco is to be applied.

The floors are to be double. In the first story rooms the sub-flooring is to be 1 x 6 in. tongued and grooved pine, while the finish floors in the hall and living room will be ⅞ x 2½-in. maple. All other rooms are to have ⅞ x 4-in. comb grain North Carolina pine floors.

It will be noticed from an inspection of the floor plans that the dining room has been combined with the living room, making it an apartment measuring 12 x 26 ft. A movable screen, however, may be used to separate the dining portion from the remainder of the apartment. The pantry has been eliminated, and the kitchen, which is 8 x 11 ft., contains all that is necessary in this part of the house, the equipment embracing a two-part soapstone or enameled iron wash tray, galvanized iron sink, ice box, range, a 40-gal. galvanized iron hot water boiler over the range, and a 6-ft. closet.

On the main floor are two sleeping rooms and toilet and on the second floor are two sleeping rooms and bath. There is also a small room which can be used as a study, a sewing room, or as a child's room, according to preference.

The entire trim throughout is fir for the living room and hall, and white wood finished with enamel for the bedrooms. All bedroom doors are birch. All rooms are plastered with a hard smooth finish, except the living room and hall, which are to be sand finished.

The Plumbing and Heating

The bath room and toilet on the first floor have walls enameled a soft green, while the floors are covered with white tile and the ceilings are left white. In the bath room there is a built-in medicine closet, a porcelain enameled tub and wash stand, also china bowl closet with low tank. All exposed pipe and fixtures are to be a nickel plated finish.

The house is to be heated by steam with radiators in all rooms except the kitchen, and shall be of such capacity as to give a comfortable temperature when it is zero weather outside. A hot air furnace is appropriate for a house of this character and the architect points out this system of heating can be installed instead of steam if the owner desires to be economical with this part of the work.

The hardware throughout the house is to be of neat design and in the living room it shall be of bronze plated finish.

The house is to be piped for gas and wired for electric lighting, the fixtures being of simple design and to match the hardware in finish. The living room is to contain two drop pendants of three lights each and a few loose base or wall sockets are provided as a convenience for connections with the table lamp, etc.

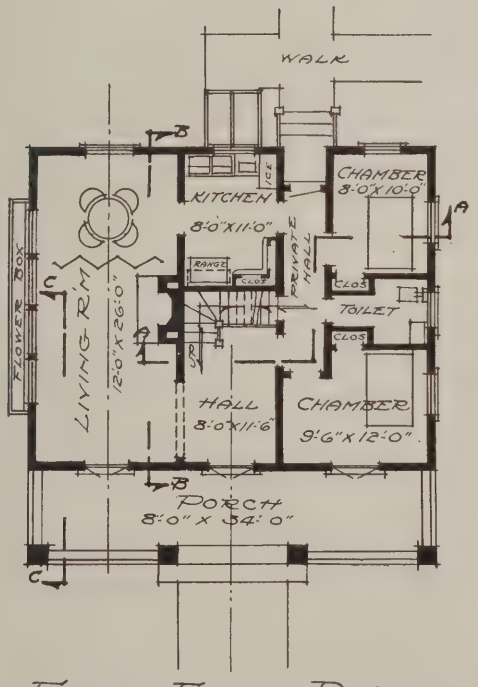
All the sheet metal work is to be painted on both sides before placed in position and all leaders are to be square and of a neat design.

The house here shown is of sufficient size for a family of 6 with a spare room for guest or servant.

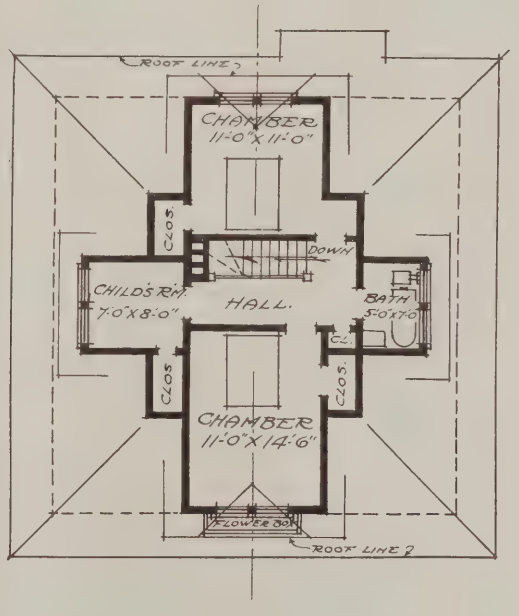
The cubical contents as figured by the architect


ARTHUR WEINDORF
1914

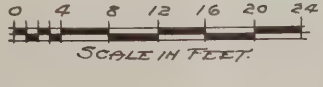
VIEW FROM REAR

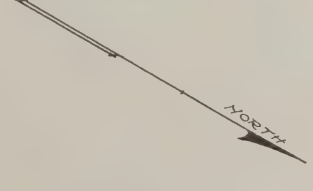


FIRST FLOOR PLAN



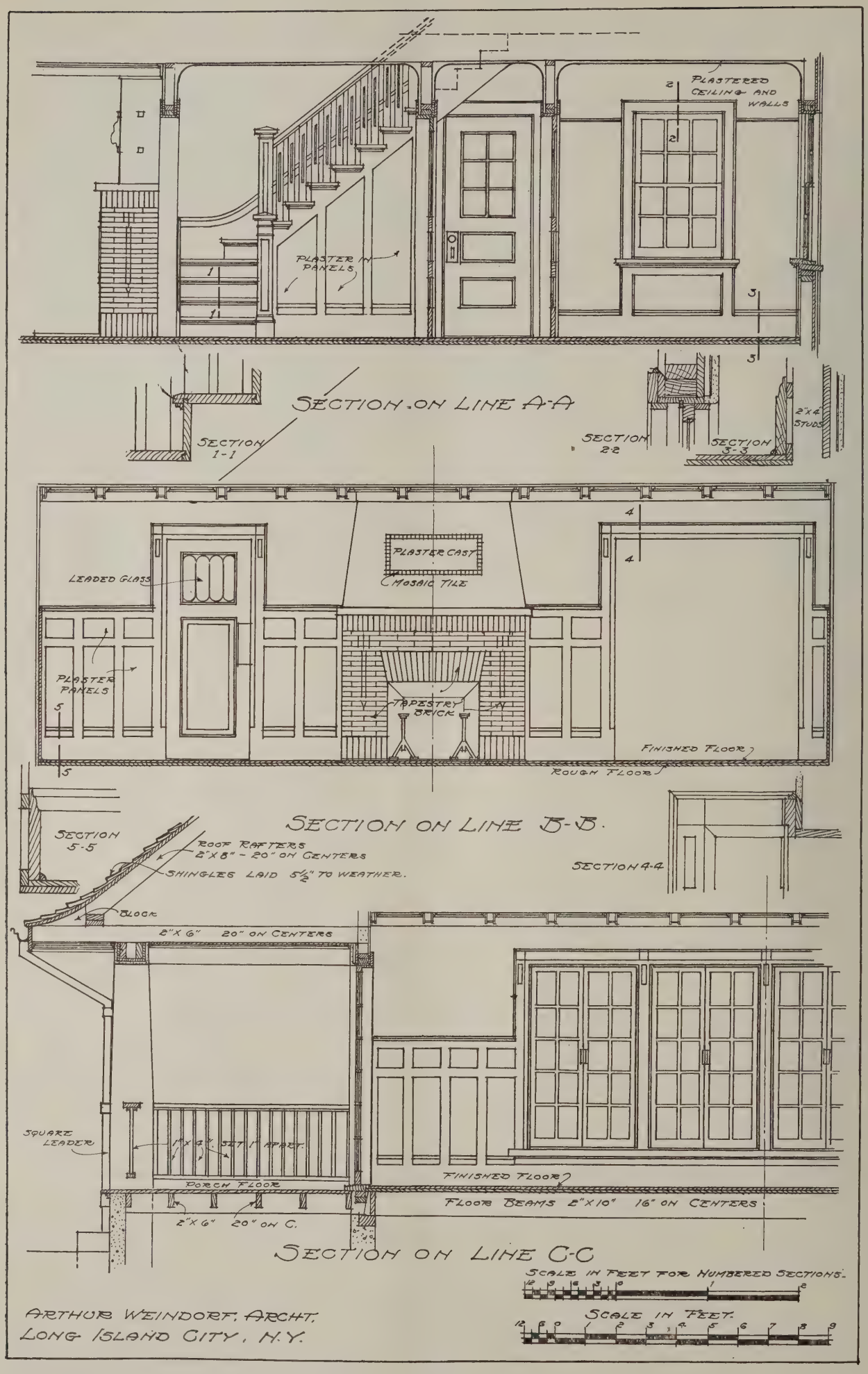
SECOND FLOOR PLAN





ARTHUR WEINDORF, ARCHT.
LONG ISLAND CITY, N.Y.

Plans and Perspective View of the Country House Forming Basis of Colored Supplemental Plate



Miscellaneous Constructive Details of Country House Forming Basis of Colored Supplemental Plate

is 21,148 cu. ft. which, at 19c. per cu. ft., amounts to $4,018.12.

Classified Estimate of Cost

An estimate of the cost of labor and materials for this house is given by the architect as follows:

Excavating and grading	$180.00
Masonry work including concrete footings and foundation walls, chimney and fire place and tile work	400.00
Plastering exterior and interior	650.00
Carpenter work, including lumber bill, mill work, glass, etc.	1,800.00
Hardware	80.00
Metal work	70.00
Painting, staining and tinting	220.00
Plumbing and gas fitting	260.00
Heating	250.00
Electric wiring and bell work	70.00
Combination lighting fixtures	40
Total	$4,020.00

The house was designed by Arthur Weindorf, architect, Long Island City, New York, who states that the above figures are intended to include the usual contractors' profit of 10 per cent.

Ohio Sheet Metal Contractors Organize

The Ohio Master Sheet Metal Contractors' Association was organized at Columbus, Ohio, January 28. Preliminary meetings were held at the Virginia Hotel on the day mentioned, and in the evening a dinner was served at the Builders' & Traders' Exchange, after which came a business meeting and the election.

The following officers were chosen:

President....George E. Snyder, Columbus
Vice-president....F. J. Hoersting, Dayton
Secretary.....W. D. Weaver, Columbus
Treasurer.....Clayton Murphy, Toledo

The board of trustees is made up as follows: George E. Techmaster, Cleveland; J. J. Dalzell, Cleveland; M. D. Armstrong, London; John Weigel, Cincinnati, and A. E. Faunce, Columbus. The next meeting will be held at Dayton, Ohio, June 3.

Free Course in Plan Reading and Estimating

Many of our readers, especially those in and about New York City, will be interested in learning that the Harlem Evening Trade School, 138th street and Fifth avenue, is offering a free course in plan reading and estimating in which there are still a few vacancies. The scheme of instruction is so arranged as to enable the student to concentrate his attention on lines which will secure advancement in his chosen field. All classes of mechanics in the building trades are taught to read plans, take off quantities and interpret specifications, thereby training them for the position of foreman or superintendent. Men desirous of going into business for themselves are taught the principles of estimating and plan reading, also of writing specifications and purchasing supplies. The course offers opportunities to those wishing to become appraisers and quantity surveyors.

The course embraces principles of plan reading, valuation of buildings, estimating the cost of plumbing, plastering, sheet metal work, heating and ventilating systems, structural steel, bridges, road work, piers, freight sheds, municipal work, etc. It also involves the use of hand books, formulæ, slide rules, calculating machine and weight computer. Considerable attention is given to explaining the requirements of the various New York City Codes connected with the building trade.

The school is open Monday, Tuesday, Wednesday and Thursday evenings.

Ameliorating Conditions in the Building Trades

At a recent meeting of the Building Trades Employers' Association of New York City, the following resolutions were presented:

"The Building Trades Employers' Association in mass meeting assembled this day, January 26, 1915, recommends and urges that every firm and corporation carry out to the fullest extent the following resolutions, so that the unemployment now existing in the building industry may be ameliorated as far as possible:

"1. That the building industry should patronize to the greatest extent practicable the local manufactories and shops for the purchase of building materials at this time.

"2. That the work now available on buildings be distributed among the largest number of individuals practicable by working part of the eight-hour work day in shifts, or one shift the one week and one shift the next week alternately as far as is possible, consistent with the nature of the work.

"3. That when it becomes necessary to lay off men, preference of employment shall be given to the married men."

Convention of Frontier Mason Builders' Association

At the recent annual meeting of the Frontier Mason Builders Association—an organization of master masons in cities along the Canadian frontier—the following officers were chosen to serve during 1915:

President....W. Kroening, of Milwaukee
1st Vice-Pres.....W. F. Fallon, of Buffalo
2d Vice-Pres..W. Haymar, of London, Ont.
Treasurer.....Wm. F. Dow

The meeting closed with a banquet at which Judge Gillette of New York was toastmaster. Canadian Builders' Exchanges were well represented among those in attendance.

The meeting was held in Rochester, N. Y., and on the first day the Builders' Exchange of that city entertained the visitors at luncheon, after which they were driven to Kodak Park, where they were photographed and special guides conducted them through the immense plant of the Eastman Kodak Company. In the evening there was a theatre party.

At one of the business sessions a committee was formed to draw up an acceptable form of agreement with the labor unions in the various cities belonging to the association. It was also decided to publish each year a wage scale showing the rates prevailing in the different cities.

The Yellow Pine Manufacturers of the south have just perfected an organization known as the Southern Pine Association, with J. E. Rhoades as secretary and manager, and with permanent headquarters in New Orleans, La. For the present three departments will be maintained—Forestry, Publicity and Research. We understand that more than 150 members signed the roster representing an annual output of about five billion feet.

Use of Slate as a Roofing Material

Something of Its Early History and Development—How It Is Quarried and Manufactured

By J. Crow Taylor

SLATE is numbered among the oldest of present roofing materials and dates so far back in the past in the old country that its first use for this purpose is lost. It was evidently used in the very earliest days in the shape of slabs of stone. for it is found among some of the oldest homes in the old countries and it is antedated only by clay tile.

Early History of Slate

The Delabole quarries of Cornwall had acquired considerable importance as far back as the sixteenth century and some of the Welsh slate quarries are very old as are those of Angers in France. But the slate industry belongs mainly to the present century and the latter part of the eighteenth century and since the opening up of the country by sea and land communication the progress and development of slate quarries has been very great.

The first development of slate quarrying seems to have been in North Wales and among the British Isles, where it was extensively used long before slate roofing was thought of in this country. Slate was at first imported here, the bulk of it coming from Wales, as there was very little produced in the United States until along about 1850. It is claimed by some that slate has been quarried more or less in this country since 1750 and was probably used in a local way, but the opening of quarries on a commercial scale seems to date back to 1852 when Squire Henry Kuntz, the pioneer of Slatington, Pa., opened up his first quarry just outside the present limits of the town of Slatington. There had been another quarry opened prior to that and called the Franklin quarry, which later came under the control of Kuntz. From this modest start in Slatington, Pa., a little more than 60 years ago, the slate industry has developed and spread until the total production is said to now amount to over $6,000,000 a year.

Importance of Slate for Roofing

Slate is used for a number of other purposes besides roofing, yet the roofing material branch of the industry overshadows everything else in the matter of prominence, and the growth of the slate industry depends largely on its use in the roofing business. As a roofing material it is claimed for slate that it will withstand cold, rain, and storm and is among the most durable roofing materials extant.

Probably the most peculiar thing about slate is the fact that the general public is mistaken as to how it is made, and are laboring usually under the false impression that slate formations are simply shaly formations of thin rock smoothly bedded on each other. The fact of the matter is slate in the modern sense is nothing of the kind. When taken out of the quarry it is a solid black, green or red mass and while it is still fresh from the quarry, before the sap dries out, it has a peculiar cleavage property that enables the workmen to split it up into thin sheets. There are some slaty formations which show these thin layers, but they are not usually a smooth surface and are seldom of any value commercially. The true commercial slate is a heavy mass which has the property of splitting pretty much as a block of wood is split in the making of shingles and boards. Then after it dries out this cleavage property disappears and it may be broken or scaled off a little, but it can never be split again. For this reason, the slate is worked right after it is taken out fresh from the quarry and a roofing slate maker keeps the edges moist with a swab while he is about his work.

Process of Manufacture

The manufacture of roofing slate is a very simple process, the work being done almost entirely by hand, even today. A roofing slate plant consists usually of a number of small shanties alongside of the quarry, the slate coming up from the quarry by cableways, being usually unloaded on a truck, having a track that runs along in front of the small shanties. The crew at each shanty consists of a man to work the block of stone down to the size required for roofing shingles; a splitter, who takes the blocks and splits them to the thickness required for roofing slate, and a trimmer, who has a foot-power chopping knife machine for trimming and squaring the edges to the size required, and sometimes a boy to pile the slate and do other incidental work.

A "Square" of Roofing Slate

Roofing slate is generally estimated and sold by the square. The wood square as applied to roofing, of course, means enough stock to cover 100 sq. ft. of surface and allow a 3-in. lap. The approximate weight of slate roofing of ordinary thickness is 650 lb. per square.

Roofing slate is made in a regular schedule of sizes ranging from 9 x 7 in. to 24 x 16 in. and the number of pieces required to make a square of roofing vary from 85 ft. to 686 ft., depending on the size. The usual thickness is from ⅛ to 3/16 in. In slate, as in other kinds of roofing, there are different qualities as well as different colors, and some of it sells lower and some considerably higher than the average price.

Meeting of Ohio Builders Exchanges

Reports of Affiliated Bodies—Discussion of Workmen's Compensation Law—Election of Officers—State Building Code

WHEN the officers of the Ohio State Association of Builders' Exchanges decided to hold the ninth annual convention as a "curtain raiser" to the National Convention of Builders in Columbus, O., they made a wise choice for never before were so many delegates present, and never before was the interest greater than at the 1915 meeting. Ohio has a strong state affiliation, comprising the Exchanges in the well organized cities of Cleveland, Cincinnati, Columbus, Toledo, Dayton, Youngstown, Springfield, Canton, Alliance, Lima, Newark and Elyria. All of these were represented in good force when President John W. Boren called the first session to order at 2 o'clock on Monday afternoon, January 25.

The rooms of the Columbus Exchange were decorated with flags and bunting and a welcome banner was prominently displayed over the entrance. President Kunzman had appointed every member of the Exchange on the reception committee, thus giving the visitors an easy time in getting acquainted. The elegant quarters of the Columbus Exchange, operated after the manner of an up-to-date city club, were much admired by the strangers, many of whom patronized the daily luncheon feature during their stay.

Officers of the national association recognized the opening session with attendance. After an invocation by Rev. Dr. H. W. Kellogg, pastor of the Broad Street M. E. Church, an address of welcome was given by H. E. Kunzman, president of the Columbus Builders and Traders Exchange. State President Boren responded briefly and introduced H. L. Lewman, of Louisville, president of the National Association of Builders Exchanges. Mr. Lewman emphasized the growth of local exchanges throughout the country and said:

"These local exchanges have been organized to protect local interests. They have done well and are useful agencies in the building centers where they are established. The next step in organization is the state associations and these also are doing well, particularly well in this state. Many years ago a number of men realized the need of a national association and through their efforts the National Association of Builders was organized. For a time it did good work and it is a matter of regret that it did not continue and prosper. The Uniform Contract was the result of efforts of that association. Had that associaion continued we would undoubtedly have better conditions to-day. Four years ago the new national association was started. The men back of it have worked royally to protect the interests that can only be taken care of by a national association. It is true that our present national body is a complex organization, comprising general contractors, sub-contractors and material dealers, creating many problems and requiring very careful handling. We are trying to do this in a fair and impartial manner for the best interests of all concerned."

Panoramic View Showing Some of Those who were in Attendance at the Builders' Convention

Report of the Secretary

The report of the secretary and treasurer was made by Edward A. Roberts and from it we take the following:

The activities of our state association for the period covered since the convention held in Cincinnati have been largely devoted to keeping watch of legislation at Columbus and encouraging the development of our affiliated bodies with some effort to establish new exchanges in cities where these have not heretofore existed. All of the associations represented at the last convention have continued in prosperous condition and a new addition has been made to our roster through the establishing of an exchange in Lima, making eleven in in all now connected with the association. This is the largest number of individual organizations affiliated in any state association in the country, so far as my knowledge goes. The secretary has visited a number of these from time to time and has enndeavored to assist them in their various undertakings both by personal suggestions and through frequent correspondence.

At the last convention a recommendation was made that the State Building Code be not introduced at the session of the legislature, then in progress, and this recommendation was followed by those in charge of this proposed legislation. There seems to be a divided sentiment as to the wisdom of enacting a Code similar to the one that is now proposed and we believe that our association may be of considerable service in further activity in this connection.

The Workmen's Compensation Law

The association has been in touch with the State Industrial Commission relative to various features of the Workmen's Compensation Law and has endeavored to keep the affiliated bodies informed as to any new developments on this important subject. One feature of the law which seems to cause considerable dissatisfaction is that employers are compelled to pay awards that may be granted to injured workmen by the pro rating of such awards over a period of years in the payment of premiums, thus inflicting what is regarded by many as a penalty for an unavoidable misfortune. It is believed that the awards should be paid out of the aggregate fund collected for this purpose rather than be charged directly against the employer in the manner stated. Furthermore, there is considerable objection to the opportunities now given to workmen to start damage suits at common law. Although the records of the commission show that few such suits have been actually started, the possibility of these serves to weaken the confidence employers have in the law as a full protection in time of need. There are other phases of the law which may also be considered with profit to all concerned. From present indications an effort will be made to modify the entire system at the present session of the legislature and our association should keep watch of anything that may be done in this regard.

The Mechanics Lien Law

The operation of the Mechanics Lien Law has now been observed for upwards of a year and the building fraternity of the state should express itself as to whether this law may be improved or corrected with advantage to those engaged in construction work. My own investigation leads me to think that the law has not been taken advantage of in nearly so many instances as was expected. Few liens have been filed under its provisions in various cities and for the most part, business has proceeded as before the law was enacted, except for its influence upon the banking institutions. Some proposed amendments to the law are to changes now in successful operation, give considera- we will also have a discussion of these at a time fixed in our regular program.

The subject of affiliation with the National Association of Builders Exchanges has been considered by some of the affiliated bodies with favorable action, while others, for various reasons, have not yet acted upon invitations frequently extended by officers of the National body. It was recommended by President Schuster at our last convention that any action to be taken in this regard should be in the nature of an affiliation by state associations rather than by local exchanges. For this reason, as well as for others, certain of the local bodies have not felt inclined to take individual action and I believe this subject should receive attention by the convention and some policy adopted for the guidance of those who have not yet come to a decision.

Our association has continued its representation at Washington by giving authority to James A. Emery, Esq., Counsel of the National Council for Industrial Defense, to speak for Ohio builders as well as for various others whose consent for such authority was requested. In addition to this, however, I believe that greater activity and interest on the part of the exchanges in different cities is needed if proper influence is to be brought to bear upon Congress and other officials in charge of governmental affairs at our national capital. I would therefore urge the boards of directors of the affiliated bodies to pay strict attention to all communications that may come from Mr. Emery or other sources for co-operation in presenting the views of employers on national legislative topics.

At our last convention, a resolution presented by Mr. Kumpf of Canton, was adopted, recommending that a committee be appointed to consider a uniform system of estimating for the builders of the state. Inasmuch as this subject has a direct bearing upon work now being done by the national association relating to Uniform Specifications and Contracts, it was thought wise to defer the appointment of such a committee until conclusions were reached in the negotiations between the National committee and the American Institute of Architects as these conclusions could be used as a basis for a code of practice if desired for state adoption.

While Ohio has a good number of local Exchanges, there are many cities in which organizations could yet be formed with splendid results to these communities. The secretary has urged the builders of Akron to revive the exchange in that city and has also advocated exchanges in several of the other larger cities. I would recommend that the directors of the different exchanges now in successful operation, give consideration to organizing similar bodies in the cities located near them as I believe this method will prove productive of good results.

Reports from Affiliated Exchanges

A symposium of reports from the affiliated bodies brought out some interesting facts. The exchange in Alliance has twenty-five members and is progressing finely. Canton has 110 members and is admitting applicants at the rate of five or six at each meeting. A General Contractors Association has been formed under the auspices of the exchange and is a 70 per cent organization. Cleveland is conducting a school in concrete construction, now in its second year, where more than thirty young men are being instructed by a technical engineer. Columbus has a membership of 240, adding eighteen last year. The dining room on the self-serve plan is a big drawing card. Dayton has increased the size of quarters and now has a roster of 150 members. Springfield admitted 21 applicants last year, bringing the total up to 91. Desk spaces are now provided for members wishing such accommodations. Toledo has taken a lease of the fourth floor of a prominent business block and has some new plans on hand. Youngstown has consolidated with the Chamber of Commerce and their exchange is now operated as the "Youngstown Builders Exchange Board of the Chamber of Commerce." The experiment is proving satisfactory. The exchange in Cincinnati has 176 members and is undertaking a "Billy Sunday Revival" for more according to former president Weist. In Lima the "Baby Exchange" is progressing with 32 members. Although the youngest in the state it is a healthy

aspirant for honors. Plenty of enthusiasm is on tap in Elyria where the enrollment is 32.

A feature of the session was an address by Wallace D. Yaple, chairman of the State Industrial Commission charged with the operation of the Ohio Workmen's Compensation Law. Mr. Yaple reviewed the two years' record under the law. He said that actual trial of the law had proved that fears expressed by its opponents at the start had not been realized; that the claim made by employers that the law would impose a handicap upon them in competition with other states was not borne out by the facts; that the administration of the fund had not been a burden upon the state financially; that the amount of compensation to the injured workman was adequate, being on the average more than under the old system, and that the accusation that the state had created a monopoly in the insurance field was not correct because no such system as that now conducted by the state was previously operated. Mr. Yaple stated that there were 70,000 industrial accidents in Ohio last year and in all this number only six suits at common law had been filed and only one judgment rendered in such actions. He reported that 16,000 employers were now contributing to the state fund, while 800 had elected to carry their own risks under state regulations. The number of employees covered by the first named class was 700,000 and the number under the last named class 300,000, making 1,000,000 in all. The total premiums collected last year were $3,375,093 and the total losses $2,730,000, leaving a surplus of about $645,000. Compensation laws are now in force in twenty-four states, according to Mr. Yaple, but only those in West Virginia, Oregon and Washington are comparable to the Ohio law.

A lively discussion followed Mr. Yaple's remarks in which E. W. Davis, a prominent liability insurance man, attacked the law. He declared that the business of insurance was not a governmental function, and advocated that four options be given the employer, first to adopt the state fund; second, to carry his own risk; third, to insure in established private liability companies, and fourth, to insure in mutual associations.

In the evening an open session, both social and business in character, was held at which the members of the Columbus Chapter, American Institute of Architects, were guests. An address by Hon. Herbert B. Briggs, member of the House of Representatives, a well-known Cleveland architect, was delivered on the subject "Building and Kindred Legislation." Mr. Briggs discussed the proposed Ohio Building Code, a proposition to license architects and town and city planning.

At the session on Tuesday morning R. M. Lucas, Esq., a Columbus attorney, discussed the operation of the Ohio Mechanic's Lien Law. He said that the law had as its purpose the elimination of dishonest and incompetent contractors and he thought it had accomplished results in that line. In his opinion the law had enabled contractors to get their money more quickly, provided against loss to dealers and imposed no hardship upon owners. An amendment proposed for the benefit of Building and Loan Associations was receiving favorable consideration, this amendment to provide for the right of such companies to file a notice with the recorder when a morgage is filed setting up that this is a construction loan and has priority over other claims unless said claims are filed within fifteen days with due notice to the building and loan company. This would enable the owner to secure his loan more promptly and get started more readily than under the old method. Another change agreed upon was to extend the time for filing mechanic's liens from sixty days to ninety days. There is an effort in Ohio to have the law cover public work as well as private work, and a bill to this effect will be introduced in the Legislature.

New officers were elected in every instance without a contest, the roster being as follows:

President..C. Taylor Handman, Cincinnati
1*st Vice-Pres*.....L. E. Fishack, Toledo
2*d Vice-Pres*....J. J. Dalzell, Youngstown
3*d Vice-Pres*.....R. B. Thomas, Lima
Secy-Treas.....E. A. Roberts, Cleveland

Among the resolutions adopted by the convention was one recommending a state-wide movement for starting building and repair work at once with a view to relieving the unemployed as well as being advantageous to owners and builders. This reso-

PREST. C. T. HANDMAN OF CINCINNATI

SECY. E. A. ROBERTS OF CLEVELAND

lution was recognized by Governor Willis, who supported it publicly the following day. The text of the resolution was as follows:

Resolved, by the Ohio State Association of Builders Exchanges, that this Association emphasizes the fact that the present is an opportune time to start building operations. Many skilled workmen are out of employment, especially in the large cities. Architects and contractors are not rushed with business and better attention can be had from material firms than during the active building season. In some lines concessions are being made in prices to stimulate orders and more accumulating stocks in yards and warehouses.

We, therefore, believe that the state, cities, counties and private owners having any building work to do will profit by having the same done now, rather than delaying until the spring rush is under way.

The sentiment of the convention toward the proposed Ohio State Building Code was expressed in the following resolution unanimously adopted.

Resolved, that the Ohio State Association of Builders Exchanges hereby approves the recommendations made by the joint Citizens Committee in reference to the proposed state building code, namely:

That the present state code commission be enlarged by the addition of architects, engineers and builders as well as the City Building Commissioners for consideration of the proposed measure and criticism before the same is enacted, further

Resolved, that in our opinion a code of general terms, both statutory and regulatory, sufficient to safeguard life and property, should be enacted, leaving to individual cities the right to amplify the same to meet their particular requirements, rather than to establish complicated and specification-like set of regulations, which we believe would impose needless expense and hardship upon the building industry of Ohio.

On motion of W. J. Albrecht the action of the officers in fixing Toledo as the place for holding the next convention was approved and the time was left to their discretion.

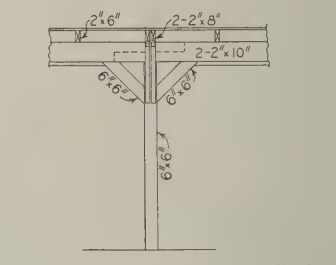
CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

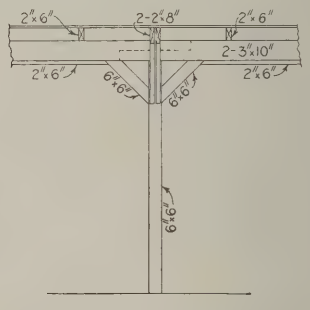
Roof Construction of an Open Shed

From C. C. Conklin, Patchogue, N. Y.—I am enclosing a snap-shot showing the roof construction of an open shed or shelter used in a lumber yard for storing hand carriers loaded with orders ready for work in the mill. I am also sending a sheet of details clearly indicating the principal features of construction. I would add that the floor is of paving brick, the post footings are of concrete with bolts inserted to fasten the bottom of the posts. This feature is clearly indicated in the vertical section through the main wall of the shed. The roof is boarded over and carries prepared roofing.

Partial View of Under Side of Shed Roof Showing the General Arrangement of the Framing Members



Section C-C of the Plan—Scale ⅛ In. to the Foot



Section on Line B-B of the Plan —Scale ⅛ In. to the Foot

Roof Construction of an Open Shed—Contributed by C. C. Conklin, Patchogue, New York

The posts are placed 17 ft. on centers in the length of the building and 15 ft. 6 in. on centers in width of the building. The outside girders are 4 x 10 in., the center girder is 6 x 10 in. and strut girders are 4 x 12 in. The rafters are 2 x 6 in. placed 3 ft. on centers, those over the posts being 2 x 8 in. and doubled. The rods are ¾ in. in diameter with turnbuckles as shown in the details.

Considering the distance between supports this method of construction seems to require less lumber than any other and yet is strong enough to carry the maximum snow load. I would be glad to know what the readers think of it.

Qualifications of a Quantity Surveyor

From R. A. W., Williamson, W. Va.—I have been following for some time the various articles in *The Building Age* by Ernest McCullough and have profited to a large extent by the information contained in them. The reprint of his article answering the question "Who Pays for the Quantity Surveyor?" proved of special interest to me, and it is upon this question I take the liberty of asking for further information. In my experience with building and architectural work nothing has ever appealed so strongly to me as some system which will place all contractors on the same footing. Since I first heard of quantity surveying I believed it to be the solution of many of the problems confronting the architect and builder.

As the practice of quantity surveying is not widespread at present there will be a demand for quantity surveyors in coming years. I would therefore like to ask Mr. McCullough what in his estimation would be the requirements for a man who desired to become a quantity surveyor? Should he be a graduate of a technical school? Does the Association of Quantity Surveyors require certain conditions involving architectural experience in order to become a licensed surveyor?

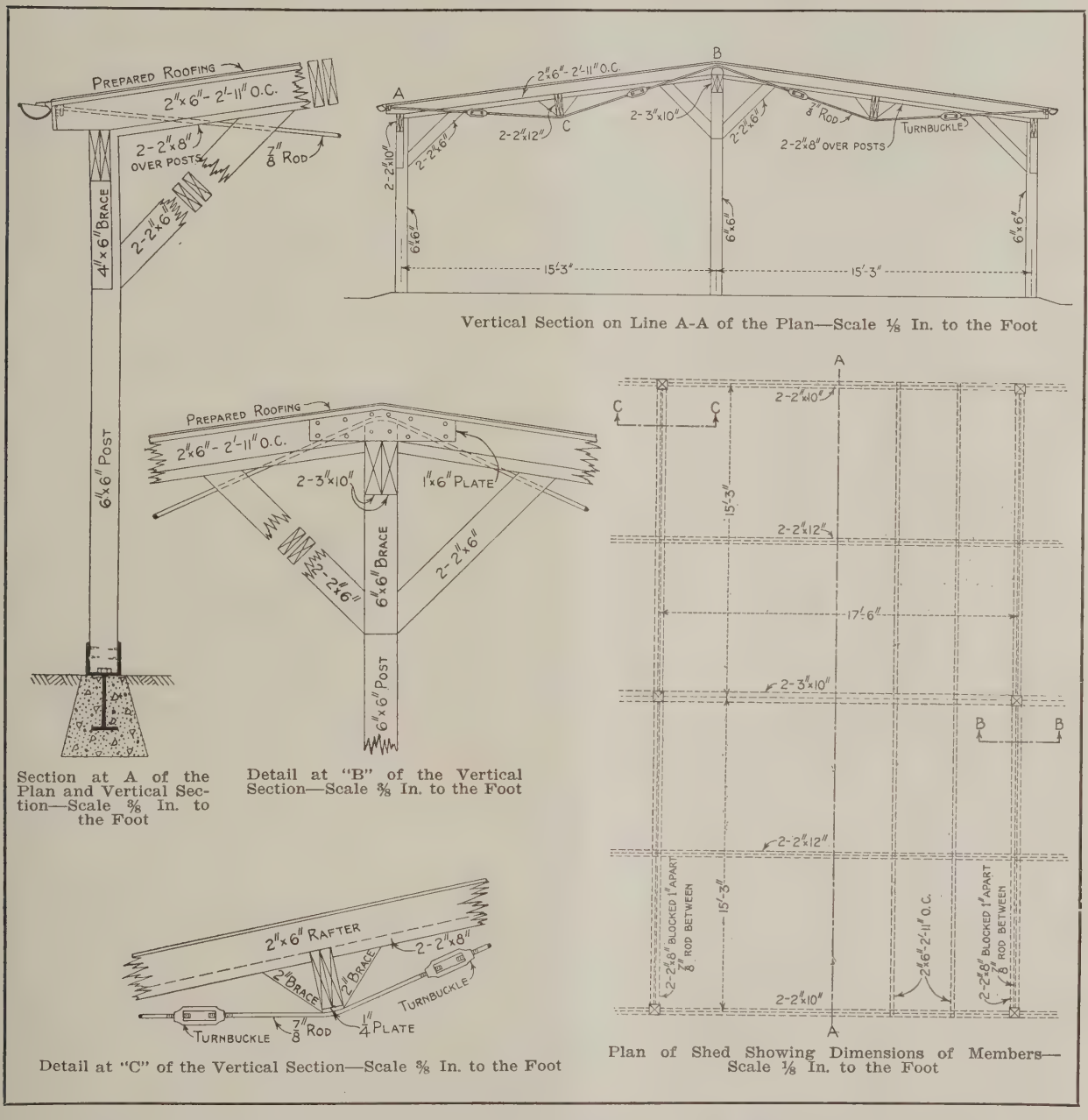
Would the following qualifications be sufficient for a man to establish himself as a quantity surveyor: Carpenter and foreman, four years; draftsman and architect's superintendent, two years; at present am engaged in the superintendence of work?

If above are not sufficient could Mr. McCullough recommend a course of study, text books, handbooks, etc.? I am located permanently in this place,

which is a growing town of over 40,000 people. During my residence here I have come into contact with many of the conditions described in his article. When there is a difference of $10,000 on a $40,000 job between the two lowest bidders, a person can realize just how some men figure and the necessity for a system.

Answer.—In reply to the above Mr. McCullough furnishes the following comments: The training and experience mentioned by the correspondent above should admirably prepare him for studying a young man works so long for a firm that he believes his pay should be raised and his employer disagrees with him, he goes to some other firm, very often in a different line of work, and becomes an estimator for that concern. After several such changes he styles himself "A General Estimator."

An estimator for a large firm of general contractors is often a man with training such as has beeen described, but more frequently he is a man who starts in a minor capacity with a firm and gradually picks up some idea of estimating, assisted



Roof Construction of an Open Shed—Contributed by C. C. Conklin, Patchogue, N. Y.

the business of quantity surveying. Ordinary estimating stands to quantity surveying in somewhat the same relation that exists between surveyors and civil engineers, or between druggists and physicians. Unfortunately, estimators in this country seldom receive much training. The usual method is to hire a young man who will work cheaply enough and to give him a little instruction in figuring quantities; then set him to making estimates.

Each trade has its estimators, so it follows that the majority of estimators are specialists. When by books such as Arthur's "Estimator," Joslin's "Estimating the Cost of Buildings," etc.

The Quantity Surveyor of Great Britain is a man who has served an apprenticeship with a firm of engineers or architects and who has studied the subject of building construction. Thus he is a good draftsman and has a good knowledge of the kind of work done on buildings for the reason that during his apprenticeship of several years he is engaged in superintending building construction, keeping cost accounts, making comparisons of bids, etc. In

fact, I fail to see how a man with a training any less complete can be a good quantity surveyor.

A man with the experience described by "R. A. W." should be able to prepare himself for the vocation of a Quantity Surveyor by first becoming thoroughly informed on the subject as it is at present practiced in Great Britain and then adapting the methods to American conditions. The oldest text book is W. Leaning's "Quantity Surveying," the price of which is $10. The most modern book is Banister Fletcher's "Quantities," revised and brought up to date by H. Phillips Fletcher. The work is published abroad but costs in this country $2.50. Mr. Fletcher wrote a number of valuable books which deal with English practice, but as the Common Law obtains largely in the United States they are of some value to American students.

In addition to purchasing the books mentioned and keeping up-to-date on similar American publications, I would suggest to the correspondent that he get in touch with G. Alexander Wright, the father of the system in the United States. He will doubtless be very glad to give him plenty of advice and instruction. His address is 571 California Street, San Francisco, Cal. An American system will be developed in time and the idea is gaining in favor throughout the country among architects and contracting builders.

Safe Construction of Church Roof Trusses

From K. D. Schwendener, Los Angeles, Cal.—On page 59 of the January issue of *The Building Age* I note the reply of Mr. McCullough to the church roof truss problem submitted in the December number by "W. J. B.," of Wichita, Kan. The detail for joint 1 of truss "A" presented by Mr. McCullough, on page 67, is of more than passing interest. From the data given the stress in the compression member *B* is approximately 92,000 lbs., and that in the chord *L*, approximately 69,000 lbs. The 1⅛-in. bolt has an area at the root of thread of 0.693 sq. in., which at 12,500 lbs. per square inch gives the bolt a tension value of 8700 lbs. The horizontal component of this stress is 5700 lbs.

The projection of the ¾ x 10-in. plate is $1\frac{1}{4} - \frac{3}{4} = \frac{1}{2}$, and the value of this ½-in. projection in bearing on the end fibers of the chord is:

$$\frac{1}{2} \times 10 \times 1100 = 5500 \text{ lbs.}$$

The value of the two ⅝-in. bolts other than that of holding down the plate is somewhat doubtful, but assuming the strength of the bolt to be determined by its shearing resistance we have a value of 3070 lbs. for single shear at 10,000 lbs. per sq. in., or 6140 for the two bolts.

Thus there is to resist the tensile stress of 69,000 lbs. in the chord 5700 lbs. from the 1⅛-in. bolt, 5500 lbs. from the plate and 6140 lbs. from the two ⅝-in. bolts—a total of 17,340 lbs. In other words, if the factor of safety of the member *L* is 4, that of the joints as detailed is one. Just what the author had in mind when he said, "The factor of safety in the joints is the same as that used in the wood and metal" is not evident upon close inspection of the joint detail. Due to the shrinkage of the timber the 1⅛-in. bolt is not a very efficient member, and as the exact value of the two ⅝-in. bolts is indefinite good practice dictates a neglect of features in design and gives preference to a dependency of the bearing of projections on a bent plate in determining the strength of such a joint.

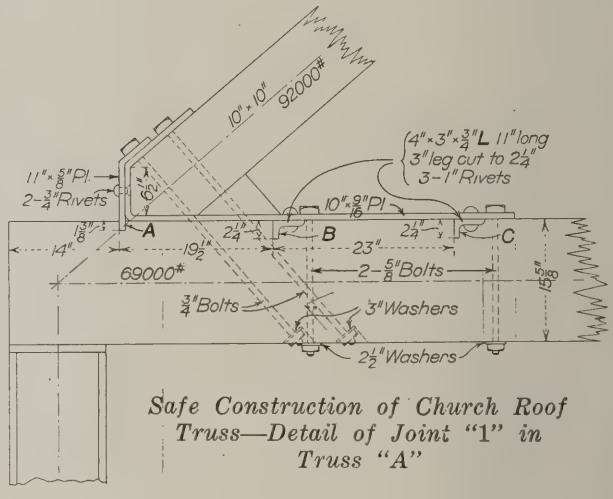
I submit herewith a detail for this end joint using the same size timbers and the same unit stresses as recommended by Mr. McCullough. The design consists of a metal shoe with three lugs properly proportioned and held in place by bolts. The two ¾-in. bolts are provided for the purpose of holding the various members in place and assist in taking erection stresses if the trusses are lifted into place and the ⅝-in. bolts are used to hold the lugs down and keep the plate in position.

The total depth of the lugs is $1\frac{3}{8} + 2\frac{1}{4} + 2\frac{1}{4} = 5\frac{7}{8}$ in., which, with a width of 11 in., gives a unit

$$\text{compression on the end fibers of } \frac{69{,}000}{5.87 \times 11} = 1080$$

lbs. per square inch. The total load of 69,000 is divided among the lugs in proportion to their depth; *A* takes 16,000 lbs. and *B* and *C* each 26,500 lbs.

The unit horizontal shearing stress in front of



Safe Construction of Church Roof Truss—Detail of Joint "1" in Truss "A"

lug *A* is $\frac{16{,}000}{11 \times 14} = 104$ lbs. per square inch, and between lugs *B* and *A* is $\frac{26{,}500}{11\ (19\frac{1}{2} - \frac{5}{8})} = 128$ lbs. per square inch, and between lugs *C* and *B* $\frac{26{,}500}{11\ (23 - 4)}$ = 127 lbs. per square inch.

Lug *A* is formed by a ⅝-in. bent plate, the thickness being determined by assuming the projection a uniformly loaded cantilever. Lugs *B* and *C* are identical, being composed of a 4 x 3 x ¾-in. angle 11 in. long, having the 3-in. leg cut to 2¼ in. and riveted with three 1-in. rivets to the plate. On account of the width of the plate used (10 in.) not more than 3 rivets can be used in a row, and as each rivet transmits a load of $\frac{26{,}500}{3} = 8830$ lbs., it is found that for single shear at 11,000 lbs. per square inch a 1-in. rivet is required.

The plate thickness is determined by providing an area sufficient to take the total load of the lugs *B* and *C*. Assuming a 10-in. width, the plate thickness is:

$$2 \times \frac{26{,}500}{16{,}000\ (10 - 3 \times 1\frac{1}{8})} = .53 \text{ in.; say } 9/16 \text{ in.}$$

The height of the shoe is determined by the assumption that due to the confining of the end of the compression member the unit stress of 1100 lbs. per sq. in. as for direct compression may be used instead of making a reduction in the unit stress on acount of the inclination of the fibers to the bearing surface. The hight of the shoe therefore is

$$\frac{69{,}000}{1100 \times 10} = 6.27; \text{ say } 6\frac{1}{4} \text{ in.}$$

Notwithstanding the fact that Mr. McCullough has the sanction of Kidder (see "Architects and Builders' Hand Book," 15th edition, page 1053) to the type of joint he submitted, the writer is of the opinion that the design furnished by him having practically the same factor of safety as obtains in the other members of the truss, is preferable to a design in which the factor of safety is one.

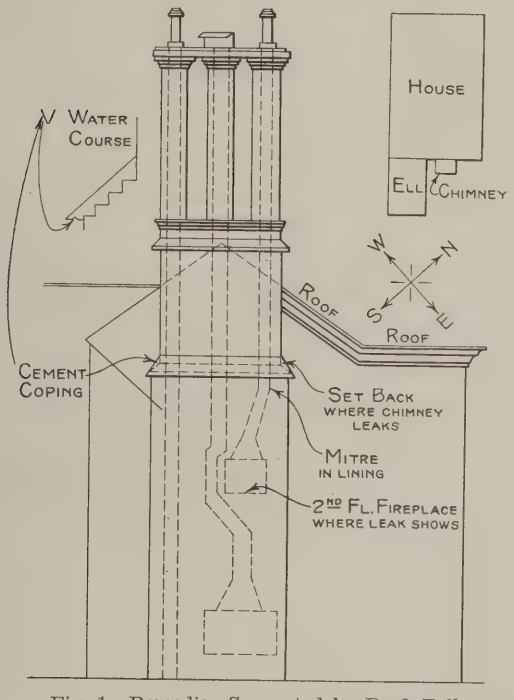


Fig. 1—Remedies Suggested by Prof. Bell

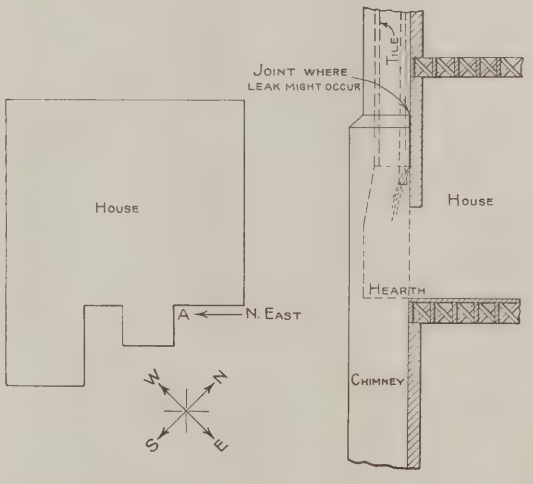


Fig. 2—Sketches Accompanying Letter of "H. B."

Trouble with a Leaky Chimney—Sketches Submitted by Different Correspondents

Trouble with a Leaky Chimney

From Prof. J. R. Bell, Huntingdon, Pa.—In answer to the query of "W. A. W.," Danvers, Mass., in the February issue of *The Building Age* relative to a leaky chimney, I offer the following suggestions which I trust may be of interest. As a journeyman brick and stone mason, contractor and instructor in building at the Pennsylvania Industrial Reformatory, I have in my experience met with many similar cases. From what the correspondent says in regard to remedies he has already tried I conclude that the trouble must be between the attic and the second floor fireplace. There is but one plausible place where the leak could occur and that I have indicated in Fig. 1 of the sketches. It is a natural place to expect trouble, and next to the flashings is the first place I have found trouble of this kind to exist.

The fact that the chimney leaks only when there is a northeast storm would indicate that point of the chimney as the place of least resistance. Below this point there is a 12 in. wall and above it a 9 in. one, but the correspondent does not indicate on his drawing whether this setback is made of brick or stone, which does not materially change conditions if either is of a porous nature. If of vitrified brick or nonabsorbent stone, no doubt there is an open joint which is causing the trouble.

In either case, the open fireplace would be the natural outlet, the water flowing down the chimney between the brick and the flue lining. When the lining is used the bricklayers are very often careless in throwing a course joint in the rough brick work around the lining. Again it is common practice to start the lining at the end of the draw in a chimney which in this case is near the setback, or if started below that point, the lining must be cut the required bevel of the lining indicated. A perfect mitre is seldom made. Both pieces of lining must be cut to make this mitre and the bricklayer usually cuts the lower piece, which would make the opening in the lower pipe at this point larger than the upper joint of lining, thus causing a natural place for the water to enter the lining.

During a northeaster the water would run down the chimney to the setback and either be filtered through the brick or stone, or seep through an open joint and flow down to the end of the lining, or enter the lining at the joint and then down the lining and enter the second floor fireplace.

If the material is waterproof I would suggest to "W. A. W." that he carefully examine the work at this place and point up the open joints, and he will undoubtedly stop the leak. If, however, the material is porous he should either cover this setback with tin or sheet copper, being careful to imbed the metal in the horizontal mortar joint above the setback or cover it with a rich cement mortar

of one to one cement and sand and about 15 per cent. of hydrate of lime. I would suggest that he make this covering 2 in. thick and allow it to extend over the brick with a water course where indicated on the drawing to prevent water dripping on the brick below and causing a stain.

If the leak has caused efflorescence on the brick work he can, after remedying the evil, wash the brick work with a dilutd solution of muriatic acid and rinse well with water.

From H. B., West Pittston, Pa.—I am sending a sketch, Fig. 2, showing the only solution of which I can conceive of the problem presented by "W. A. W.," Danvers, Mass., in the February issue of the paper. It will be seen from the sketch that a northeast rain hits in the angle made by the side of the chimney with the wall of the house. There is a "setback" in the chimney just above the second story fireplace and if the chimney was constructed after the house was completed it would leave a joint between the house and chimney. Using the wall of the house for one side of the flue, as per the drawing, it can readily be seen from an inspection of the vertical section just where a leak might occur as the rain would rest or find a lodging to some extent on the "setback," thus allowing it to soak in and run down to the hearth.

The problem is a most interesting one and I hope other mason-contractors will give us the benefit of their experience in the solution of puzzles of this nature.

From D. P. B., Redford, N. Y.—In my opinion "W. A. W.," Danvers, Mass., has a pretty bad job on his hands, but he has not yet made enough experiments to give all the data necessary to determine the cause of the trouble. If this chimney leaks when there is no fire in the fireplace or in the spring or fall, or if it leaked in the attic before he flashed it, then the water comes from the outside and can be remedied by a coat of stucco containing 10 per cent. Maltha, plastered on the outside half an inch thick. The water might possibly be driven through the brick and work down between the brick and the tile, then through joints in the tile and out at the hearth. If the other flues do not leak then this one does not from the outside.

I strongly suspect he has what we here call a "creosote chimney" and is incurable. In this particular section of the country such chimneys are very common. I have one on the west end of my house that is very bad in zero weather. I cannot burn green or wet wood in the stove which connects with this chimney. When the fire gets so low that only warm air passes up the flue, it is condensed by the cold walls of the chimney and runs down on the outside. The same thing will occur with brick or stove pipe. My chimney is concrete, and there has been no fire in the stove for eleven months. On January 30 the thermometer registered 26 deg. below zero, and on the following morning it was 18 deg. below zero. I started a fire in the stove and it balked to such an extent that it nearly went out. I have my chimneys arranged so I place a vessel under the thimble entry. I can open the door and see the creosote run. While the fire is getting started the creosote comes down with celerity.

If the chimney referred to by "W. A. W." is what I call a creosote chimney, and I think it is, the occupants of the house must discontinue the use of wet or green wood and keep a good fire during zero weather. If there is a stove pipe entry to this flue, a coal stove kept running night and day may stop it during the times when the leak is bad. When the air is very damp and cold, creosote runs very freely.

The correspondent must do one of four things: endure the creosote; drill through the chimney at the level of the hearth and put in a gas pipe from the outside to draw off the water; tap the middle flue and carry off the water that way, or else drain the second story fireplace into the cellar flue. It is a fact that flue linings aid the condensation of creosote, as does an open fireplace by allowing a large quantity of damp air to pass over the fire and up the cold flue to be condensed.

Value of the Correspondence Department

From O. K., Wapinitia, Ore.—By all means let us have the articles on perspective drawing and as Mr. Crawford suggests let them be simple and comprehensive. I thin kthe ambitious and studious young builder derives more benefit from the Correspondence Department than from any other one department in *The Building Age;* yet some of the letters and drawings are very enigmatical. Some correspondents will go to great length about something that does not pertain to the drawing or diagram and then end up by stating that "the drawing is self explanatory."

To the man versed in reading plans and drawings maybe it is, but a young fellow is very apt to be reminded of the old colored cook's recipe for pancakes. A southern bride asked the old cook for her recipe and received an answer something like this:

"Take what flour yo need fo how many you'alls gwine ter feed; put in a pinch ob salt, den de res ob de ingradients and be sho an hab de griddle hot."

The Building Age certainly does improve as the years advance. At present I am greatly interested in the article by Mr. McCullough on the "Design of Beams, Girders and Trusses."

Some Questions in Concrete Construction

From G. S. B., Lewiston, Idaho.—I am about to build a one-story cottage or bungalow and thought at first of making it entirely of cement blocks, but I am more friendly disposed toward the hollow wall construction; that is, two solid concrete walls, each about 4 in. thick and with a 2-in. air space between them. The scheme I have in mind now is something like this. I have enough cement blocks on hand to lay up a wall 3 blocks high around the building. I intend to dig out a full basement and put in a solid concrete wall 5 ft. high or up to the grade line and then use the cement blocks for the under-pinning. If I do this and then put on a solid concrete water table and on top of this use the hollow wall system with stucco finish, what sort of a combination will it make? The cement blocks are dark gray in color and the stucco of course would be white.

The blocks are only 8 in. in width and the double

concrete wall with air space would be 10 in. wide. If I put up "forms" and fill in behind the blocks with concrete the balance of the 2 in. will this make the wall solid and strong enough to carry the load which it would be called upon to sustain? I could place reinforcing in the blocks when I lay them up in order to hold the concrete solid against them.

For a small house will the practical readers recommend some sort of wooden forms that would be suitable for building this kind of a concrete wall.

Plans Wanted of November Cover Design

From E. G. H., Atchison, Kansas.—I am greatly interested in the design illustrated in colors on the front cover of the November issue of *The Building Age* and I have no doubt other readers could say the same. Cannot Mr. Fellner give us the plans of this house and thus meet the requirements of many others besides myself?

Floor Plans for a Six-Room Cottage

From D. P. B., Redford, N. Y.—For the benefit of "W. H. Y.," Lonoke, Ark., I am sending a sketch of a floor plan, Fig. 1, for a six-room and bath cottage which may help him out.

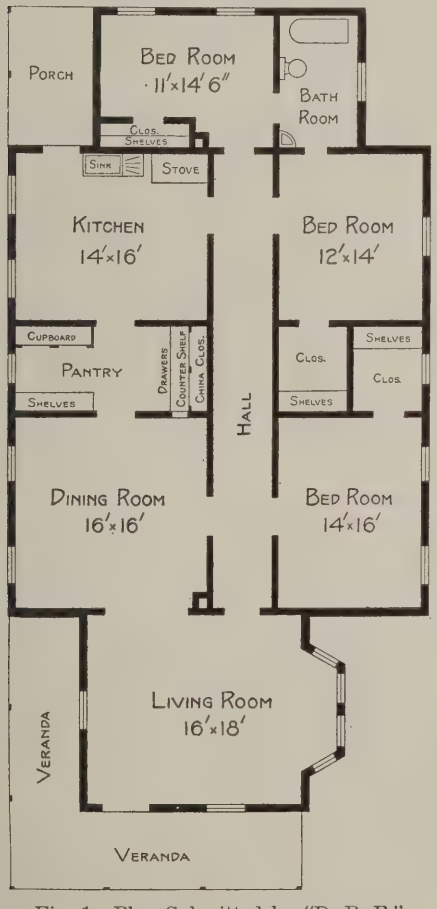


Fig. 1—Plan Submitted by "D. P. B."

From A. B. N., Washington, D. C.—In the December issue of the paper "W. H. Y." of Lonoke, Ark., requested floor plans for a one-story six-room and bath cottage. With a view to meeting his requirements I am enclosing a floor plan, Fig. 2, for such a cottage, the outstanding feature of which is the central hall extending from front to rear of the building. In the South this is one of the features characterizing interior arrangement, for in the summer months it permits of front and rear doors being open and adds materially in ventilation and comfort. I have shown no stairs to the attic as no attic was specified.

Fig. 2—Plan Contributed by "A. B. N."

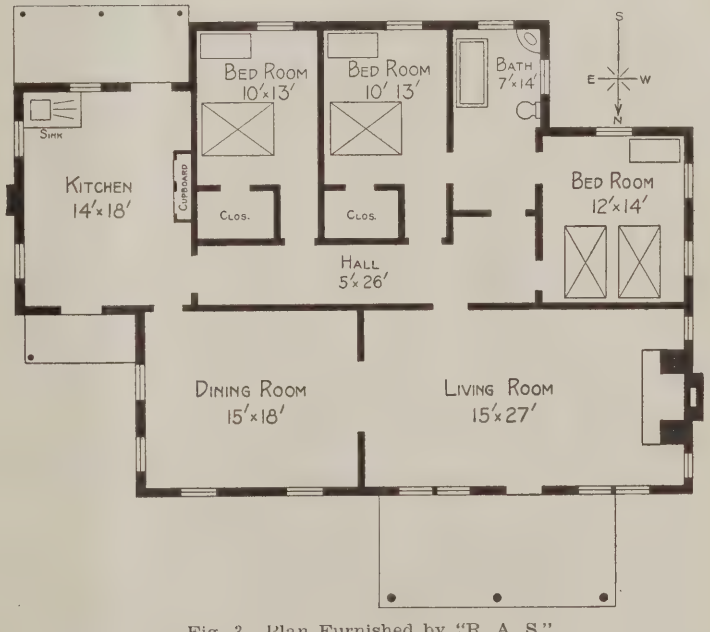


Fig. 3—Plan Furnished by "R. A. S."

Floor Plans for a Six-Room Cottage—Arrangements Suggested by Different Correspondents

From R. A. S., Reading, Pa.—I am enclosing a floor plan, Fig. 3, of a six-room cottage as requested by "W. H. Y." in a recent issue of the paper. The request was for a one-story six-room and bath cot-

tage and I hope that what I have sent may be of assistance to him. I am a young man taking a course in architecture and building in the Correspondence Schools and I shall be glad to have some of the other readers criticise my plan if they feel so disposed.

Question in Platform Stairway Construction

From M. C. G., San Diego, Cal.—As a constant reader of *The Building Age*—a chip in embryo—I would like to ask Morris Williams to enlighten me regarding a little point in connection with the construction of the platform stairway which appeared on pages 33 and 34 of the January issue. It has to do with the joint between the base board and the stringer of the stairway as shown in Figs. 4 and 6. Is not this indicated incorrectly in Fig. 4, because in Fig. 6 there is a solid piece between the points A and C which cannot, from my way of thinking, be part of the stringer, unless the stringer is cut from a plank wide enough to include this piece, and I am free to confess that I have never seen it done. According to my knowledge which, as a young chip is very imperfect, the joint should be at A.

Now as regards the round ended treads and rises, one often meets the problem of the cove and carpet strip in the circular part. My old boss taught me to fix this when building up, the cove and carpet strip being moulded on pieces of stuff to cover the circular portion. The carpet strip was placed under blocking and the cove piece glued to the tread, there being enough ripped off the veneer to allow for it. Only this week I had to fit a cove and carpet strip to stairs which the other fellows had fixed, and I got both out of solid material and glued them on. I did this because I thought if one should saw kerf them to fit, the appearance is not workmanlike and at the same time it shows the saw marks. One cannot often find the right (soft) piece of mould to bend and steaming is not always practical. As before intimated, I shall be very glad to have Mr. Williams or some other stair building expert discuss this point, as of course it is easy to fit straight pieces between circular parts.

Front Elevation for Bank Building

From T. T. Carter, Bluefield, W. Va.—I am enclosing a sketch, Fig. 1, showing a front elevation and plan of entrance for a small bank building in reply to "A. B.," Marthasville, Mo., and trust it may be of interest. I have built some structures like this and they have given entire satisfaction.

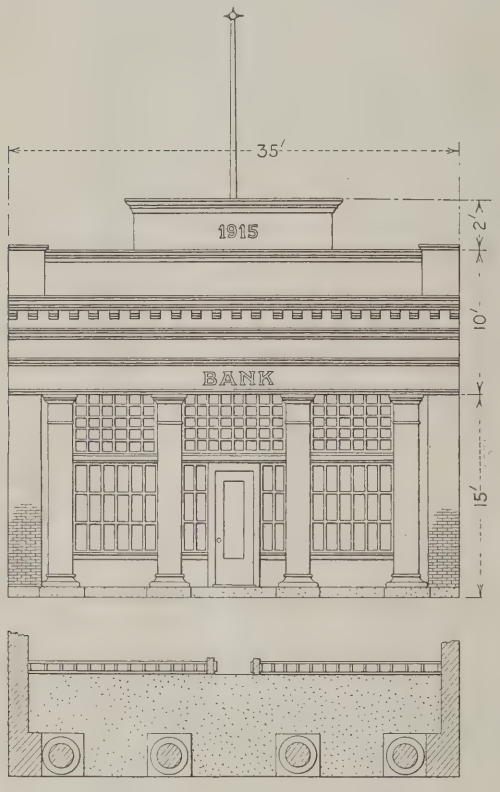


Fig. 1—Design Furnished by T. T. Carter

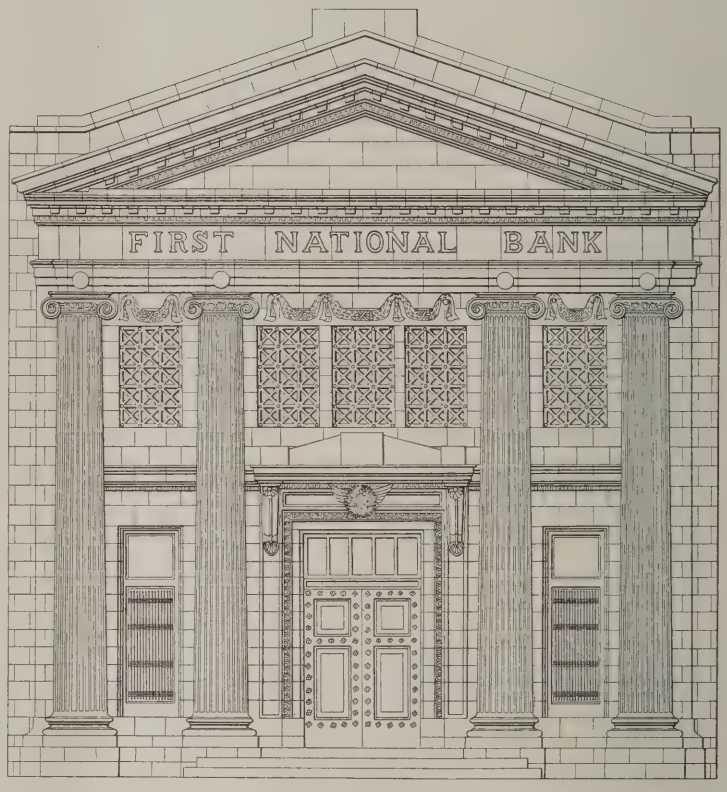


Fig. 2—Drawing Submitted by C. Allen Rogers

Front Elevation for a Small Bank Building

From C. Allen Rogers, Trenton, N. J.—In the February issue, page 60, there is an inquiry from "A. B." for a design for a bank front elevation. I am sending one, Fig. 2, drawn for marble, but it can be built in brick with stone trimmings if desired.

A Spring Floor for a Dance Hall

From G. S. N., North East, Pa.—Will some of the practical readers of the Correspondence Department tell me how to put a spring floor in a dance hall? I would be glad to learn all the details and see a sketch showing a section through the floor.

Some of the recommendations of the Entomologist of the United States Department of Agriculture for keeping the white ant from damaging timber are set forth in a Bulletin just distributed.

Right to Lien for Plans Not Used

A Judicial Discussion of an Architect's Rights Where a Proposed Improvement Is Abandoned

By A. L. H. Street

THE Minnesota Supreme Court handed down a decision on January 29 which construes the Mechanics' Lien law of that state as entitling an architect to a lien for services rendered in preparing plans and specifications for a building which was never constructed, if the plans were abandoned through no fault of the architect. And it is further held in the same opinion that where an architect is engaged to supervise the erection of a proposed building, as well as prepare the plans, and the owner breaks the contract of employment after the plans have been furnished, the statutory period during which the lien statement must be filed is to be computed from the date of such breach of agreement, rather than from the date when plans were finished.

This decision will prove of interest not only to the architects of Minnesota, but will, also, afford a persuasive precedent in other states where the same question may be presented to the courts.

Statement of the Case

Lowell A. Lamoreaux, a Minneapolis architect, contracted with defendant to prepare plans and specifications for buildings and supervise its construction for compensation to be computed on a basis of four per cent. of the cost of the proposed improvements, which it was understood would be constructed on certain land. The plans and specifications were duly furnished and no complaint was made against them by defendant, but he later announced a purpose not to erect the buildings, and resisted enforcement of a lien against the premises on the ground that since no improvement was placed upon the land there was nothing to which a lien could attach. In sustaining Mr. Lamoreaux's right to hold the premises as security for payment of his charges, the Minnesota Supreme Court said that it was a close question, and admitted that the conclusion announced was not the unanimous opinion of the court. The decision, however, cites former holdings of the same court to the effect that where there is an actual improvement constructed an architect is unquestionably entitled to a lien for services in preparing the plans and specifications, as well as for supervising the construction. In each of the cited cases it appeared that the architects who claimed liens performed both classes of service.

"It has been held," says the court, "that an architect's service in preparing plans only are not lienable, but we confess our inability to see why plans and specifications do not as much contribute to the construction of a building as does the supervision of the architect, and well considered cases so hold."

Here the court cites opinions of the appellate courts of Nebraska, Iowa, Wisconsin, Illinois, California, and Rhode Island as supporting the rule that an architect's claim for compensation for preparing plans and specifications is just as lienable as a claim on acount of supervision of construction.

What the Court Said

"We think," proceeds the Minnesota decision, "plaintiffs would have been entitled to a lien if their plans had been used in the construction of a building on the premises. Is this right to a lien lost where the owner, through no fault of the architect, does not use the plans or make the contemplated improvement? Liberal construction of the lien statute is the settled policy in this state. But the right to a lien is still wholly dependent upon the language of the statute. There is no lien except where the statute gives one. The answer to the question, therefore, depends upon the words of the statute liberally construed to further the objects of its enactment. * * * If in the case at bar, the building had been actually constructed or its construction begun, on the plans furnished therefor by plaintiffs, their right to lien would be clear. The owner could not defeat the lien by abandoning the project after the improvement was actually begun on the ground, nor would the destruction by fire of a partly completed building destroy the lien. * * * While it is perhaps difficult to see how the value of property is enhanced in any case by labor or material that do not go into the improvement or how such labor or material contributes to the improvement, our liberal policy has led to this result where there is an actual improvement. Is it an unwarranted extension of this doctrine to include cases where no improvement is made when that is no fault of the laborer or materialmen?"

Court Decisions of Other States

In referring to decisions handed down by the courts of other states on this question, the Minnesota court refers to the case of Foster vs. Tierney, 91 Iowa Supreme Court Reports 253, where it was decided that there could be no lien for an architect's services in preparing plans and specifications which were never used, but this decision is reconciled with the Minnesota holding on the ground that the language of the Iowa lien law is much narrower than that of the Minnesota statute.

On the other hand, the decision in Freeman vs.

Rinaker, 185 Illinois Supreme Court Reports 172, could not be regarded as a strict precedent, although it was there held that an architect was entitled to a lien for compensation due him for furnishing plans and specifications for a building which was never erected, since that decision was based on an Illinois statute which specifically gives a lien to a person who performs services as an architect "for the purpose of building a house," etc.

After reviewing the sections of the Minnesota lien law, which provide in several places for liens for services rendered in connection with the "improvement" of real estate, the Supreme Court decides that they must be deemed to authorize a lien in such cases as the one which was presented, as against the owner, inasmuch as one clause provides that the lien shall attach when the first material or services are furnished for a building, and another clause provides that, *as against a third person* who takes a mortgage upon the property, or who buys the property, a lien does not take effect until there is a visible improvement commenced upon the land.

"We must not overlook the fact," adds the Minnesota court, "that defendants prevented the improvement of their own volition, and through their breach of contract preventing the work of plaintiffs from actually contributing to the construction of an actual improvement on the land. We do not mean that the breach of contract created the lien. Of course, it could not, but it is rather hard on those who have performed labor or furnished material in reliance upon the lien statute, if the owner can defeat their lien by refusing to go on with the building."

"The decision on the second point involved in the case, to the effect that where an architect contracts for a lump sum to furnish plans and specifications for the construction of a building, and also to supervise the work of construction, and the owner breaks the contract, as was done in this case, the time during which the lien statement must be filed is to be computed from the date of such breach and not from the date when the plans were furnished, is based on the fact that the contract is to be regarded as an indivisible transaction. When the plans were furnished plaintiffs had no right to file a lien, because they had only partly performed their contract. And the court holds that this decision is not to be avoided on the ground that when the contract was broken there still remained thirty days in which a lien might have been filed, and yet have fallen within the ninety-day period fixed by the Minnesota statute for filing lien statements.

A Long Building Controversy Settled

In one respect at least the building situation in the city of Chicago has been clarified for after several years of negotiation the Building Construction Employers' Association and the Building Trades Council have adopted a plan covering every phase of labor disputes and have arranged a scheme by which to adjust them without a cessation of work. The agreement which we understand was adopted on January 16 by the Building Trades Council is for a period of three years from June 1, 1915.

The scheme is that when a dispute arises the presidents of the Union and of the Contractors' Association, with which it has a contract, will attempt to reach a settlement. Should they fail, the issue will be taken up by a joint board of arbitration composed of members of the union and association involved.

If this board should fail, an umpire will be selected. In case of failure to select an umpire, the matter can be referred to the joint arbitration board of the Building Trades Council and Building Construction Employers' Association.

This arbitration plan will be incorporated in all contracts between individual unions and contractors' associations. These organizations will make their own working rules for carrying on the trade, and will also fix wage scales.

Meeting of Wisconsin Master Carpenters

At the recent convention of the Wisconsin State Association of Master Carpenters many topics of vital interest to the trade were discussed, among them being the Apprenticeship Law; Proposed State Mutual Liabilities Insurance for Employees under the Workmen's Compensation Act, and the Proposed Revision of Contract Forms and Specifications. The association also favored licensing by the state all carpenter-contractors so as to place them on a similar plane with plumbers. The officers elected were as follows:

President.....Joseph Tyrell, of Madison
Vice-Pres.....T. J. Van Pool, of Janesville
Matt Peters, of Milwaukee
Treasurer....H. G. Zickert, of Watertown
Secretary.....O. H. Ullbricht

It was decided to hold the next convention in the city of Madison, Wis.

Officers of Cement Manufacturers' Association

At the twelfth annual meeting of the Association of American Portland Cement Manufacturers the following officers were elected:

President.....John B. Lober
Vice-Pres.....R. S. Sinclair
Secretary.....Percy H. Wilson
Assist. Sec'y.....L. R. Ferguson
Treasurer.....Charles F. Conn
Assist. Treas.....W. D. Lober

The meeting was the most largely attended in the history of the association and the membership now embraces 70 concerns.

It was decided to hold the next meeting of the association at Hotel Blackstone, Chicago, Ill., May 10 to 13, inclusive.

The architectural and building fraternity has been given liberal representation on the board of directors of the New Orleans Association of Commerce, a commercial organization that is developing a new economic era in New Orleans and Louisiana. Two of the leading architects of that city, Allison Owen, of Diboll & Owen, and Charles A. Favrot, of Favrot & Livaudais, were recently elected members of the board of directors of the New Orleans organization, and Ernest Lee Jahncke, building materials, has been elected vice-president.

The Annual Cement Show at Chicago

A Most Attractive Display of Products of Special Interest to Patrons of "The Building Age"

CONCRETE evidence that the annual Cement Show grows year by year more useful, instructive and essential to the contractor, architect, builder, dealer in building materials and manufacturer of concrete products was demonstrated most emphatically at the 1915 exhibition which was opened in the Coliseum in Chicago on February 9. The attendance this year gave it national recognition and more exhibitors than ever before were on hand, representative of every branch of the industry, to meet old acquaintances as well as to make a host of new friends.

One of the Many Very Attractive Exhibits at the Recent Chicago Cement Show

The Cement Show is certainly growing in popularity and dealers and contractors from all parts of the country made the second week in February one for a combination of business and pleasure. Manufacturers look upon this annual convention as a most propitious time to launch new models and tell interested buyers of their new ideas and methods.

This year there were approximately two hundred exhibitors displaying concrete mixers, gasoline engines, metal lath, pumping outfits, tools, saws, derricks, planers and many other products too numerous to mention. One of the noticeable features was the delegation of large concrete mixer manufacturers, due to the fact that the rapid development of the paving mixer is bringing out many new features in this particular line. Taken individually and collectively, the quality of displays and the interest shown exceeded even the most sanguine expectations of the exhibitors. In a nutshell, the Cement Show is recognized as a very efficient means for meeting the buying public. Purchases of machinery are made by contractors and others who have no other chance to see so many different models in actual operation. Many of those attending are on the lookout for the improvements which will help them in economical production while others satisfied with original purchases are often ready to place repeat orders for different equipment.

As has been the practice in former years, several conventions were held during the week of Febru-

The Annual Cement Show in Chicago—Exhibit of Concrete Stone as it Would Appear When Used in Building and the Machines by Which It Is Made

ary 8. Important in this connection were those of the National Builders' Supply Association, Illinois Lumber and Builders' Supply Dealers' Association, American Concrete Institute and the American Concrete Pipe Association.

The accompanying illustrations of a few representative exhibits clearly indicate that the displays and their surroundings were most artistic.

An entirely original decorative scheme added considerable interest to the Coliseum. The hall presented a forest of green, with a central decoration consisting of a huge wreath of evergreen from which dropped twenty-four streamers to different points on the balcony rail. The steel columns of the building were encased in natural bark, and individual booths were marked off by an overhead system of smilax, festoons and palms placed at intersections. At many booths concrete stands supported concrete receptacles with picturesque Japanese gardens.

Another innovation was tried with success this year. For one-half hour every afternoon and evening all machinery was stopped. This arrangement had a double advantage. Firstly, it gave the exhibitors thirty minutes of recuperation, for it was admittedly hard work talking all day surrounded with concrete machinery of all sizes and capacities in full operation. Secondly, it gave one the opportunity to enjoy the Illinois State Band of fifty pieces which furnished interesting musical programs every afternoon and evening.

February 11 and 12 were set aside for celebrating the birthday of Thomas A. Edison and that of Abraham Lincoln. On Thursday a telegram was sent by Edward M. Hagar, president of the exhibition company, to the famous inventor, who very feelingly replied.

On Lincoln's Day drawing for space for the 1916 show to be held February 9-16 occurred in the Coliseum annex on the second floor on Friday morning at 11 o'clock.

The first item on the program was music furnished by the band. President Edward M. Hagar then delivered an address of welcome and he was followed by William R. Moss, vice-chairman of the Ways and Means Committee of the Chicago Association of Commerce. Some additional musical numbers were given by the Chicago Association of Commerce Glee Club, after which John D. Shoop, Chicago's Assistant Superintendent of Schools, delivered an address entitled "Abraham Lincoln." Music by the glee club completed the exercises.

At the drawing for the 1916 show practically all of the space in the Coliseum and the Annex was sold, a feature which illustrates conclusively that the Chicago Cement Show has come to stay as a permanent institution.

All around the show were to be seen signs containing but three words, "Concrete for Permanence." In this connection J. P. Beck, general manager for the exhibition, said:

"A wonderful development of industry has come within the last twenty years, and of necessity this has resulted in a great change in building methods.

Display of Barn and Stable Equipment with Model of Barn Shown at the Left

This growth is greatly measured by the heavy increase in the use of Portland Cement. Since 1894, the yearly output has increased from 1,000,000 to 90,000,000 barrels, a growth spectacular and rapid. It has called out all the ingenuity of engineers to devise allied materials and building equipment which should give structures not only adequate to modern manufacture and living needs, but which should be safe to embody certain ideals which have through all ages marked the efforts of men's hands. . . . The future is bright for the wider extension of concrete into every building field. With the better understanding of concrete has come its broader adoption, and the last vestiges of prejudice are rapidly being swept away by the sheer merit of present day work.

The three words, "Concrete for Permanence," have been proposed as a slogan for all connected with the concrete industry. They are full of potential possibilities for bigger business. They carry to the layman, who is not familiar with the good qualities of concrete and the economy following its use, just the meaning which will cause him to favor concrete as opposed to materials of less permanence and less efficiency. To the architect they emphasize a feature which should be a predominant one in his work. These three words will mean much to the industry if every member of that industry makes use of it in his advertising, in his correspondence, in his casual conversation."

Among the concerns making displays of special interest to readers of this journal, mention may be made of the following:

ABRAM CEMENT TOOL MFG. CO., Dugger, Ind.—Cement Finishing Tools.
ALBRECHT EXCAVATOR CO., Milwaukee, Wis.—Road and Excavating Machines.
AMERICAN CEMENT MACHINE CO., INC., Keokuk, Ia.—Concrete, Mortar, Plaster Mixers.
AMERICAN HOIST & DERRICK CO., St. Paul, Minn.—Hoists, Derricks, Crosby Clips.
AMERICAN SAW MILL MACHY. CO., Hackettstown, N. J.—Saw Mill and Wood Working Machinery.
ANCHOR CONCRETE STONE CO., Rock Rapids, Ia.—Block Machines, Automatic Tampers.
ARCHER IRON WORKS, Chicago.—Concrete Mixers.
ARCHITECTURAL MOLD CO., Detroit, Mich.—Molds for Concrete Architectural Specialties.
ARROWSMITH CONCRETE TOOL CO., Arrowsmith, Ill.—Finishing Tools, Stamping Outfits, Curb and Gutter Forms.
ATLAS ENGINEERING CO., Milwaukee, Wis.—Concrete Mixers.
BADGER CONCRETE MIXER CO., Milwaukee, Wis.—Concrete Mixers.

The Annual Cement Show in Chicago—Examples of Concrete Work of An Ornamental Nature

BAKER CO., THE R. D., Detroit, Mich.—Equipment for Concrete Roads and Pavements.
BAUTE CONCRETE MACHY. CO., Benton Harbor, Mich.—Block, Brick and Silo Machines and Tampers.
BLAW STEEL CONSTRUCTION CO., Pittsburgh, Pa.—Steel Forms for Concrete Construction, Structural Steel.
BLYSTONE MFG. CO., Cambridge Springs, Pa.—Concrete Mixers, Concrete Block Machines.
BUILDING AGE, New York.—A Monthly Publication Devoted to Building.
CARNEGIE STEEL CO., Pittsburgh, Pa.—Steel Shapes and Bars, Reinforcing Bars, Piling Sections.
CARPENTER & CO., GEORGE B., Chicago.—Contractors' Tools, Machinery and Equipment.
CEMENT TILE MACHINERY CO., Waterloo, Ia.—Concrete Mixers, Block and Tile Machines, Power Tampers.
CERESIT WATERPROOFING CO., Chicago. Waterproofing for Concrete.
CHAIN BELT CO., Milwaukee, Wis.—Concrete Mixers, Paving Mixers.
CHICAGO BUILDERS' SPECIALTIES CO., Chicago.—Concrete Mixers.
CHICAGO PORTLAND CEMENT CO., Chicago.—Portland Cement.
C. H. & E. MFG. CO., INC., Milwaukee, Wis.—Portable Saw Rigs, Contractors' Equipment.
CONTRACTORS' MACHY. CO., Keokuk, Ia.—Concreting and Contractors' Equipment.
CORRUGATING BAR CO., Buffalo, N. Y.—Reinforcing Bars, Mesh, Lath, Waterproofing.
CROPP, A. J., & CO., Chicago.—Concrete Mixers.

CROWN POINT SPAR CO., New York.—Granite Surfacings for Concrete.
C-S CONCRETE FORM CO., Kansas City, Mo.—Adjustable Steel Column Molds.
D. & A. POST MOLD CO., Three Rivers, Mich.—Concrete Post Machines and Molds.
DULL, RAYMOND W., CO., Chicago.—Sand and Gravel Washing Equipment, Excavators.
DUNN, W. E., MFG. CO., Chicago.—Concrete Machy. and Crude Oil Engines.
ELITE MFG. CO., Ashland, O.—Concrete Mixers, Scaffolding Brackets, Lifting Jacks.
EUREKA MACHING CO., Lansing, Mich.—Concrete and Mortar Mixers, Pumping Outfits.
FOOTE CONCRETE MACHY. CO., Chicago.—Concrete Mixers, Paving Devices.
GARDEN CITY SAND CO., Chicago.—Stonekote Exteriors. Toch Bros.' Waterproofing.
GIBSON CONCRETE WORKS, Fromberg, Mont.—Sectional Reinforced Concrete Culverts.
HELTZEL STEEL FORM & IRON WORKS, Warren, O.—Steel Forms for all Types of Concrete Work.
HOBBS CONCRETE MACHY. CO., Detroit, Mich.—Block Machines and Tampers.
HURON PORTLAND CEMENT CO., Detroit, Mich.—Portland Cement.
HURST CO., CHAS. B., Chicago.—Poured Reinforced Concrete Block Silos.
HYDRAULIC PRESSED STEEL CO., Cleveland, O.—Wood and Metal Forms for Subways, Sewers, Retaining Walls, Bldgs. and Silos.
IDEAL CONCRETE MACHY. CO., Cincinnati, O.—Concrete Mixers, Block and Brick Machines, Power Tampers.
ILLINOIS STEEL CO., Chicago.—Reinforcement Bars, Rd., Sq. and Twisted.
INTERLOCKING CEMENT STAVE SILO CO., Des Moines, Ia.—Machines for Mfg. Interlocking Cement Staves for Silos and Water Tanks.
INTERNATIONAL MOTOR CO., Chicago.—Mack and Saurer Motor Trucks.
INTERNATIONAL ROOFING MFG. CO., Chicago.—Manufacturers of Asphalt Shingles, Roofings and Paints.
JAEGER MCH. CO., Columbus, O.—Concrete Mixers.
KENT MACHINE CO., Kent, O.—Concrete Mixers and Mortar Mixers.
KEYSTONE SILO CO., Sheffield, Ia.—Keystone Silos, Machines for Keystone Silo Blocks.
KNICKERBOCKER CO., Jackson, Mich.—Concrete and Mortar Mixers.
KOEHRING MACHINE CO., Milwaukee, Wis. Concrete Mixers, Pavers, Bar Cutters and Benders.
LA GRANGE SPECIALTY CO., La Grange, Ind. Brick, Post and Tile Machines.
LANSING-COMPANY, Lansing, Mich.—Concrete, Mortar and Plaster Mixers, Wheelbarrows and Carts.
LEHIGH PORT. CEMENT CO., Allentown, Pa.—Portland Cement.
LOUDEN MACHINERY CO., Fairfield, Ia.—Barn and Stable Equipment.
MACARTHUR CEMENT PRODUCTS CO., Burlington, Ia.—Molds and Processes for Poured Conc. Blks.
MARBLE MOSAIC CO., Milwaukee, Wis.—Marble, Mosaic Floors, Wainscot, Stair Treads, Toilet Slabs.
MARSH-CAPRON MFG. CO., Chicago.—Concrete Mixers, Contractors' Specialties.
MICHIGAN PORTLAND CEMENT CO., Chelsea, Mich.—Portland Cement.
MILES MFG. CO., INC., Jackson, Mich.—Concrete Mixers, Block Machines.
MILWAUKEE CONCRETE MIXER CO., Milwaukee, Wis.—Concrete Mixers, Paving Mixers.
MONOLITHIC SILO & CONST. CO., Chicago.—Equipment for Building Monolithic Concrete Silos.
MORTAR MIXER CORP., Iowa City, Ia.—Mortar and Plaster Mixers.
MULTIPLEX CONC. MCHY. CO., Elmore, O.—Block Machines, Cap, Step, Sill, Column and Ornamental Molds.
MUNICIPAL ENG. & CONTR. CO., Chicago.—Concrete Mixers, Paving Mixers.
NATIONAL LEAD CO., New York.—Paints for Concrete, Expansion Bolts.
NATIONAL MIXER CO., Oshkosh, Wis.—Concrete Mixers.
NEWAYGO PORTLAND CEMENT CO., Grand Rapids, Mich.—Portland Cement.
NEW AETNA PORT. CEMENT CO., Detroit, Mich.—Portland Cement.
NEW ENTERPRISE CONC. MCHY. CO., Chicago. Molds and Equipment for Concrete Silos. Wall forms.

The Annual Cement Show in Chicago—An Interesting Display of Concrete Mixers

NEW-WAY MOTOR CO., THE, Lansing, Mich.—Air Cooled Engines.
NORTHFIELD IRON CO., Northfield, Minn. Concrete Mixers.
NORTHWESTERN MFG. CO., Sioux City, Ia.—Cement Block and Brick Machines, Power Tampers.
NORTHWESTERN STEEL & IRON WKS., Eau Claire, Wis.—Concrete Mixers.
NORWALK VAULT CO., Norwalk, O.—Concrete Grave Vaults and Molds.
NOVO ENGINE CO., Lansing, Mich.—Gasoline Engines, Hoisting Outfits, Diaphragm, Trench, Suction and Force Pumps.
OHIO POST MOLD CO., Toledo, O.—Molds for Concrete Fence Posts.
OLSEN CONCRETE MIXER CO., Elkhorn, Wis.—Concrete Mixers.
ORIGINAL GAS ENGINE CO., Lansing, Mich.—Gasoline Engines, Hoists, Pumps.
OSHKOSH MFG. CO., Oshkosh, Wis.—Concrete Mixers, Pavers, Saw Rigs.
PATENT VULCANITE ROOFING CO., Chicago.—Roofing Materials, Asphalt Shingles, Ornamental Roofings.
PEERLESS PORTLAND CEMENT CO., Union City, Mich.—Portland Cement.
PENINSULAR PORTLAND CEMENT CO., Jackson, Mich.—Portland Cement.
PIONEER MFG. CO., Waterloo, Ia.—Bell-End Concrete Pipe Machines.
POLK, GENUNG, POLK CO., INC., Fort Branch, Ind.—Forms for Reinforced Concrete Grain Tanks, Silos, Stacks and Stand Pipes.

POWER & MINING MACHINERY Co., Cudahy, Wis.—Concrete Mixers, Mining, Crushing and Cement Machinery.
RABER & LANG MFG. Co., Kendallville, Ind.—Concrete Mixers, Tampers, Brick, Sewer Pipe and Drain Tile Molds.
RANSOME CONCRETE MACHY. Co., Dunellen, N. J.—Concrete Mixers, Paving Mixers.
REICHERT MFG. Co., Milwaukee, Wis.—Metal Molds for Concrete Construction.
REPUBLIC IRON WORKS, Lansing, Mich.—Concrete Mixers, Contractors' Equipment.
SANDUSKY PORTLAND CEMENT Co., Sandusky, O.—Portland Cement.
SASGEN DERRICK Co., Chicago.—Derricks, Winches, Timber and Stone Tongs.
SCHAEFER MFG. Co., Berlin, Wis.—Concrete Mixers, Gasoline Engines, Saw Rigs.
SCHLUETER, M. L., Chicago.—Machines for Surfacing Floors of all kinds.
SIOUX CITY ENGINE & MACHY. Co., Sioux City, Ia.—Mixers, Engines, Block, Brick and Tile Machines.
SMITH Co., THE T. L., Milwaukee, Wis.—Concrete Mixers, Paving Mixers.
SMOOTH-ON MFG. Co., Jersey City, N. J.—Waterproofing and Hardeners for Concrete.
STANDARD SCALE & SUPPLY Co., Chicago.—Concrete Mixers. Gas Engines, Hoists, Pumps, Contractors' Equipment.
STAPLE POST MOLD Co., Westerville, O.—Fence Post Molds and Machines.
THOMAS ELEVATOR Co., Chicago.—Hoists for Excavating and Bldg. Const.
TRUSSED CONCRETE STEEL Co., Detroit, Mich.—Reinforcing Steel, Metal Lath, Expansion Joint Plates, Steel Sash and Waterproofing.
UNITED WIRE TIE Co., THE, Toledo, O.—Wire Ties, Wire Twisting Tools.
UNIVERSAL CONCRETE BAR Co., Chicago. Expansion Joints and Curb Protection Bars.
UNIVERSAL CRUSHER Co., Cedar Rapids, Ia.—Rock Crushers, Screens and Elevators, Good Roads Outfits.
UNIVERSAL FORM CLAMP Co., Chicago.—Clamps for Use with Wooden Forms.
UNIVERSAL PORTLAND CEMENT Co., Chicago.—Portland Cement.
U. S. STANDARD MFG. Co., Ashland, O.—Concrete Mixers, Block Machines, Slate Dressers.
VAN DUZEN-ROYS Co., Columbus, O.—Concrete Mixers.
WABASH PORTLAND CEMENT Co., Detroit, Mich.—Portland Cement.
WAGNER-BEHM Co., Chicago.—Pull-Easy Nail Collars for Temporary Forms.
WATERLOO CEMENT MACHINERY CORP., Waterloo, Ia.—Concrete Mixers.
WHEELING MOLD & FOUNDRY Co., Wheeling, W. Va.—Stationary and Portable Crushing Outfits.
WHITMAN AGRICULTURAL Co., St. Louis, Mo.—Diaphragm and Centrifugal Pumping Outfits, Engines, Hoists, Saw Rigs.
WOLVERINE PORTLAND CEMENT Co., Coldwater, Mich.—Portland Cement.
WYANDOTTE PORTLAND CEMENT Co., Wyandotte, Mich.—Portland Cement.

Improvement in Housing Workmen

Steps to Be Taken by Pennsylvania Regarding Workmen's Houses of Great Interest to Employers in Other States

THE State of Pennsylvania, through an act passed by its last Legislature, contemplates a more comprehensive scheme than has as yet been instituted for the improvement of the people. One of the strong criticisms made against industrial communities has been the bad condition of many of the houses which are occupied by the wage workers. Some of the cities of that State have their own housing bureaus, but by the act referred to the commonwealth will be able to undertake correction in communities where sanitation and proper living accommodations have been ignored. A Bureau of Housing is to be provided as a branch of the State Department of Health. The act creating this bureau made no appropriation to put this special feature into operation, it being understood that the officers of the Department of Health should devise a plan which, owing to the magnitude of the work to be done, would take some time in laying out the preliminaries. An appropriation will then follow.

The act provides that the bureau shall investigate the sanitary conditions of tenement, lodging and boarding houses and when these conditions are found to be a menace to the occupants the bureau has power to condemn such houses, notifying the owners with regard to the unsanitary or overcrowded conditions prevailing, and specifying the changes or alterations to be made for the purpose of relieving the objectionable features. Provision is made for a court review, all owners or agents having 10 days in which to file an appeal. The court has authority to name viewers, and its act is to be final as to enforcement or modification of the order. Failure to comply with the order is to be followed by prosecution, and conviction involves a penalty of $20 a day for failure to obey orders or imprisonment, as the court may direct. Denial of a right of entry to bureau agents entails a fine of $50 to $100 or 60 days in prison.

Such an act as this is probably much needed in certain sections. Owners or operators of industrial plants are frequently unjustly accused of improperly treating their work people when visitors observe the bad conditions existing in some of the houses occupied by their employees. These houses are usually owned by persons having no connection whatever with the iron or steel works in the vicinity. The houses are built with the view of getting the largest return on the money invested, and their sanitary conditions are completely neglected. Opprobrium then rests on the proprietors of the works, but they have no power over the property owners. The best that can then be done is to erect good houses in some adjacent section and rent them to the work people. This, again, has its objectionable side, as an industrial company erecting houses for rent is then charged with endeavoring to monopolize the business of the locality. It appears to be well, therefore, that the State should step in and exercise authority over the houses which are occupied by working people and endeavor to surround the inmates with something of comfort and give them conditions which are more likely to be healthful. The experiment to be tried in Pennsylvania will undoubtedly be watched with interest by employers in other States.

Building Construction Taught in High Schools

It is interesting to note that the students in the Manual Training Department of the Western High School at Bay City, Mich., are being taught the practical side of house building by instructor R. D. Paxton. The students are given blue prints and are instructed in the proper manner of carrying out the work which they cover. The work done by students thus far as an experiment has proven a great success and they will be taught not only how to build homes but also the details of house construction.

A Storage Cellar Built of Concrete

A Safe Place Near the House for an Acetylene-Generator, or for Oil and Gasolene

By Percy H. Wilson

THE acetylene-generator used in furnishing gas for illuminating rural houses requires a safe, permanent location somewhat removed from the residence so as to minimize any danger from fire or objectionable odors. A concrete cellar located partly underground serves the purpose admirably. The cellar, when not used for housing the acetylene-generator can be well employed for storing combustibles, such as oil, gasolene, etc., or for the safeguarding of farm explosives. The cost of such a structure is slight and it can be easily built by farm labor.

When deciding upon the size of the cellar it is well to make it large enough to contain the generator, its accessories and any other material that is to be stored therein. There should be provided also space for a box or container in which to dump the sludge or exhausted carbide from the generator. The cellar shown in the illustration is about 8 feet long by 6 feet wide and 6 feet deep below ground level, and has 6-inch walls.

A Concrete Cellar for an Acetylene-Generator at Chalfonte, Pa.

Note that the top is sloped for the purpose of shedding rain water. The door is carefully made and fitted to insure a perfectly dry cellar.

Make the excavation 1 foot larger each way than the inside dimensions of the cellar and 4 inches deeper. This will provide for 6-inch walls and a 4-inch floor. If the earth is of a stiff character and will stand up no outside forms will be required below ground, the earth taking their place.

Before mixing any concrete have ready the inside forms as well as the outside forms for use above ground. These forms are made of 1-inch boards with tight joints.

The 4-inch floor should be first laid in the bottom of the excavation. Concrete for the floor is proportioned 1 part Portland cement, 2½ parts sand and 5 parts crushed stone or gravel. As soon as the concrete floor is placed set the inside forms in position. While the concrete in the floor is still soft begin depositing the concrete for the walls between the inside form and the sides of the excavation.

This concrete should be proportioned 1 part Portland cement, 2 parts sand and 4 parts gravel or crushed stone. The concrete should be well tamped and spaded into place. In doing this, however, care should be exercised to prevent dirt from falling from the earth walls into the fresh concrete as this would weaken the walls. Locate any pipes that are to run into the cellar at the proper points and place the concrete entirely around them where they pass through the walls. Continue depositing the concrete until ground level is reached.

Now place the outside forms in position, staking them securely in place to prevent shifting. Continue depositing the concrete until the forms are filled. The top surfaces can then be troweled to a smooth finish and the concrete permitted to harden. The forms should be allowed to remain in place for two weeks before removing them. As the work progresses bolts for holding down the generator and hinges for the cover may be placed, heads down in the fresh concrete.

Concrete steps can be provided for entering the cellar, but it is usually the practice to provide only a short ladder for this purpose. The cover should be heavy, well made and provided with strong locks to prevent access by unauthorized persons.

A cellar of the size specified will require approximately 6 barrels of Portland cement, 2 cubic yards of sand and 4 cubic yards of stone.

In the state of Washington there are 435 shingle mills with a daily output of 15,000,000 shingles. There are 14,000 men employed with a daily wage approximating $14,000,000 a year.

New Publications

Stair Builders' Guide. By Morris Williams. 256 pages. Size 6 x 9 in. Illustrated with 357 line drawings and halftone engravings. Bound in cloth with illuminated side title. Published by *The Building Age* Book Department, 231 to 241 West Thirty-ninth street, New York City. Price $1.50, postpaid.

The subject of stair building, in which of course is included hand railing, is but little understood by the great majority of carpenter-contractors and builders at the present day although knowledge of the art and science is much more widespread than it was years ago when only an expert could properly construct a stairway that was at all intricate or complicated in its various details. As the author of the work under review expresses it, "Stair building differs materially from all other branches of carpentry. It is a science having its fundamentals in the solution of some of the most intricate problems in plane and solid geometry. The solution of these problems have within the last century been the study of a number of scholarly mathematicians, resulting in a variety of solutions known as 'systems' of cylindrical hand railing." The effort of Mr. Williams has been to explain the simplest method of the science in its present advanced stage. The first chapter treats upon the constructive details of the stairway, while chapters 2, 3, 4 and 5 are devoted exclusively to the fundamental elements of wreath rail construction. In the 6th chapter he gives attention to the arrangement of rises, while in the twenty-three chapters which follow he considers examples of stairways of all descriptions, ranging from the small straight flight to the most complex of cylindrical structures. Each chapter represents a complete example of a special stairway, including plan, elevation and rails. The laying out of each working detail is considered and explained and is accompanied by such diagrams as render the description easily understood.

Many of the problems considered originally appeared in the columns of *The Building Age* and were the result of queries by readers of this well-known building journal. The entire matter has been presented in such a way as to be of inestimable value to the builder who desires to familiarize himself with the art and science of stair building in all its phases. A striking feature of the work is found in the series of halftone engravings showing finished stairways in dwellings, hotels, banks, office buildings, etc., and intended to be of value to the architect, the stair builder, or the contractor in the way of suggestions to prospective clients. The work is of such a nature that no wideawake and progressive architect and builder can afford to be without it.

It is stated that the Russian Government has placed an embargo on all kinds of lumber to prevent its exportation. Walnut lumber, including Circassian walnut, much prized by American furniture makers, is specifically mentioned.

Building permits issued last year in Medicine Hat, Assinaboia, Canada, showed a total of $1,800,000 as gainst $3,800,000 in 1913.

Convention of New York Builders

One of the most important subjects which engaged the attention of the delegates at the recent annual convention of the New York State Association of Builders held in Utica was the Workmen's Compensation Law, and a series of resolutions were adopted, a part of which read as follows:

"That we do not favor paying to alien dependents of deceased workmen large awards and benefits under compensation.

"That this convention believes that the best interests of all parties concerned is served by permitting the four forms of insurance as now allowed under the existing compensation law. This convention further believes that it is not to the best interest of the public that the limit when compensation begins shall be reduced from 14 days to seven days.

"That this convention recommends that the existing compensation law be so amended as to absolutely secure compensation for injured employed in all building industries protecting them particularly against employers not carrying workmen's compensation insurance.

"This convention would further recommend to the Compensation Commission a consistent revision of the rates as applying to the contracting fraternity, and we further recommend that insofar as possible the merit rating of contractors' risks be allowed and that this merit rating apply to all contractors.

"This convention further recommends that the best interests of the employes, as well as the insuring public would be best served by separating the State fund from the commission and placing same under the jurisdiction of the commissioner of insurance in the State of New York. In other words, the same supervision being given said State fund as is given to all stock and mutual companies."

Attention was also given to the matter of uniformity of contracts, and a resolution was adopted favoring the equality of union and non-union workmen so as to relieve the unemployed situation so far as may be possible.

The officers elected for the ensuing year were:

President....C. G. Norman of New York.
1*st Vice-Pres*..E. M. Gregory of Corning.
2*nd Vice-Pres*....E. A. Keeler of Albany.
Secy-Treas...James M. Carter of Buffalo.

The chairman of the Executive Committee is Lewis Harding of New York City.

Exhibition Prizes of the Architectural League

The thirteenth annual exhibition of the Architectural League of New York, which opened according to programme in the building of the American Fine Arts Society in West Fifty-seventh street, was of unusual interest by reason of the number and variety of architectural drawings, paintings and sculpture which were displayed. A special feature was found in the number of decorations for the buildings at the Panama Exposition which was opened to the public in San Francisco on February 20.

This year there was no prize awarded for architecture, but the medal of honor for sculpture was given to Robert Aiken for his "Foundation of the Earth" at the Panama Exposition at San Francisco. The special prize for the best design submitted by an architect, mural painter and sculptor in collaboration was awarded to Jerauld Dahler, Warren Dahler and Anthony T. Terizzi for a scheme of decoration for a terminal to a garden.

The Henry O. Avery prize for sculpture was awarded to Hans Schuler for his figure of a small nymph which he made for a garden terminal designed by William B. Beecher.

The *Journal of Commerce* estimates the January fire losses in the United States and Canada at $20,-$60,600, compared with $23,204,700 in January, 1914, and $20,193,250 in January, 1913.

Current News of Builders' Exchanges

Meetings of Various Organizations—Elections of Officers—New President of Birmingham Exchange

The Pittsburgh Builders' Exchange

At the election of the Board of Directors of The Builders' Exchange of Pittsburgh, Pa., on January 13 the Exchange held "open house" and served luncheon at noon and a chicken dinner in the evening. On January 19 the Board of Directors met and elected the following officers to serve for the ensuing year:

President.....S. P. Trimble
1st Vice-President.....John A. Strouss
2nd Vice-President.....F. F. Schellenberg
3rd Vice-President.....R. W. Allison
4th Vice-President.....Geo. H. Danforth
Secretary.....E. M. Tate
Treasurer.....S. N. Murphy

A theatre party was held January 4 at the Alvin Theatre and attended by 160 members and their ladies.

The fifth annual banquet of the Exchange probably eclipsed anything in that line ever held by the builders of Pittsburgh. The committee having charge of the affair performed their work even to the minutest detail with such admirable precision and dispatch that it is fitting to congratulate the organization on their work and the way in which the affair was conducted.

The Gernert Orchestra and the Arlington Sextette proved to be good entertainers and the guests joined in singing all the latest songs with a vim and determination that if making a noise added to the success of the evening, they were there with the big noise.

The cigars which were passed around at the end of the dinner, were put up in a neat package containing two cigars and two tobies.

On the outside of the package was printed,

Builders' Exchange Banquet,
December 17th, 1914
"Favor is vapor, popularity an accident,
Riches take wings;
Those who cheer today will cease tomorrow,
Only one thing endures—Character."
Horace Greeley.

Melachrino cigarettes were passed around in profusion, each table being supplied with from four to six packages.

The *menu* card was unique and much in demand as a souvenir, this being a product of the brain of Chairman Geo. H. Danforth, and was gotten up in the inimitable way for which he is particularly noted. A. C. Kahn, W. E. Goldman, W. P. McMarlin and Jos. A. Weldon,—the other members of the Committee—ably assisted in making the evening a success.

One of the features that made the evening such a delightful one was the attendance of about seventy architects who were present as guests of some of the Master Builders.

H. L. Kreusler and A. J. Schutz were prominent in perfecting the arrangements for these guests and excited admiration from the way in which their part of the work was conducted. Withal, too much cannot be said in praise for the work of all those who assisted to make the banquet a success, and the Pittsburgh Builders' Exchange has shown in no uncertain manner that it is an organization of "live wires" and that the men who compose it are of a high class. The present membership in the Exchange is 360 and the various committees are each and every one alive to the work that has been assigned them.

Members of the Pittsburgh Builders' Exchange at the Fifth Annual Banquet

---

Annual Election of Memphis Exchange

The members of The Builders' Exchange of Memphis, Tenn., held their annual meeting and election at the headquarters in Goodwyn Institute on February 2. Probably never before in the history of The Exchange was such interest taken in an annual meeting and the affair was most successful in every way. Some two weeks before the election a membership campaign was started and when the members came together for the annual election thirty new names had been reported. It was, therefore, deemed advisable to continue the campaign for ten days additional in order that several prospective members might be secured. The fifteen members having the matter in charge were divided into squads each with certain territory to cover. D. M. Crawford and G. C. Kaucher were in charge of the entire committee.

The choice of officers for the ensuing year were as follows:

President.....James Alexander
1st Vice-President.....L. T. Lindsey
2nd Vice-President.....J. W. Clark
Treasurer.....J. W. Williamson
Secretary.....N. M. Crawford

Several encouraging reports were made by the chairman of the various committees, chief of which was that of D. M. Crawford of the special committee for new members. President Alexander declared in a short address that it was his aim and desire to aid in every way in making the Exchange second to none in the United States. Short addresses were made by various members and a vote of thanks was tendered retiring President Faires and his supporting administration.

New President of Birmingham Exchange

We take pleasure in presenting herewith an excellent likeness of J. Alfred Millsom, the new president of The Builders' Exchange at Birmingham, Ala., who was elected to the office at the annual meeting held on January 11, as stated in our last issue. Mr. Millsom is treasurer and manager of the Southern Sewer Pipe Company and in the *Exchange Record* of January 16 we find the following in regard to him:

"This Exchange is indeed fortunate in the selection and election of James A. Millsom as its Chief Executive for 1915.

"He will bring to his new office the full force and effect of his wide experience in positions of trust involving financial, commercial and manufacturing problems, as well as matters of organization and the handling of men. All of these qualities and capacities are needed in the man who will build up and weld together the various interests of this Exchange, hence our good fortune in securing such a one to unselfishly devote his talents without compensation to that end.

PRESIDENT
J. A. MILLSOM

"Especially qualified is he to bring about the best results, because he is entirely free from the criticism that he may be using his office to further his individual and corporate interests. He is Treasurer and Manager of the Southern Sewer Pipe Co., which is the only organization of its kind represented in The Exchange membership, and therefore does not compete with the interests of any other member.

"Furthermore, it is well understood that this is the day and age of prominence of the young men in the activities of life. His youth is apparent by reference to the above picture; but don't try to take advantage of him on that account or the shock may be a high-voltage one."

Annual Meeting of Worcester Exchange

The 29th annual meeting of The Builders' Exchange of Worcester, Mass., was held on January 13 when George W. Kilmer, Herbert C. Wilson and Alanson P. Robbins were unanimously re-elected president, vice-president and treasurer, respectively.

Elwood Adams, Bradford S. Gibson and Ralph H. Whitney were elected trustees for three years: Walter E. Rice, Edward J. Cross and Burton C. Fiske were elected trustees for two years, and Harry S. Cutting, Frank O. Stevens and Edward D. Ward were elected trustees for one year.

A special meeting of the Board of Trustees was held on January 15 at which time A. H. Skillings was elected secretary of The Exchange.

Beginning with the new year the policy of the organization will be much more aggressive along certain lines which have heretofore been somewhat neglected and it is the hope by united and persistent effort to bring about a change which will greatly reduce, if not entirely eliminate, all cause for criticism.

Secretary McChesney Receives a Gold Watch

The enterprising and energetic secretary of the Contractors' & Dealers' Exchange of New Orleans, La.—R. L. McChesney—was the recipient on January 22 of a handsome gold watch, presented to him by the Sheet Metal Contractors' Association as a token of appreciation and esteem while serving as acting secretary of that organization. It appears that Mr. McChesney was instrumental in getting the sheet metal contractors together for the purpose of forming a local association that would improve conditions and establish closer relations between members of the sheet metal industry. Now that the association is well under way Mr. McChesney has stepped aside in favor of Jacob Yoerger of the Enterprise Sheet Metal Works, who will hereafter perform the functions of secretary of the Sheet Metal Contractors' Association.

Chicago Exchange Elects Officers

The annual meeting of the Builders' and Traders' Exchange of Chicago, Ill., took place in their headquarters in the Chamber of Commerce building January 18. Several hundred members were present to record their votes, at which time refreshments and cigars were served to all in attendance.

The only report presented was that of Secretary J. H. Hendricks, which showed the association to have passed through a comparatively good year, considering local conditions. Forty new members were added to the roster, making a total of 335.

President John D. Corlett was not present as he is sojourning in California.

The election of officers resulted as follows:

President.....A. E. Yauger
1st Vice-President.....W. L. Hoffman
2nd Vice-President.....J. C. Carrier
Treasurer.....Joseph E. Linquist

Directors elected for two years were: F. F. French, C. J. McKeon, Charles Nicholson, Christian Paschen, and J. J. Sullivan. The director elected for one year was E. N. Biegler.

New Officers of Milwaukee Exchange

The members of the Builders' and Traders' Exchange of Milwaukee, Wis., held their annual election January 12, when officers for the ensuing year were chosen.

President.....Burton L. Hibbard
1st Vice-President.....Arthur J. Maag
2nd Vice-President.....Louis Hoffman
Secretary.....Frank T. Spetz
Treasurer.....Anton Hennecke

There were four directors elected to serve for a period of three years.

Builders' Exchange at Jacksonville, Fla.

Representative building contractors, sub-contractors and dealers in builders' supplies in the city of Jacksonville, Fla., have organized The Builders' & Traders' Exchange, and have opened headquarters in the Heard Building, rooms 404 to 406. Assistant secretary L. Smith is in charge of the office.

New Exchange at Beaumont, Texas

The leading building contractors in the city of Beaumont, Texas, have just organized a Builders' Exchange with Oscar Jensen as president, James Wellman as vice-president, and M. A. McKnight as secretary.

Plans for a 20-story office and store building have been filed by architects Jardine, Hill & Murdock, of New York City, to be erected on Madison avenue and Forty-second street, the cost being placed at $350,000.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in January, 1915, and January, 1914

THE reports of projected building operations in various sections of the country covering the month of January indicate an appreciable improvement over the conditions existing in December. At that time there was a falling off in the value of new construction work of something over 40 per cent. as compared with the same month of the year before, but in January of this year the decrease covering 114 cities of the country is 27.7 per cent. as contrasted with January, 1914. These figures are more encouraging as to the future than they indicate on the surface owing to the fact that there is a vast amount of work contemplated for which permits have not yet been taken out. Among the eastern cities New York shows in the Borough of Manhattan, a value of work for which plans have been filed almost double what it was a year ago, but this is attributable in part to the filing of plans of tall buildings in anticipation of the enactment of a law which will limit the hight of so-called sky scrapers. The tremendous gain in the figures for Schenectady, N. Y. are due to the expiration on January 30 of the time limit in which prospective builders had to file permits under the old municipal housing code which has been inactive for some time past, but became operative again on February 1.

Of the 44 eastern cities reporting for January 19 show an increase and 25 a decrease with a percentage loss of 9 per cent. as compared with January, 1914.

Cities of Eastern States

	1915	1914
Albany	$340,290	$149,066
Altoona	22,255	19,922
Binghamton	40,000	89,600
Beverly, Mass.	7,950	40,835
Boston	2,408,000	6,652,000
Brocton, Mass.	48,275	95,640
Bridgeport	98,110	127,295
Buffalo	381,000	536,000
East Orange, N. J.	87,120	84,358
Erie	66,509	60,772
Hartford	139,265	191,750
Harrisburg	7,575	28,750
Jersey City	184,385	114,450
Lawrence	48,375	20,850
Manchester	18,317	78,445
Montclair, N. J.	80,860	19,612
Newark, N. J.	339,708	353,214
New Bedford	75,560	368,964
New Haven	132,155	264,320
New Britain	35,095	27,215
New York City:		
Manhattan	8,164,716	4,419,142
Bronx	2,108,668	1,410,252
Brooklyn	1,624,203	2,459,290
Queens	736,320	1,151,710
Richmond	149,356	80,514
Niagara Falls	44,825	71,350
Paterson, N. J.	73,895	29,941
Passaic	20,410	8,200
Philadelphia	910,805	1,247,985
Pittsburgh	465,460	1,171,037
Portland, Me.	15,065	91,050
Quincy, Mass.	59,605	66,850
Rochester	246,717	354,320
Reading	5,900	414,975
Schenectady	827,650	36,105
Scranton	38,170	101,925
Springfield, Mass.	266,005	162,500
Syracuse	219,715	107,365
Trenton	38,812	47,118
Troy	100,014	19,346
Utica, N. Y.	109,905	43,600
Waterbury, Ct.	1,945,300	1,800,200
Wilkesbarre	34,634	103,109
Worcester	77,276	530,184

Considering next the cities of what may be regarded as the middle states of the country, there are 34 reporting of which 9 show increases and 25 decreases with a percentage loss of 22.2 per cent. Chicago falls but a trifle behind the record of last year, but the outlook is regarded as most encouraging and it is expected that barring strikes or other unexpected trouble 1915 building projects will exceed $100,000,000.

Cities of the Middle States

	1915	1914
Akron	$52,635	$138,150
Canton	31,175	11,200
Cedar Rapids	168,000	384,650
Chicago	4,327,900	4,784,300
Cincinnati	451,350	580,910
Cleveland	1,116,080	1,298,620
Columbus	85,100	178,740
Dayton	30,100	84,785
Des Moines	52,250	38,400
Detroit	1,217,290	2,629,260
Duluth	90,155	237,610
East St. Louis	23,025	47,525
Evansville	69,050	70,236
Ft. Wayne	35,100	35,350
Grand Rapids	80,072	341,240
Indianapolis	266,907	481,850
Kansas City, Mo.	387,580	884,265
Kansas City, Kansas	35,690	57,870
Lincoln, Neb.	70,135	76,150
Milwaukee	203,649	471,858
Minneapolis	485,100	504,505
Omaha	165,075	180,440
Peoria	17,600	182,200
Richmond	159,840	233,534
Saginaw	133,794	20,050
St. Joseph, Mo.	12,380	48,500
St. Louis	1,094,673	854,122
St. Paul	699,258	514,312
Sioux City	24,950	75,125
Superior, Wis.	65,830	30,775
Springfield, Ill.	69,400	29,410
Toledo	537,297	234,894
Topeka, Kans.	18,270	63,010
Wichita, Kans.	33,300	19,005

In the southern section of the country 20 cities make report of which 6 show increases and 14 decreases, the percentage of loss mounting up to 42.16 per cent. From the figures in the accompanying table it will be seen that the increases were very slight, while in the case of the decreases some were decidedly marked.

Cities of Southern States

	1915	1914
Atlanta	$273,796	$322,965
Baltimore	575,072	1,796,351
Birmingham	72,178	250,230
Chattanooga	29,142	55,170
Dallas, Tex.	140,005	727,635
Huntington	1,153,497	1,175,520
Louisville	277,420	217,250
Memphis	101,953	361,390
Montgomery	40,635	38,880
Nashville	56,037	102,269
New Orleans	146,910	204,051
Norfolk, Va.	119,764	120,865
Oklahoma	16,757	10,515
Richmond	159,840	233,536
Savannah	152,750	180,025
Shreveport	46,326	184,500
San Antonio	91,330	317,865
Tampa, Florida	66,112	181,240
Washington	470,328	461,760
Wilmington	58,084	56,460

Coming now to the extreme western section of the country we have reports from 16 cities of which 5 show increases and 11 decreases with a loss of 65.6 per cent. This is very largely due to the heavy shrinkage in San Francisco where building activities incident to the Panama-Pacific Exposition have ceased. The following table speaks for itself.

Cities in Western States

	1915	1914
Berkeley, Cal.	$83,750	$59,750
Colorado Springs	7,665	36,495
Denver	177,635	229,320
Fresno, Cal.	146,782	102,022
Los Angeles	860,360	1,182,246
Oakland	291,859	257,786
Pasadena	74,779	128,808
Portland	372,690	444,675
St. Lake City	85,650	121,850
San Diego	288,895	365,085
San Francisco	1,006,043	7,349,816
San Jose	24,156	24,713
Seattle	408,585	1,206,580
Spokane	92,185	34,045
Stockton	24,040	22,425
Tacoma	58,134	109,103

$246

This low price covers the dandy rig shown in Figure 2134. It consists of a Mixerette on steel truck with 2 H.P. gasoline engine, steel house and low-down, gated batch feeding hopper.

Figure 2134

OUR "STRAIGHT-FROM-THE-SHOULDER" GUARANTEE COVERS THE SMITH MIXERETTE ABSOLUTELY

THE GUARANTEE

WE GUARANTEE the Smith Mixerette to have a capacity of 3 cubic feet of mixed concrete per batch, and to produce when fed to capacity, not less than 45-60 batches per hour of first-class concrete, to pass any inspection. If it fails to do so, we will take back the machine, refund the purchase price and the freight with 5% interest from date of payment to date of return. Any defects or complaints must be reported promptly to this office.

WE GUARANTEE the Smith Mixerette to be of first-class workmanship and material throughout; and will replace F.O.B. factory any material which, within one year from shipment, proves to have been defective when furnished.

WE GUARANTEE the engine to pull the load. It is also covered by the special guarantee of the maker.

THE MIXERETTE

If you are going to buy a small mixer, buy one that "stacks up right." Get a machine that will do your work rapidly and economically—one that you can use on the large job as well as the small one.

For fourteen years the *Big Smith Mixer* has demonstrated its economy and superiority on hundreds of famous projects. It has well earned its wonderful reputation. And it is this reputation that is back of the Smith Mixerette; that insures your safety under our broad and comprehensive guarantee.

Read the guarantee! Then read it again! *You* have nothing to lose and everything to gain. We are staking our reputation that the Smith Mixerette will do your work and do it to your entire satisfaction.

You wouldn't deliberately blindfold your eyes and take your chance on picking out a good house and lot. Nor would you buy a mixer without comparing the various makes. Part for part the Smith Mixerette excels. Get our catalog and make the comparisons yourself. Send for Catalog No. 115-D.

$315

Covers the cost of the outfit shown in Figure 2135. This machine has a gear driven power charger in place of the batch hopper. Otherwise these machines are identical.

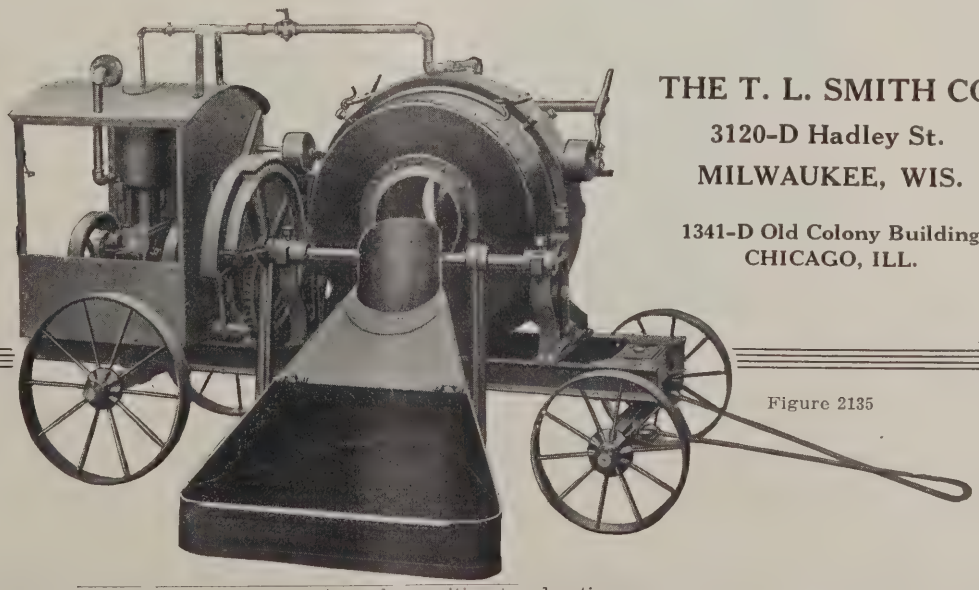


Figure 2135

THE T. L. SMITH CO.
3120-D Hadley St.
MILWAUKEE, WIS.

1341-D Old Colony Building
CHICAGO, ILL.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

A Departure in Pergola Construction

With a view to meeting the increasing requirements of its trade the American Column Company, Battle Creek, Mich., has recently equipped a separate department which will be devoted exclusively to the construction of pergolas in any size or design. We are informed that the steel sewed columns will be used as they are especially well adapted for this class of work and will stand up under any weather conditions. All

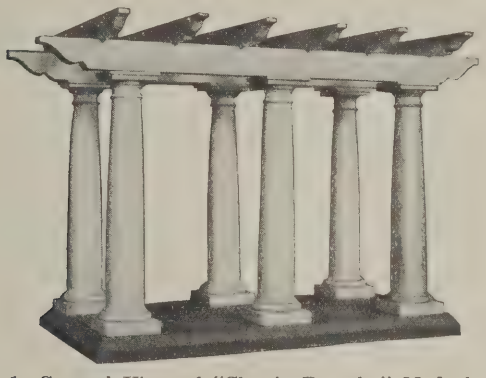


Fig. 1—General View of "Classic Pergola," Made by American Column Co.

of the rafters and beams are made of cypress—"the wood eternal"—and everything is cut and fitted so that the pergola may be erected without trouble. In Fig. 1 of the illustrations we present a general view of what the company terms its Classic Pergola and which affords an idea of the general appearance of the design when it is completed.

The Eureka Self-Measuring Concrete Mixer

We have before us a package of interesting literature relative to the Eureka self-measuring concrete mixer sent out by the Eureka Machine Company, Lansing, Mich. Among the collection is a circular illustrating and describing the new model for 1915. The truck is constructed of channel steel frames with steel wheels and grooved tires. The drum is cylindrical in shape, is 6 ft. long, 18 in. in diameter and rolled from No. 10 gauge heavy steel plate. It is open at the top and at one end there is a cast hopper into which the materials are shoveled, the shoveling hight being about 45 in. The removable mixing blades are referred to as being of distinctive design and arrangement. The discharging door is said to be of exclusive Eureka design and is securely locked in an open or closed position by simply raising or lowering the handle. The motive power is a "New-Way" Standard 4½-h.p. gasoline engine, which, together with the gearing, is protected by a substantial steel housing.

Valuable Reference Book on Roofing

There has just been published by the Heppes Company a complete reference book of all its different lines of roofing. The book is unique in that it shows the different brands of roll roofing made by the company just as they look on the roofs. Particularly timely is the offer to include with a copy of this handsome reference book, samples of the new "Flex-a-Tile" Giant Asphalt Shingles, for which unusually strong claims are made. This book, together with samples of all the Heppes roofings, will be found convenient for reference by the up-to-date contractor. The new factories of the company are said to be among the most thoroughly equipped of roofing factories in America. Giant machinery, giant processes and giant experience are the elements which give the name Flex-a-Tile, and particularly Flex-a-Tile Giant Asphalt Shingles, their reputation. A copy of this new reference book, as well as samples by addressing the Heppes Company, 1011 South Kilbourne Avenue, Chicago, Ill.

Flush Sash Design of Entrance Doors

We have just received from the Hyde-Murphy Company, Ridgway, Pa., and with New York office at 507 Fifth avenue, a copy of an exceedingly attractive catalogue of 344 pages devoted to sash, doors and cabinet trim. The company states that it makes a specialty of high grade interior trim, cabinet work, bank and office fixtures, folding partitions, and all classes of detail

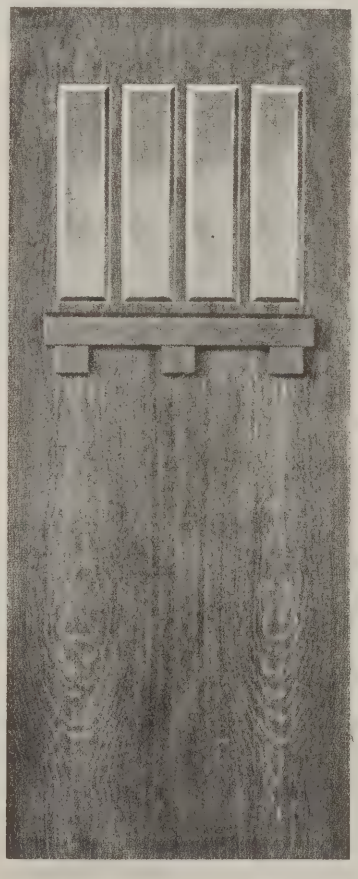


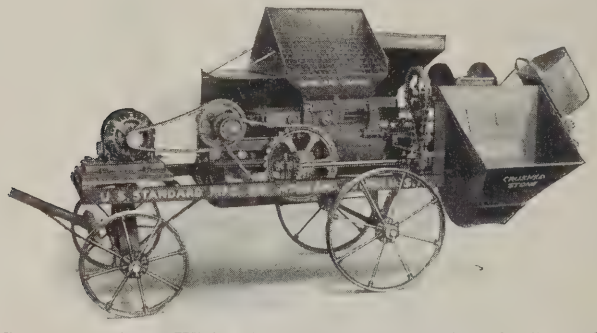
Fig. 2—Elevation of a Flush Sash Design of Entrance Door

work executed in strict accordance with architects' drawings. The early pages are given up to list prices on windows of all kinds accompanied by illustrations showing sash of varying description. There are also sections of moulded doors, followed by medicine cases, china closets, sideboards, etc. Another section of the catalogue is given up to grained and painted doors, the

illustrations being in colors. A number of pages carry designs of hardwood doors which, however, are only a part of the very large line that is handled. Particular emphasis is laid upon the slab, sanitary or flush veneered hardwood doors, which is one of the specialties of the company. In Fig. 2 we show a flush sash design especially intended for entrances, and which is in great demand for bungalows. The illustration shows the design in oak, although it can be furnished in birch, plain red oak or any other wood that may be desired. It can also be supplied in many varieties of finish and glazed with any design or kind of glass suitable for glass openings of this size. The point is made that the slab, sanitary, flush doors are substantially made, and by reason of their being slow burning are well adapted for hotels; on account of sanitation are adapted for hospitals, and as they are practically sound-proof are adapted for communicating and bath rooms. Other departments of the catalogue are given up to store fronts, interior trim, door and window frames, pulpits, choir and altar railings, grill work, pedestal colonnades, cathedral glass, leaded glass, mouldings, etc., etc. There is also a glossary of trade terms.

Concrete Mixer With Measuring Device

Among the candidates for popular favor in the way of a concrete mixer is the "U. S. Standard" which we illustrate herewith, and a feature of which



Concrete Mixer With Measuring Device—Fig. 3—General View of the Machine

is the measuring and proportioning device for cement and sand or gravel. A general view of the machine itself is shown in Fig. 3, while the measuring device is illustrated in Fig. 4. The arrangement is such that only a given number of cubic inches of material is allowed to feed into the mixing trough at a time in exactly the proportions desired. The size of the measuring box is regulated by screws clearly shown at either end of the carriage, and also in accordance with a scale marked on the edge of the adjusting plates, all as shown in the engraving. After the device is set for a mixture of certain proportions it can be locked so as to prevent accidental change. The mixer is mounted

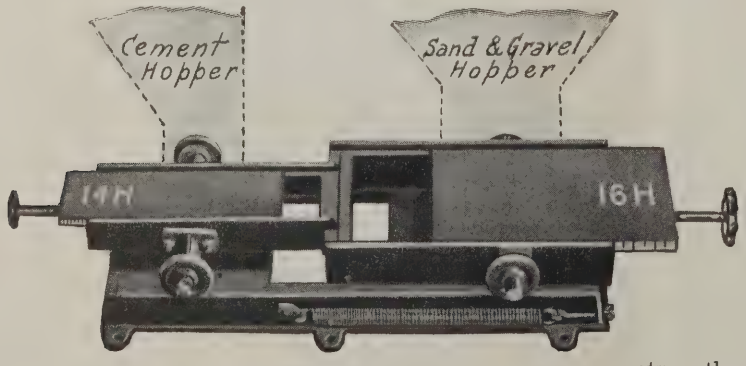


Fig. 4—Details of the Measuring Device Used in the Concrete Mixer

upon trucks and is of a nature to be readily moved from one job to another or from place to place about the same job according to requirements. It is equipped with a 4 h.p. gasoline engine and has two hoppers so that it may be fed from either or both sides at the same time. The hopper is equipped with a division plate to be used when stone or wash gravel is the aggregate. The Junior Portable mixer is intended to meet the needs of the small contractor for laying sidewalks, small foundations, curbing, etc., where only a small quantity of material is required and is designed to feed cement and sand, bank run gravel or limestone. All portable mixers are chain driven and the engine is enclosed in a steel housing and steel aprons which protect the working parts. The mixers are made by the U. S. Standard Manufacturing Company, Box 61, Ashland, Ohio.

Artistic Treatment of Cement Surfaces

The rapidly increasing popularity of concrete construction in the way of buildings of all kinds as well as of stucco finished houses has naturally brought up the question of the treatment of the exterior cement in such a way as to give an artistic effect. Many of the leading paint manufacturers throughout the country have endeavored to solve the problem by making a coating applicable to cement and which when applied would give a durable, pleasing exterior finish without showing a painted effect and which at the same time would be unaffected by dampness or alkali action. Much thought has been given to the matter by Wadsworth, Howland & Co., Inc., Boston, Mass., and has proven by practical demonstration to the satisfaction of leading architects and building contractors that the base of such a compound must be of a concrete nature. The only medium, it is said, suitable to such a base is one which does not contain an oil which is affected by alkali and one which would evaporate immediately upon application, leaving the base of the coating an integral part of the surface and not as a skin coating like ordinary paint. The point is made that the Bay State Brick and Cement Coating for concrete, cement, brick and plaster made by this concern is manufactured from such a base and does not turn yellow. This cement coating is offered in many pleasing tints and therefore opens an unlimited field of possibilities for the architect, the contractor or the owner who seeks an artistic and harmonious effect on these surfaces.

Sani-Tile Products

We have before us some interesting literature which is being sent out by the Sani-Tile Flooring Company, 418 Free Press Building, Detroit, Mich., and relating to specialties which are of particular interest to architects and builders. In one of the pamphlets the merits and uses of mineral pulp are set forth, this being an adhesive flooring material which may be laid over wood, concrete, brick, stone or iron surfaces. For floors subjected to light wear it is stated that mineral pulp can be used alone and can be polished, stained, oiled and waxed like a wood flooring. For wainscoting and all similar work it is well adapted, as it can be applied as easily as plaster over wood or metal lath. It can also be used for molding ornamental and decorative work, such as friezes, columns, capitals and all exterior and interior trim. For stucco it can be obtained with two and a half times the volume of stone or sand, and thus make a surface which is said to cost only 1¾ cents a square foot. When used as a plaster coating it serves as an excellent sound-deadening material. It is referred to as easy to work and finish; is low in cost, and water does not affect it.

Compo-stone, another of the company's products, is a new composition unlike any similar sanitary flooring material from the fact that it hardens with an extremely flinty, polishable surface, has great tensile strength and is laid over a wet surface or one that has been previously moistened with water. The claim is made that the material can be laid when the temperature is 110° Fahrenheit and have ample time to finish perfectly, also when the temperature is below zero without frost injuring it. It does not require an expert to make a perfect floor surface with Compo-stone, as it is finished as easily as an ordinary concrete floor. Another

(*Continued on page 74*)

Our Service Bureau Helps
10,000 Contractors Make Money

FREE To You

ALTHOUGH we are today serving an army of nearly 20,000 contractors, carpenters and builders, we realize that we are only touching the surface. There are six times that number who would take advantage of our service if they only knew more about it. For example, do you, yourself, know the Gordon-Van Tine Service? Do you understand our one-price, low-cost, high-quality methods of doing business? Are you familiar with our "Guaranteed Right" plan of prompt estimating? Do you know we employ a staff of high class architects to develop and work out your own ideas? Do you know you can have us do this for you cheaper and better than your local architect? Have you understood that our Service Department is at your Free Disposal to solve for you any knotty or unusual problems that come out of the day's work? Do you know the "Factory Price Plan" which has created our enormous business? Ask yourself these questions. If you do not know the complete answer to every single one of them, write to us and let us answer them for you.

All Our Estimates Are "Guaranteed Right"

WRITE us for a "Guaranteed Right" estimate on your needs. Try it once; you'll repeat it. Quality for quality, our prices are lowest; our stocks give the widest selection of any building material concern on the continent; our service is the quickest (rush orders a specialty) and our guarantee covers everything.

Let Our Service Save You Thousands of Dollars

ONE builder wrote us recently that in 14 months we had saved him $3,000 on a total of $10,000 worth of building material. That is a 30% saving. But, mark you, he had his regular profit as well. So this $3,000 extra profit was virtually an additional bonus over and above regular profits! It is worth your while to save $3,000 on every $10,000 of material you buy. You can do it, too. Our Service Bureau will show you how; that's what we have it to do. Write for details.

Make the Coupon Bring You Our BUILDING MATERIAL CATALOG

THIS splendid 156 page profusely illustrated catalog containing over 5,000 bargains in high grade Building Material is a veritable encyclopedia of Building Information for contractors and carpenters and a price-maker for the entire building trade. We will send you a copy FREE on request.

If you have never dealt with us a test order is all we ask. Our catalog prices speak for themselves and a test order will convince you the quality and service are back of them.

Every item listed is ready for immediate shipment—and hundreds of special fancy pieces of millwork that you could not get locally in less than two or three weeks can be shipped to you at once. We ship direct to you **anywhere** you live.

Satisfaction or Money Back—three strong banks and 100,000 satisfied customers endorse this.

Use the Coupon

GORDON-VAN TINE COMPANY
752 Case Street, Davenport, Iowa

GORDON-VAN TINE CO.,
752 Case St., DAVENPORT, IA.

Gentlemen—Please send the books checked below.

In sending for Plan Book, enclose 10 cents for postage and mailing. You will receive the books by return mail.

- ☐ **Millwork**
- ☐ **Roofing** Circular and Samples
- ☐ **Plan Book**
- ☐ **Lumber**

Name.....

Address.....

Occupation.....

product of the company—Porcela—is a porcelain-like coating for use upon floors, walls, concrete blocks, brick, iron and other surfaces. The claim is made that it will dry or harden with a flinty, glazed surface that will scratch glass and turn the edge of tempered steel tools. It becomes an inseparable part of the wall, thus making it waterproof and stainless. It can be applied with a brush in a thin coat of the consistency of neat cement, and after this has hardened for about 30 minutes or longer a second thin coat is applied. "Laying Sani-Tile Products" is the subject of an illustrated folder sent out by the company, while a number of leaflets tell how to make ornamental molds with mineral pulp, how to mold marble columns, laundry tubs, sinks, lavatories, lawn vases, etc. Directions for mixing and using Sani-Tile products are also presented.

The Ro-San Chemical Closet

In Fig. 5 of the accompanying engravings we present a general view of what is known as the Ro-San chemical or indoor closet that has been placed upon the market by the Rowe Sanitary Manufacturing Company, Detroit, Mich. The device is referred to as "a city comfort for a country home," and has, we understand, been endorsed by State Boards of Health. The closet is such that it can be placed in any out of the way spot around the house, while the chemical that is used renders it absolutely odorless. The device is

Fig. 5—General View of the Ro-San Chemical Closet

portable, easily put together and is economical in use. A pamphlet which the company is sending out and which illustrates and describes the Ro-San, gives full particulars for installing, names the cost of the chemical that is used and tells how the closet operates. The Ro-San is made of pressed steel and is round in shape, thus giving it added strength. The container inside the closet is of 22 gauge galvanized sheet steel, double reamed and soldered with a strong bail like a pail. The seat is of light aluminum and is 17½ in. above the floor. The closet has a French pearl gray enamel finish produced by giving it two coats of French gray and then two coats of luster enamel. All pipe, elbows and wall collars used inside the house are similarly finished.

Lighting the Home by Electricity

There has just been issued from the press an attractive pamphlet illustrating and describing the electric lighting plants made by the Isolated Electric Plant Company, 67 West One Hundred and Sixth street, New York City. The statement is made that one of these small isolated electric lighting plants can be purchased for about the price of a good piano, and in its construction, design and materials it conforms to a high standard. It is referred to as being simple and easy to install, and will be found exceedingly convenient in

(*Continued on page* 76)

those districts where a Public Service system of electric lighting is not available. The company states that on receipt by the purchaser of the entire equipment all the work of installation necessary is to remove a few nails and boards, raise the switchboard, fasten the braces to the skid, attach house wires to the lugs provided, belt the engine to the generator pulley, fill the fuel tank with kerosene and water in the cooling tank and the plant is ready for operation. The Bessemer kerosene engine that is provided is a two-cycle affair, having only three moving parts in the action of the operation of the engine, these being the piston, the crank shaft and the connecting rod.

Stanley's Portable Bench Dog

A little tool which will be found very convenient for all kinds of work requiring the use of a bench dog, more especially where a well appointed work bench is not available, is shown in Fig. 6 of the illustrations. It is known as the Stanley No. 202, and has just been placed upon the market by the Stanley Rule & Level Company, New Britain, Conn. It is made entirely of metal with well sharpened points and blued finish. As shown in the illustrations, one or more of the devices can be so placed as to securely hold a board or other work in almost any position required. Referring to the illustrations, No. 1 shows the tool itself, all the points

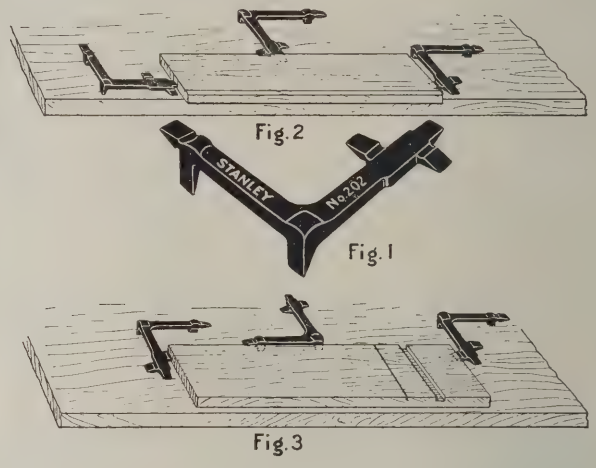


Fig. 6—Stanley's Portable Bench Dog and Some of Its Uses

being clearly indicated; No. 2 represents the tool engaging the stock in different positions for planing, while No. 3 shows the tool in various positions for producing a saw or dado cut in the stock. The company states that even in connection with a fixed or permanent bench dog it will be found useful to hold steady the other end of the board while being worked.

Exhibit of Work at Pratt Institute

Wednesday evening, March 10th, will be observed as "Visitors' Night" in the School of Science and Technology of Pratt Institute, Brooklyn, N. Y. From 8 to 9 o'clock all the shops, laboratories and drawing rooms of the school will be open to the public, and all persons interested in industrial education will be given an opportunity not only of viewing the students at work in the various courses, but also of inspecting both the results and methods as well as the equipment and general facilities of the institute for conducting this kind of industrial training. The School of Science and Technology provides instruction in industrial electricity, technical chemistry, mechanical drawing and machine design, strength of materials, stationary engineering and power plant machinery, machine work and toolmaking, carpentry and building, pattern making, sheet metal work, plumbing and trade teaching for the training of skilled workmen who desire to prepare themselves for the teaching of their trades. Practically all of the thousand students in the evening classes of this School are men who are regularly employed in their several vocations, and who use these

(*Continued on page* 78)

Wanted---the right sort of man

One that can make good on a new proposition—can you recommend him?

HERE is an opportunity for one man—and only ONE. As soon as another man takes it, you lose it! What we are looking for is not a man out of a job, but a man who wants to get out of a *job* and start a *business*. Nor do we want men who have failed in other lines of work; but men who have already succeeded and are now ready to reach out after still greater success.

WE want the best—not necessarily the biggest—young contractor or builder in your neighborhood. $5,000 to $10,000 a year earnings must not be beyond his ambitions. But he must be prepared to work, to overcome obstacles and able to judge a *new* proposition on its own merits. And he must be able to appreciate that money is made by advertising and salesmanship, not by plodding along in a shop. Furthermore, he must be willing to back his own judgment by investing from $150 to $5000 in his equipment.

ON this investment he should, after a few months of good preliminary work, earn not less than 10% a month profit, which rate should not only remain steady, but steadily increase. A man out in Michigan—to take a striking example—piled up nearly 2000% profit in six years. Our proposition is neither a theory or an experiment, but a tried out and tremendously profitable manufacturing line for a practical man with imagination and enterprise enough to crave something bigger than the rather crowded opportunities to be found in the regular line of building, contracting, or cement work.

ON the other hand, the Norwalk proposition is neither a "sure thing" nor a get-rich-quick game. For the man willing to work hard enough and invest money enough to get a fair start, it will give bigger and more certain returns than any other legitimate business we ever hard of. This is all we claim—and this we can prove. For the last two months the factory at Norwalk has worked night and day shifts and is still behind its orders for molds and apparatus. If you are interested let us give you more details—you may investigate and check up to your heart's content.

OUR eight years experience have shown that two kinds of men are by far the most successful with the Norwalk Vault proposition:

a—The man already doing well, whose business, however, is not developing rapidly enough to suit him or has slow seasons at one time or another.

b—The man who wants to go into business for himself but has so far seen nothing really worth his while.

STARTED as a side line, it is more than likely some day to prove at least as important as your present business. A man in a little town on the Hudson, working nights and holidays in a cellar, paid up in a single year his original investment of $450 and in the second year cleared 200% profit. Naturally, however, we would much rather hear from a man with capital enough to make the business a pleasure rather than a struggle. For it is just as easy—and lots more certain—to make as good a rate of profit on $4,500 as on $450.

THE Norwalk Vault business is still in its infancy. Not one man in ten knows now that he can provide for a departed wife or child an absolutely moistureproof, airtight burial vault as smooth and clean cut as your desk, yet solid as if hewn out of granite. Undertakers everywhere are waking up to the fearful crudeness of the old-fashioned method of burying unprotected in the muddy bottom of a six-foot cistern. As soon as the *public* begins to realize there is something better—and we are taking advertising steps to see that they do before long—the holders of the Norwalk Vault franchise for any given district will find they have got hold of a mighty valuable possession.

FOR the Norwalk Vault Company is, we believe, going to become one of the big business institutions of the country. We propose to unite several thousand local manufacturers all over the United States—each in his own territory—into a sort of giant partnership. Then we propose making the idea of a cement burial case as thoroughly understood as the idea of a Pullman sleeping car, and the name "Norwalk Vault" as familiar as the name "Uneeda Biscuit." The Norwalk Company has already a branch factory of its own in New York City; but the United States is pretty big, and to cover even a small part of it with our own shops would take far too many years. There is, therefore, this opportunity for the right man to take over local manufacturing rights—and get in on the ground floor of what is to become one of the great manufacturing businesses of the country.

NOW suppose you arranged a sort of partnership with all your local undertakers—they to sell, you to manufacture for your locality. Figures from more than a hundred concerns in various parts of the country show the average manufacturing cost per vault to be considerably less than $10. Nowhere in the country is one of the finished vaults sold to the undertakers for less than $20, and in most cases they bring $25 or $30. All the selling—the direct retailing—is taken entirely off your hands by the undertaker, who pays your wholesale price and makes for himself $20 profit or more, according to his customer.

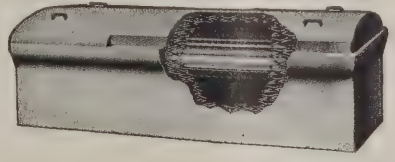
SUPPOSE you could ever reach the point where you made $10 every time a funeral took place in your county—and did a real *service* to your fellowmen. Wouldn't worry much about your income, would you? European wars, bad crops, hard times never affect the annual death rate.

AS you can see, there is a perfect gold mine of business on all sides—*waiting*—but this being a new and rather unusual proposition, it takes rather a good man to cash in. If you are the kind of man who has made good already or can make good, this may be your opportunity. No technical experience necessary; the equipment required is not expensive; any respectable shed may be converted into a factory; no high priced labor—the knack of making the vaults can easily be taught an unskilled laborer; no large sum tied up in machinery or materials—a few dollars at a time will keep the business running. Once established the business is not affected by hard times, no burdensome fixed charges—you can open up and shut down like an umbrella, according to your sales and collections.

THE amount of money required to start with varies directly with the size of territory occupied. One man, for example, recently bought outright the entire state of Maine; another man started at the same time on a royalty basis in a half county in Ohio.

YOU may acquire your territory outright or we will share with you on a royalty basis. In either case—compared with the possible returns—the cash investment is ridiculously small.

REMEMBER the Norwalk Vault is a trade marked article fully protected by patents. Eight years test has shown no weakness. More than 12,000 vaults have already been made, sold and used. Half of the good territory of the whole United States is already gone. And remember that every day—with each new round of advertising, with the opening of every new territory—comes a jump in values for those already in.



SO if the proposition appeals to you at all, don't pass it by because it is new; before it is much older someone else will take it. Let us prove it out for you. We will be glad to show you original letters, figures, maps, models, or to take you to the nearest local factory and let you see the vaults themselves. (We are so busy, however, that we would greatly appreciate the favor of your not writing unless you are in a position to talk real business in case you are thoroughly satisfied on every point.) If you think you would be interested, ask us anything you want to know—our office and sales force are paid to answer your questions—no obligation on your part whatever and a pleasure on ours. Address

The Norwalk Vault Company, 44 Seminary Street NORWALK, OHIO

courses as a means to prepare themselves for more efficient service—a fact which indicates the practical character of the work offered by the Institute.

The Yaeger Concrete Mixers

There has just been issued from the press an exceedingly attractive catalogue printed in colors upon tinted paper relating to the Yaeger concrete mixers manufactured by the Yaeger Machine Company, 216 West Rich street, Columbus, O. It is profusely illustrated not only with various styles of the mixer, but at the bottom of each page is a panel showing one or more views of the mixer in practical use upon a building job. The company points out that it has been building concrete mixers ever since the introduction of machine-made concrete. The latest models which it is now offering represent the results of long and careful study and experimentation, the results being a mixer that meets the requirements, not of a particular class, but of the trade in general. A close study of the situation demonstrated to the company that what was really wanted was a mixer that would handle an ordinary sized batch, give a reasonable daily output at a saving of time and labor and stand up under the hardest usage. Attention is called to the fact that the 1915 models have many valuable additions and improvements as compared with former models; the best materials are used in their construction, and every machine is given a vigorous test before it leaves the factory. Emphasis is laid upon the fact that for the general contractor on residences, churches, schoolhouses and other construction work a Yaeger outfit will serve as a power machinery plant—mixing concrete, mortar and plaster as well as hoisting the material into place, and the engine can be used to run other machines. The mixers are also indispensable for sidewalks, curbs and gutters as well as for country work, culverts, bridges, etc. A copy of this very attractive descriptive catalogue will be sent to any builder who may be interested.

The Helm Cement Brick and Block Machine

Under the title "The Way to Success With the Helm Press," there is being distributed an attractive pamphlet of 40 pages profusely illustrated and setting forth

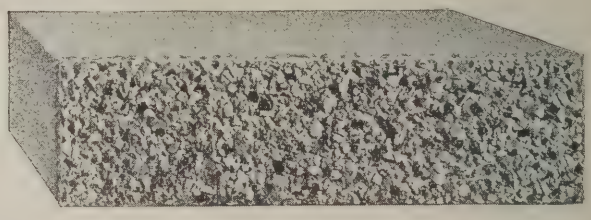


Fig. 7—View of a Granite-Faced Brick Made by the Special Helm Process

in interesting style the salient features of the Helm dry wall system as carried out by the Helm brick and block machines. The dry wall system is illustrated by numerous outline drawings, showing how the blocks are placed and tied together, the arrangement being such as to give a continuous air space between the inner and outer walls. There is also a sectional view taken through the main wall of a building running from the footings of the foundation to the wall plate for the rafters. Some of the many styles of blocks turned out by the machines are shown, together with general views of the machines themselves. In Fig. 7 of the engravings we show a granite faced brick made by the special Helm process utilizing crushed granite, marble, mica or mica spar crystals, whereby all the natural beauty and color of the aggregates are revealed on the face of the brick. Emphasis is laid upon the fact that no acid is used in the finishing of the bricks. Figures of cost are given for pressed cement blocks so that the contractor can obtain a pretty good idea of what can be accomplished in a specified time by the operation of the

(*Contined on page 80*)

equipment made by the Helm Brick Machine Company, 3 Mitchell street, Cadillac, Mich.

New York Office for Ceresit Waterproofing Company

Architects and builders will be interested in learning that the Ceresit Waterproofing Company, Chicago, Ill., has established a New York office in the Architects Building, 101 Park avenue. Space has also been taken with the Architects Samples Company, where the products of the Ceresit Waterproofing Company are exhibited in a way tending to demonstrate their merits and with a view to giving the architect and his clients the information required in deciding upon the proper materals to use. R. E. Clarke, who is the New York manager, is a graduate of Columbia University, Class of 1906, and is an experienced waterproofing engineer.

The Speakman Shower Bath Fixtures

The "shower" as a feature of the modern bath room is becoming more and more popular, and the variety of apparatus which is now being offered by those specially engaged in its manufacture is sufficient to meet every requirement, whether it be for the moderate cost dwelling or the pretentious mansion. An attractive catalogue which contains a vast array of shower bath fixtures of special interest in this connection has just been issued from the press by the Speakman Supply & Pipe Company, Wilmington, Del. The illustrations shown on its 84 pages have been made from actual fixtures and clearly indicate many new and approved ideas in shower bath construction. The statement is made that the company was among the first to devote active practical attention to the demands for a mixing valve with one handle that would be economical with the use of water; supplying it in varying temperatures without danger of scalding the bathers and at the same time be simple in construction as well as easy of operation. The Speakman mixing valve is therefore carefully illustrated and described, the matter being presented in such a way as to render all the features clearly understood by the novice. From the many illustrations presented in the catalogue we reproduce in Fig. 8 one of the most popular rain and needle showers made by the company, this being designed to be used either in a marble stall or over what is known as a tiled-in bath tub. When used over the latter a large curtain frame to which a duck curtain is hung is used in connection with the shower, thus giving ample room in the tub for the bather. The picture shows the Speakman shower and needle bath with mixing valve, strainer unions, lock-shield controlling valves, cast brass needle head with removable face and adjustable ball joint. The matter within the catalogue is arranged in a way to be of special service to the architect, the builder, the plumber and the house owner, and we understand that a copy of the catalogue known as "G-3" will be sent to any address on application.

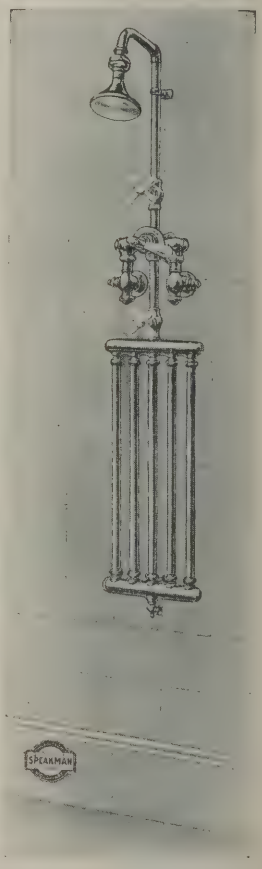


Fig. 8 — The Speakman Shower Bath Fixtures

New President of Universal Portland Cement Co.

Edward M. Hagar has resigned as president of the Universal Portland Cement Company, Chicago, Ill., which position he occupied for the past 15 years, to

(*Continued on page 82*)

assume the presidency of a new company he is forming to acquire a chain of Portland cement plants covering a large portion of the United States. The headquarters of the new concern will be in Chicago, Ill. Mr. Hagar was for 2 years president of the Association of American Portland Cement Manufacturers and has been an important factor in the promotion and development of the use of cement in building construction of all kinds. He also founded the Cement Products Exhibition Company in 1907. Before becoming connected with the cement industry he organized and conducted the business of Edward M. Hagar & Co., Chicago, acting as sales representative for machinery makers.

Mr. Hagar will be succeeded as president of the Universal Portland Cement Company by B. F. Affleck, who entered the service of the Illinois Steel Company in 1896 and from 1901 to 1903 represented the Cement Department of the company in the St. Louis territory. When the Universal Portland Cement Company was incorporated in 1906 to take over the cement business of the Illinois Steel Company he became general sales agent. He is vice-president of the Cement Products Exhibition Company, and is recognized as the pioneer in promoting the use of concrete as a paving material.

Northwestern Concrete Mixer

In order to meet a well defined demand for a concrete mixer which is adapted to the requirements of big as well as little jobs, the Northwestern Steel & Iron Works, 351 Ball street, Eau Claire, Wis., has placed upon the market the improved type of cone machine illustrated in Fig. 9 of the engravings, and known as the "Northwestern Special." Reference is made to its

Fig. 9—General View of the Northwestern Concrete Mixer

efficiency, speed, capacity, durability and the attractive price at which it is offered. In its construction the frame is made rigid by means of corner brackets securely riveted to the cross and side pieces so that there is no possibility of the frame or truck getting out of alignment. The front wheels are 18 in. in diameter, and the rear truck wheels 24 in. with 3½ in. face. The truck frame is made of 4 x 3 x 5/16 in. angles of sufficient strength to carry, it is claimed, ten times the load which the machine is expected to handle. The front wheels swing clear of the frame so that it is possible to turn the machine around within its own length. The two ends of the drum are of semi-steel and are held by means of rods running the entire length of the drum. The shell is of one piece of boiler plate and is securely riveted. This mixer has a capacity of 5 ft., although the company has customers who are loading from 5 to 6½ ft. The arrangement is such that the mixture is always in plain sight so that the operator can see what he is doing. The machine is equipped with a Northwestern 2½ h.p. horizontal water-cooled engine, which is guaranteed for 5 years. If the contractor desires, the company can furnish a kerosene attachment for the engine. There is an all-steel housing so that the engine and gearing are entirely covered. The illustration shows the mixer with a side elevator which is a feature that cannot fail to be appreciated by the building-contractor who is called upon to do any considerable amount of concrete work. Another point to

(*Continued on page* 84)

Winner Mixer

The "BIG BEN" *of* CONCRETE WORLD

The WINNER looks all kinds of jobs square in the face. Time it per hour or per day and you will find it always *on time.*

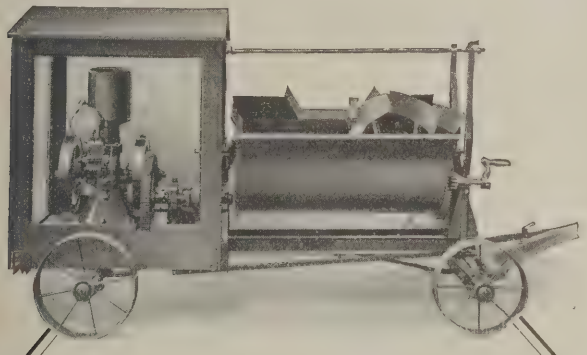
Contractors everywhere call it the *main-spring* of their business and wherever you find the Winner—it's the whole works.

Tick Tock—the batch is loaded, *Tick Tock*—the batch is mixed, *Tick Tock*—the batch is dumped, *Tick Tock*—all day long it saves men's backs and makes men profit.

Wind it up in the morning—feed it a gallon of gas and a few drops of oil and with *two hands* it will do the work of SIX.

The Winner is the best business *Alarm Clock* you can buy—lets folks know you are on the job—turns hours into minutes—and fills your men with hustle.

Write the **CEMENT TILE MACHINERY COMPANY,** 392 Rath St., Waterloo, Iowa, and they will tell you the whole story.



Built for Work

The Blystone Concrete and Mortar Mixer was designed by a practical concrete man to meet his own needs. He solved your problems when he solved his own.

It was not originally made to sell, but was wanted to do this man's work. It did his work so well it forced itself onto the market.

The Blystone will mix hardwall plaster perfectly. Whether the material is wet or dry does not matter.

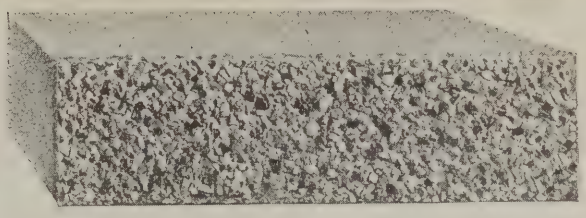
The material is always in view while being mixed. The open drum is easy to clean.

Mounted on skids with pulleys for belting to power, the Blystone makes a mixer that positively cannot be equalled for the block or tile plant.

You will be interested in a complete description of this unusual mixer. Write while you have it in mind.

The Blystone Manufacturing Co.

315 Day Street, Cambridge Springs, Pa.

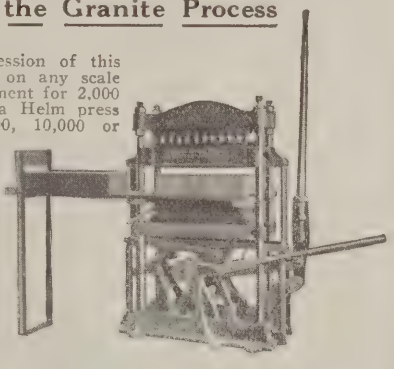


Granite Brick and Blocks by the Helm Process will Bring You Enormous Profits

These brick sell for $12 to $20 a thousand and the blocks in proportion. Nearly one-half of this is actually gross profit. This is a "classy," distinctive product and a rapid seller. The texture may be coarse or fine, rough or smooth. The face is readily waterproofed. Moisture will not show on it any more than on the most expensive clay face brick. The face is even stronger than the body of the brick or block. The edges and corners are sharp and strong. Any aggregate used in the face is exposed in all its natural beauty and color without the use of chemicals or acids by this process.

Here is a wonderful field open to you with a Helm machine. No need for expensive clay face brick to be shipped into your community. You can furnish a more distinctive product and make big money. The process is so simple any novice can handle it successfully and produce effects as beautiful as the view above, taken from an actual photograph of a granite face brick made on a Helm press.

$25 and Up Will Get You a Helm Machine and the Granite Process



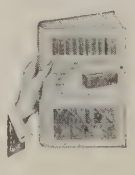
You can take possession of this field. You can start on any scale you like. With equipment for 2,000 brick a day or with a Helm press for turning out 5,000, 10,000 or 15,909 brick daily.

Helm presses make pressed cement brick which compete with the **CHEAPEST** to most expensive clay brick. They make blocks which positively secure dry walls. These machines work by hand or power, automatic, rapid, no tamping. Medium wet concrete is driven together under enormous pressure, securing the best quality of brick and blocks.

You Should Investigate the Helm Dry Wall Building System!

This is the system which appeals to builders, contractors and architects. It overcomes the opposition to concrete, because it offers absolutely dry wall construction. It saves money for builders, as no furring and lathing are required. It makes rigid walls and fireproof walls. This is the system which is bound to get you business and give you the advantage over all other products.

Send for this Book
"The Way to Success with a Helm Press"



Tear off the corner coupon right NOW, before you turn the page. Let this FREE book tell you all about this great opportunity which is open to you TODAY. It will tell you all the details of this system about the Helm machines and the dry wall building system. Let this book show you how to get into the most profitable end of the concrete industry.

Helm Brick Machine Co.
3 Mitchell Street
CADILLAC, MICH.

Helm Brick Machine Co.
3 Mitchell Street
Cadillac, Mich.

Please send your Free Book.

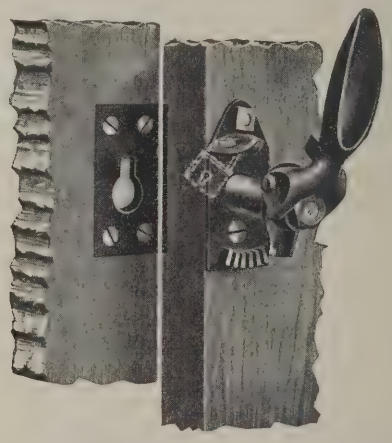
To.....

Address.....

which reference should be made is that the machine may be easily moved by three men from one place to another and it is of narrow gauge so that it can be readily taken from one floor to the one above it in the average building in course of construction. Still other features are the non-slop rim and flanged deflector.

The R-W Parallel Garage Door Bolt

A bolt which has been designed especially for garage doors, operating on parallel track and suitable for doors 1¾ to 3 in. thick, is illustrated in Figs. 10 and 11 of the cuts. The construction is such that the bolt may



The R-W Parallel Garage Door Bolt—Fig. 10—View Showing Its Application

be used on single doors by inserting the keeper casting in the jamb on the side wall. Again the bolt can be used with the No. 235 single right angle garage doors. It is made in malleable iron and steel, and when used on the outside of a building a padlock can be attached, thus providing a combined bolt and lock. The pictures show so clearly the construction that little description would seem to be necessary, but it may be stated that the lock is inserted in the stile of the door, the key or bolt passing entirely through the stile on the inside track and into the keeper in the stile of the outside door. When used with single doors this bolt passes into the keeper inserted in the jamb. By turning the handle the doors are drawn together and held in that

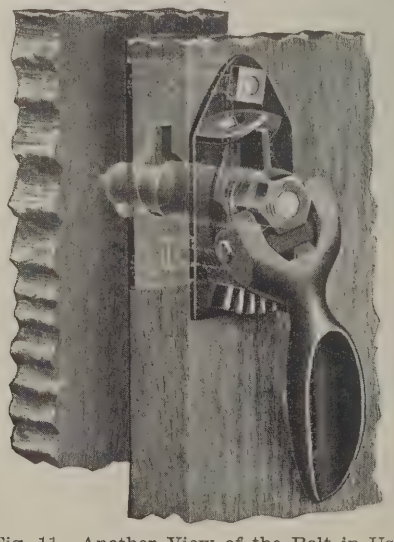


Fig. 11—Another View of the Bolt in Use

position by a stop lug resting in a notched section of the lock plate. This, it is pointed out, prevents the turning of the bolt or of its being removed or the doors opened. This garage door bolt has just been added to its already extensive line by the Richards-Wilcox Manufacturing Company, Aurora, Ill.

Frostproofing Concrete

What is referred to as a new method of keeping concrete from freezing, thus permitting work involving its use to be conducted during the winter months with

(*Continued on page* 86)

the same facility as in the summer has been brought out by the Lansing Company, Lansing, Mich. The material used is a fine white substance very much resembling cement in appearance, and from 2 to 4 lbs. is used to each batch of cement. The claim is made that the extra cost per cu. yd. is only 75c., which is more economical than heating water and covering the concrete work with straw, canvas or other material as is now the usual practice when conducting operations in freezing temperatures. We understand that extensive tests have been made and it was found that the concrete would not freeze even with temperatures 6 deg. below zero. It was found further that in the case of two briquettes, one with the frostproofing and the other without it, that in the former case the concrete was not affected in the least by the cold, while in the case of the briquette without the frostproofing the concrete froze hard as a rock. It was also discovered that at the end of seven days the concrete with the frostproofing withstood 11 lbs. per sq. in. more compression strain. Another advantage pointed out is that the material has a tendency to keep the "forms" from rusting, which is a vital desideratum in connection with reinforced concrete work. The tests were made by the New England Bureau of Tests and the report signed by Herbert L. Sherman, a graduate of the Institute of Technicality. We understand that the material is shipped in 100 lb. bags, and can be obtained from any of the warehouses of the company which are located in New York, Boston, Philadelphia, Chicago, Kansas City and Minneapolis.

The New Neponset Shingle

A shingle which is said to be unlike anything that has ever been manufactured before is the new Neponset which has been placed upon the market by Bird & Son, East Walpole, Mass. This shingle is of a patented built-up construction, having the butt end three times as thick as the other end so that when the shingles are laid they form seven layers on the roof. In addition to the feature of possessing unusual durability, the Neponset shingle also has the advantage of ease of laying, and it is claimed that at much less cost than wooden shingles. This is due largely to the fact that the Neponset is made in pairs so that in reality two shingles are laid at once. Another contributing feature is the uniformity of the shingles as the carpenter is not obliged to stop and trim each one to fit. This double form of shingle also decreases the number of joints between shingles, which, of course, means a better roof because there are fewer opportunities for leakage. The shingles are made of the same materials as are used in Neponset Pariod roofing with which the trade is so familiar. With all these additions the Neponset shingle is also architecturally attractive, and it may be painted red or green. It has been specified by architects of high standard and is being used in connection with the best kinds of residences.

The Skenesborough Cement Tile

The article which appeared in the February issue of *The Building Age* entitled, "Concrete Roofs for Dwelling Houses," has brought out a letter from the Skenesborough Company, Whitehall, N. Y., giving some information regarding the cement tile which it manufactures and which may prove of interest to the builder who originally asked the question in regard to the use of concrete for the roofs of dwelling houses. The company states that Skenesborough cement tile weighs about 600 lbs. to the square; that they are well adapted to frame dwellings and that the construction used for wood shingles is ample for the purpose. If so desired the tile can be laid without roof boards, and tarred paper will still further reduce the necessity for any heavy superstructure. On new work, it is said, sheathing is entirely unnecessary as 1 x 3 in. strips can be nailed upon the rafters about 12 in. on centers, use being made of 1½ in. galvanized nails to fasten the tile to the strips. A small amount of mortar is used where the courses lap, thereby preventing the possibility of any fine snow blowing in between the tile or any water

(*Continued on page* 88)

settling back at the eaves or anywhere else. The slate tiles of this concern were used for the Museum of Natural History, the residence of Cornelius Vanderbilt, the new Custom House, and for many other notable buildings in New York City.

Test of Endurance of Concrete Mixing Machinery

The results of a very interesting test of the ability of a concrete mixer to withstand hard usage for a number of years is presented in the picture shown in Fig. 12. It represents a "Standard" low-charging mixer which was purchased four years ago the coming May by the New York State Dock Department from the New York Branch of the Standard Scale & Supply Company, the headquarters of which are at Pittsburgh, Pa. The machine is shown in a good state of preservation, and appearing as it does "on the job" clearly indicates that it is still capable of doing good work. The manufacturer has continually maintained that the simplicity of the " Standard" is the basis of its strength and endurance. The low-charging arrangement of the drum saves wear and tear on the machine, and thereby the life of it is greatly prolonged. The "Standard" is charged at the base of the drum instead of the top, thus saving power

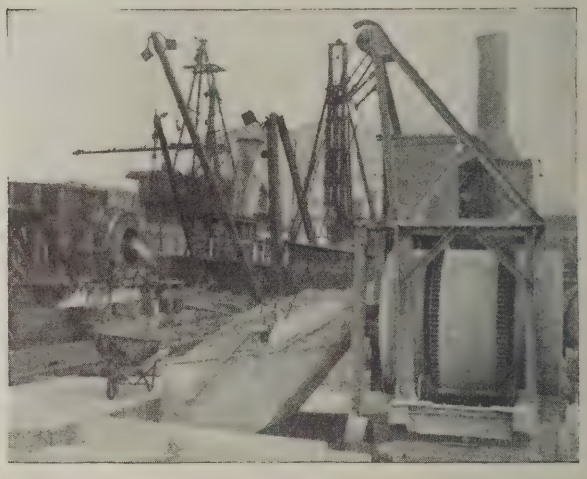


Fig. 12—A "Standard" Low-Charging Concrete Mixer After Four Years' Use

and time, while insuring greater production per day and consequently correspondingly increasing the profits of the contractor at the end of the year. The "Standard" has no complicated devices, as it is a machine of few parts, and the result is light weight. The company manufactures 24 different types of mixers and these are fully illustrated and described in literature which will be sent free to any reader of *The Building Age* who may make application for it.

Building Material Exhibit

Architects, builders and others associated with the building and allied industries in and about the city of Chicago have an excellent opportunity of inspecting building materials of various kinds at the Building Material Exhibit which occupies the entire second floor of the Insurance Exchange at Jackson Boulevard, Fifth avenue and Sherman street, Chicago, Ill. At present there are 125 exhibits, which cover a floor space of 25,000 sq. ft. The individual exhibits are very comprehensive displays and their size affords the architect and builder an opportunity to test from every angle the material in which he may be interested. In the case of the brick exhibits, of which there are a number, each is sufficiently large to show the visitor just how the bricks will appear and how they can be used in actual construction. There are already two large assembly rooms for the use of exhibitors, architects and contractors, but the rapidly increasing interest of the exhibit has made another and larger one necessary, which will be built at one end of the exhibition floor. President Friedmann is of the opinion that he will be warranted

(*Continued on page* 90)

in setting aside the new room entirely for the use of out-of-town architects and builders who take advantage of the invitation to make the exhibit their headquarters while in the city of Chicago.

The Aladdin "Drednot" Barn

A four-page folder sent out by the North American Construction Company, Bay City, Mich., gives some interesting particulars regarding the construction of what is known as the Aladdin "Drednot" barn. Galvanized iron treated by a special process is used for the walls and roof, while ½-in. iron tension rods with turnbuckles are so placed that the timbers are perfectly rigid in all instances. Each barn has framing material cut to fit and ready to nail in place, all material being dressed on each side so that the interior of the building has a finished appearance. The folder in question carries an illustration of one of these barns together with brief specifications, prices, etc.

Asbestosteel and Its Uses

What is known as Bulletin No. 54, and relating to the use of asbestos protected metal for roofing and walls in connection with concrete, has been issued by the Asbestos Protected Metal Company, Beaver Falls, Pa. The type of construction indicated, which is called Asbestosteel, makes use of ordinary sheet steel, to which a uniform coating of asphalt is applied on both sides. This in turn is protected by a layer of hardened and waterproof asbestos felt, which is laid over and imbedded in the asphalt while the latter is hot and soft. The properties of this material are briefly described, with a number of views of its application to roofs, walls, ceilings and coal bins. Views of a number of industrial plants in which this metal has been used are presented with tables of the safe loads that can be supported by it.

The Richardson Manual of Warm-Air Heating

So much attention is being given at the present time to the subject of warm-air heating that the manual above referred to cannot fail to prove of widespread interest among architects, builders, contractors, engineers and all who are called upon to install warm-air heating systems. It is a volume of 116 pages profusely illustrated and replete with tables of special value in the connection named. It is in fact a scientific and technical treatise based on a definite measure of heat and is being sent out by the Richardson-Boynton Company, 31 West Thirty-first street, New York City. Primarily of course a great deal of attention is given to the line of heaters made by this concern, illustrations being presented showing the varieties manufactured, and in connection with each is presented much valuable information. Not the least interesting feature is a short chapter devoted to the "Richardson Rule of Average for Proportioning Square Inches of Heat Pipe Areas." There are also general directions and rules of piping for the "Richardson" system of heating and ventilation; a comparison of rated capacities and what the ratings mean to the owner. Chimney flues are considered in a way to command attention for there is probably no other single source which is responsible for so many failures in heating as that of defective flues. Another feature is the "Richardson" method of rating the capacity of warm air heaters.

Disston's View of Guarantee

Apropos of the recent discussions of "What Constitutes a Guarantee" in *Printers' Ink*, it is interesting to note that Henry Disston & Sons, of the city of Philadelphia, Pa., have been advertising the guarantee feature of their goods in the trade press. "Of What Value Is a Guarantee Without a Guarantee?" is the caption of the copy, and the situation as it affects the Disston company is summed up this way: "Almost everybody guarantees their goods to-day. It is hard to make a sale unless you stand back of the goods. * * * There is a wrong impression prevailing among most

(*Continued on page 92*)

people as to the status of a guarantee. They look at it only as the promise of the manufacturer to replace defective articles. Under such a guarantee you can replace a poor tool innumerable times. You could keep it up for a lifetime (if the business lasted that long), but only at a constant loss to you through the trouble and delay occasioned by the replacement. * * * Our reputation for making high-grade and efficient tools, saws and files, assures the buyer that there is little likelihood of his having to take advantage of our guarantee. That gives the guarantee its fullest meaning. It is the guarantee of the guarantee."

The Simplex Concrete Mixer

The special features of the Simplex improved concrete mixer which has been placed upon the market are set forth in an attractive catalogue of 48 pages issued by the Miles Manufacturing Company, Jackson, Mich. This machine represents the results of several years' experience and careful investigation of the requirements of the general contractor, and it is claimed to combine the good principles of the batch mix with a positive continuous measuring and feed device. The Simplex has a framework of steel, heavy I-beams being used for the side rails. The drum is of heavy gauge boiler iron and the machine is constructed for hard usage. The company makes only one size, which has a capacity up to 100 yds. in 10 hours, but can be adjusted for any smaller capacity. It is equipped with a 3-part hopper which enables the operator to feed sand, gravel or stone from either or both sides, thus making it a right or left hand machine. The materials are not only mixed by gravity, but they are also carried to the discharging end in the same manner. The regulation of the water supply is under the complete control of the operator at all times. The catalogue also illustrates and describes the Miles improved block machines and shows various kinds of wall construction in which the blocks are used, as well as some of the many styles of blocks which the machine is capable of turning out.

Athey Cloth Lined Metal Weather Strip

The need of a weather strip which will absolutely protect against leakage around sheet metal windows and at the same time reduce friction, serve as a guide for the sash and make operation easier is generally recognized by occupants as well as owners of buildings having windows fitted with frames of the kind described. In order to meet this well defined demand the Athey Company of 1907 So. Michigan Boulevard, Chicago, Ill., brought out as being particularly well adapted for metal windows the Athey Cloth Lined Metal Weather Strip, the advantages of which are set forth in an attractively printed catalogue of 16 pages, a copy of which is before us. This metal weather strip has been in satisfactory use on wooden window frames for some time past, the live flexible contact of cloth to metal on each side of the rib, giving full protection against wind, soot and dust leakage without friction or noise and this principle of cloth to metal makes possible the practical application of the company's material to the sheet metal window. The cloth is a three-ply Windsor billiard table cloth, the center ply being a cotton wep which will not stretch. This is given a chemical treatment which makes it impervious to moisture and the elements. The cloth is held in the channels by the return of the metal over it, while at the same time this arrangement protects it from excessive wear on the rib. The opening of the throat of the channel, however, is of a width to prevent objectionable friction against the rib.

Making Tracings Without Ink

A new drafting fabric has been put on the market by the Universal Drafting Machine Company, Cleveland, Ohio, to allow making blueprints from original drawings without requiring the use of ink or pencil. The fabric is a cloth covered with a thin skin of hard brown material, and drawings are traced on it by means of a beveled steel point or scriber. Corrections may be

(*Continued on page 94*)

made by means of an ordinary writing pen and ink. Lines may then be drawn through this correction. It is also easy to change a full line to a dotted line. The steel point used may be inserted into any compass when it is desired to do circular work. Blueprints made in the ordinary way give dark lines on a white ground.

TRADE NOTES

Bird & Son, East Walpole, Mass., favor us with a copy of an attractive pamphlet relating to repairing and building which involves the use of shingles, wall board, sheathing papers, roofing and floor covering made by this enterprising concern. In the preface the statement is made that the business of the firm was started 120 years ago and that during the past 25 years it has grown ten times as fast as it grew in the preceding 100 years. From one mill on the Neponset River, in 1795, the business now requires five plants located in Massachusetts, Rhode Island, Ontario and Quebec, Canada. The illustrations are for the most part half-tone engravings of buildings in connection with which Neponset products have been used, and there are also interior views in colors showing the use of Neponset wall board.

The last issue of "Graphite" carries upon its front page a picture which represents Washington crossing the Delaware, but instead of the men being provided with pikes and oars they are using Dixon's pencils, and the statement is made that the picture is "symbolic of the strong, sturdy leads to be found in Dixon's American graphite pencils." The picture is an imitation of a wood engraving and is from Dixon's pencil geography. Among the reading matter is an article on cedar pencils, and there is more or less miscellaneous comment upon Dixon's silica-graphite paint and other products of the Joseph Dixon Crucible Company, Jersey City, N. J.

J. C. Batcheldor, Bloomfield, Ky., has just opened a department for the practice of architecture and is desirous of receiving catalogs and samples from manufacturers of building materials and supplies.

The Grand Rapids Hardware Company, Grand Rapids, Mich., is sending out among the trade illustrated circulars relating to the "Grand Rapids" ball and cone-bearing all-steel sash pulleys. These are said to be absolutely unbreakable and guaranteed to carry any window that a sash cord will support. The wheel runs without friction or noise, and the claim is made that the solid steel balls run in a large conical ball race which holds the wheel rigidly upright under any load. The circulars also call attention to the "Grand Rapids" triple and quadruple bits which are used for mortising for the pulleys. A copy of the company's catalog with prices will be sent to any architect or builder who may make application for it.

The Fox Machine Company, 655 Front avenue, N. W., Grand Rapids, Mich., is distributing an attractive circular relating to the bench type of its "Universal" wood trimmers. The point is made that Style "A" was the first wood trimmer made and is today the most popular tool for light work. It is not only in great demand in pattern shops but is being used more extensively every year by builders, contractors and interior-finish mills. This style is made in three sizes and in the circular a full description of them is given.

William S. Kinney, Canton, O., is contemplating the erection of several modern homes during the coming season and desires to hear from advertisers and readers of *The Building Age*. His address is care of Mark Hambleton Realty Company, 211 Tuscarawas street, Canton, Ohio.

A cube of the first concrete made by the old French Canal Company in 1886 formed one of the many interesting features of the exhibit by the Universal Portland Cement Co. at the Eighth Annual Cement Show, held in Chicago February 10 to 17, inclusive.

"Prosperity" emerging from a doorway equipped with R-W hangers and printed in colors embellishes the front page of the January issue of the house organ

(*Continued on page* 96)

"This Shingle Put *Me* on the Map"

The first NEPONSET Shingles put on, down my way, were put on by Yours Truly.

Naturally I got the next job—and the next job—and the next job. Any other carpenter could have done it just as well but the NEPONSET shingled roofs were advertising *me* all the time and so one job just followed the other. I have covered 15 roofs and still going strong. I use

NEPONSET Shingles

PATENTED

because I *know* they are durable and fire resisting and *any one* can see they are architecturally perfect. Don't think they are stamped out of ready roofing. This is not so. They are built up specially—heavy butt end and all that.

I'm a NEPONSET Shingle enthusiast.

This shingle put *me* on the map!

The same materials are used in NEPONSET Shingles as in the well known NEPONSET Paroid Roofing, also used in NEPONSET Proslate, the highest grade colored ready roofing ever made.

NEPONSET Wall Board, NEPONSET Waterproof Building Paper and NEPONSET Floor Covering are other well known NEPONSET Products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me a sample of the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

of the Richards-Wilcox Manufacturing Company, Aurora, Ill. Within the covers a double page carrying a birdseye view of the company's plant and representing the sun just appearing above the eastern horizon bears the headline "The Sunlight of Prosperity." The company announces that "the year 1915 should be the most prosperous in our history. Every indication points toward the road of big business; conditions promise nothing but prosperity for years to come, so let us go at the business harder than ever." The leading article tells of some of the many ways in which the carpenter and the architect can secure work during the winter months, and taken as a whole this issue of DooR-Ways is most attractive and an excellent beginning for 1915.

The Leader Iron Works, Decatur, Ill., and with New York offices at 15 William street, is distributing some very attractive literature relating to the question of water supply and the Leader water system. The Leader outfits are illustrated and described in a way to command the attention of those interested in water supply for isolated buildings of all kinds, and copies of the literature in question can be had upon application to the address given.

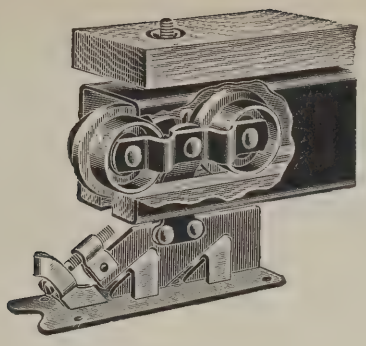
The Cement-Gun Construction Company, Chicago, Ill., has secured the contract to encase all of the structural steel work of the new power house now being erected by the Ford Motor Company at its Detroit factory. Not the least interesting feature connected with this work will be the scheme adopted of protecting the structural steel against damage by fire or corrosion.

The Elaborated Ready Roofing Co., 4417-19 Wentworth avenue, Chicago, Ill., has many unique instances of the durability of its product in that city. This roofing has for its foundation a wool felt that is saturated with a secret compound and finally given a thick coating on the weather and under side. The uses to which this roofing may be put is shown by the company's records of it as a flooring of the water chute in Riverview amusement park, Chicago. Its length is 318 ft. and width 24 ft. One inch of water runs over this roofing for eight or nine hours during the summer season and during winter lies completely exposed to the elements. This is the same quality of roofing that the company has used in covering 40,000 roofs in Chicago. Other local instances of its use for other than roofing is on the Hammond Packing Co.'s chutes in the stockyards. This has been in constant use for eight years without repairs. In recent tests a sheet of this roofing was stretched between two 2 x 4 beams, and stood a combined weight of 470 lbs., at which time one of the beams snapped and the roofing remained intact. The durability of the material as a roofing prompts the company to give a written guarantee with every installation. In every 100 sq. ft. of "Elaborated" roofing there is 23 to 28 lbs. of asphalt in the mixture, of which there is no less than 12 lbs. in the coating.

The Sandusky Portland Cement Company, Sandusky, Ohio, has commenced an active campaign for the extension of its trade in South America. It has just issued a 32-page booklet printed in Spanish, illustrating and describing "Medusa" white Portland cement, the illustrations being direct reproductions from photographs and make a very impressive effect.

The tapered asphalt shingles which are made by the Winthrop Asphalt Shingle Co., Argo, Ill., are manufactured the same as a wooden shingle having a thick, heavy butt at the weather end. They are 8 in. wide, and 10 in. long, and are to be laid with an exposure of 4 in. to the weather. No specially constructed roof is said to be necessary for Winthrop shingles, as they weigh about the same as wood shingles, while their flexibility and uniformity allow them to be nailed quickly and evenly. The company also manufactures a roof covering of the same materials as those used in making the shingles and is supplied in 32 ft. rolls 20 in. wide. The shingles are made in three permanent colors: red, gray-green, and slate-black, and are

(*Continued on page 98*)



Slides

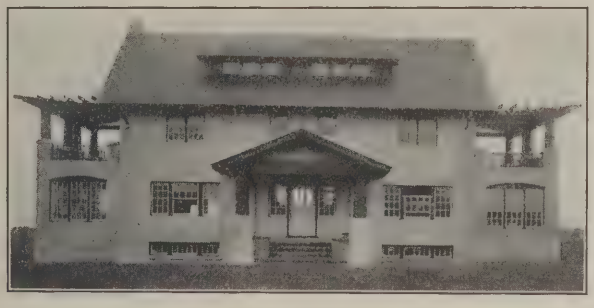
the doors in thousands of homes.

No. 122
R-W Royal House Door Hanger

A good, honest, substantial hanger, noiseless, ball-bearing, direct center-hung with adjustment in both hanger and track.
At your dealers.

Richards-Wilcox MANUFACTURING CO. AURORA, ILL. U.S.A.

"A Hanger for Any Door that Slides"



"Built Like a Thermos Bottle"

with double concrete walls at less cost than any but the most flimsy frame construction.

One small outfit is complete equipment for all kinds of structures.

One handling of material places it in the wall.

Cuts Cost, Not Quality

Special machines for fireproof *partitions, silos* and for *ice houses* and *cold storage plants.*

We have a 72-page book that gives full construction details with many useful "Kinks."

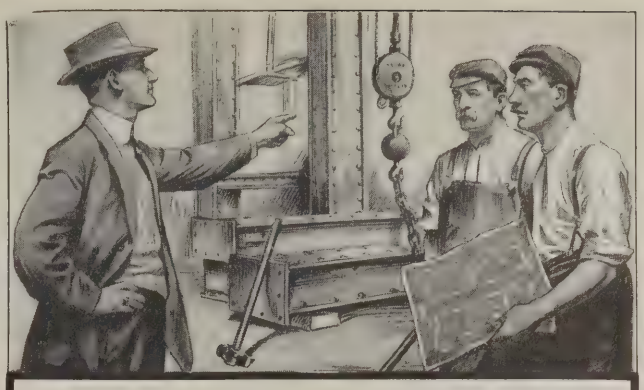
Our catalog illustrates fifty buildings of all types. You can have them both if you will ask for them and state what you expect to build.

Van Guilder Hollow Wall Co.

712 Chamber of Commerce Bldg.

Rochester, N. Y.

When in New York see our Permanent Exhibit, 8th floor, Craftsman Building, 6 East 39th St.



$2 a DAY or

$2 an HOUR

Which?

Yes, which will it be? You may continue to plod along in the $2-a-day class, if you're satisfied with that. But if you've got ordinary ability and are not afraid of a little hard work you can qualify yourself to get into the $2-an-HOUR class.

$2 a DAY or $2 an HOUR—the difference is only a matter of *training.* The fellow who hammers away from year to year without trying to learn to do anything better will always be in the poorly paid class. It's the fellow who learns the business from bottom to top who gets into the $2-an-HOUR class.

If you want to learn how to read drawings, estimate costs, draw plans, or do contracting—if you want to get into the $2-an-HOUR class as a builder or architect—the ***International Correspondence Schools*** can help you. Right in your *own home* during your *spare time* they can give you the very training you need.

For over 23 years the ***I.C.S.*** have trained carpenters for good jobs as Draftsmen, Builders, and Architects. *They can do the same for YOU.*

You are ambitious. You want to get ahead. Then don't turn this page until you have marked the coupon and sent it to the ***I.C.S.*** for full particulars about their system of home instruction.

Mark the Coupon NOW

International Correspondence Schools

Box 969-J, SCRANTON, PA.

Please explain, without obligating me, how I can learn more about the line of work before which I have marked **X**.

Architect	Foreman Steam Fit.	Concrete Construct'n
Arch'l Draftsman	Plumbing Inspector	Automobile Runn'g
Contracti'g & Build.	Heat. & Vent. Eng.	Foreman Machinist
Building Foreman	Civil Engineer	Sh.-Met. Pat. Drafts.
Building Inspector	Surveying	Bookkeeper
Estimating Clerk	Mining Engineering	Stenographer
Law for Contractors	Mechanical Eng.	Advertising Man
Structural Eng.	Mechanical Draftm'n	Window Trimming
Structural Draftsman	Stationary Eng.	Commer'l Illustrat'g
Plum. & Heat. Con.	Electrical Engineer	Civ. Service Exams.
Supt. of Plumbing	Electric Lighting	Chemist

Name _____

Street and No. _____

City _____ *State* _____

Present Occupation _____

guaranteed to be waterproof and impervious to coal gases and fumes in addition to having excellent fire-resisting qualities.

The February issue of Door-Ways, the house organ of the Richards-Wilcox Manufacturing Company, Aurora, Ill., contains some very interesting comments on Ideal elevator door-hangers as well as on some of the other specialties turned out by this well-known concern. There are pictures of some model barns, the sliding doors of which are equipped with the company's hangers, and there is an interesting display of garage door fittings, not forgetting the R-W grindstones.

The Universal Portland Cement Company, Chicago, Ill., is distributing as a unit of its extensive assortment of literature a large poster printed in colors, bound at top and bottom with metal strips and emphasizing the advantages of concrete in road construction. The point is made that the use of this material "lessens the cost of hauling, increases the pleasures of driving, lengthens the life of horses, trucks and automobiles, and permits the children to attend school regularly."

The plant of the Lewis Brothers Mfg. Co. will be moved from Rockford, Ohio, to Lima, Ohio, where new works will be erected on a 100 x 200 ft. site. The company makes interior hardwood finish, including doors, grille works, etc.

J. D. Wallace, 527 West Van Buren street, Chicago, Ill., is meeting with a gratifying inquiry for his portable bench planer, an illustrated description of which appeared in these columns a few months since. The planer is easily portable, can be used on a bench without fastening, has a table which is adjustable to any depth of cut and a fence adjustable to any angle. Its construction is such that it may be either belt or motor driven, according to circumstances.

The attention which is now being given to the subject of lighting of buildings renders more than ordinarily interesting a catalogue of 64 pages which is being sent out by the Superior Mfg. Company, Ann Arbor, Mich. It consists of a very complete description of Ann Arbor gasoline lamps and lighting systems and we understand that a copy of the little work will be sent to any reader who may write for it. Not the least interesting feature of the company's product is the "Instanto" lighting system which involves the use of inverted lights. In operation it is only necessary to pull a chain and secure a flood of light as handily as turning an electric button.

A twenty-page booklet recently issued by the Home Lumber & Supply Co., 1320 Fisher Building, Chicago, Ill., gives full particulars concerning the company's ability to supply lumber and building material at wholesale mill prices. It is pointed out that the great saving to purchasers is accomplished by the elimination of the middleman. By shipping any materials direct from the mills they are received in a better condition than if they had been lying in some storage yard for an indefinite period. All stock is guaranteed to be as represented and is subject to inspection and approval on arrival. An exceptionally large stock is carried in millwork supplies, hardwood flooring, and miscellaneous building materials. The latter includes cypress, poplar and redwood beveled siding, fir or cypress porch flooring, red cedar shingles, building paper, wall board and plaster board, and composition roofing. Price lists may be had on application to the given address.

TABLE OF CONTENTS FOR APRIL, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, APRIL, 1915

The Popular Bungalow-Court Idea

The General Layout and Description of St. Francis Court at Pasadena, Cal.—Various Views

By Charles Alma Byers

THE bungalow or community-court idea, commonly so termed, virtually had its inception in California about five years ago, and it is rapidly meeting with favorable recognition throughout the country. This new idea in the building of apartments, for such it is, as a marked departure from the old-style apartment house, seems to be, for several reasons, particularly commendable, and builders are finding it as affording a means of very profitable investment. Of course, owing to the seeming necessary congestion of the "close-in" sections of our cities of today, and the consequent high price of property in such localities, the community court is more especially adaptable to suburban and other residental districts, for it is a scheme that requires a much larger plot of

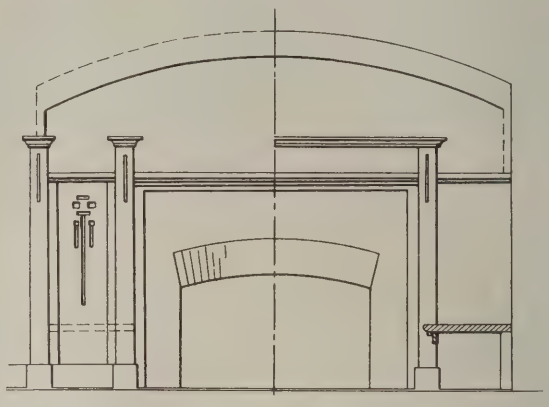
The Popular Bungalow-Court Idea—View Looking into the Court—S. B. Marston, Architect, Pasadena, Cal.

ground in proportion to its housing possibilities than does the old-fashioned apartment house. For this reason also, and because it affords more privacy and freedom and makes living in the open air more inviting, it is particularly popular in resort cities, and even more especially so in the warmer climates, such as Southern California.

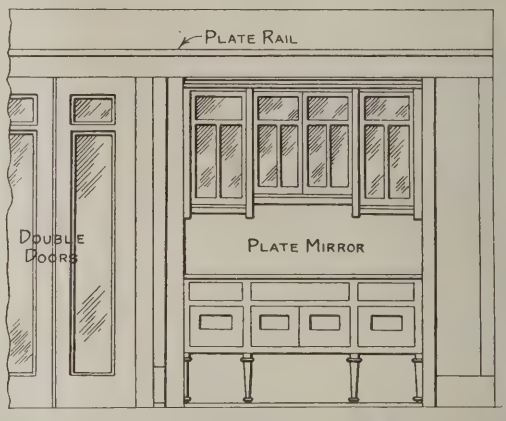
The community court consists of a group of small individual cottages or bungalows built around a sort of common court or parking scheme. It requires a plot of ground equivalent to several fair-sized city lots, probably comprising a combined area of at least something like 120 by 180 feet in size. A plot of these dimensions will allow ample space for the erection of about nine houses. This width is considered invariably sufficient, and even 100 feet will do, but the greater the depth the better. A row of houses is erected along each side with a court or park running through the center, toward which all of the houses are arranged to face.

Usually the entrance to the court from the street is more or less elaborate and attractive, and from it will probably lead an automobile driveway, with a walk on each side, down the center toward the rear of the plot. Ornamental electroliers are commonly set at intervals, to light up the place at night, and sometimes a fountain or other garden feature is worked into the plan. The lawns are kept in excellent condition, and there is always a very pretty arrangement of trees and shrubbery. Often there are garages built in the rear of the space for the use of the tenants, and in a few instances a club or summer house is included in the general scheme.

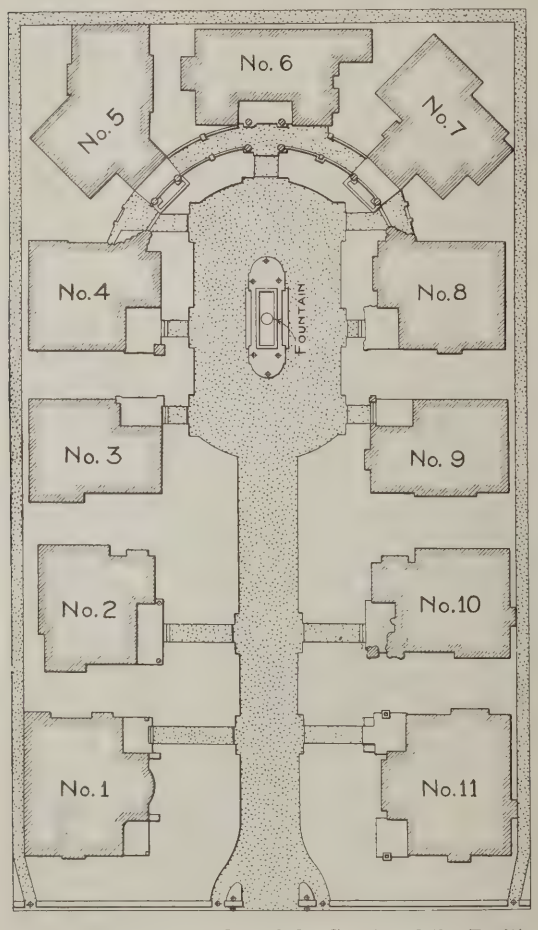
Each house, usually only one story in height, is a complete little home within itself, and is entirely independent of the others, except in its claim upon the court space and its accessories. In many of the courts the houses contain but three or four rooms, but in some cases a few of them may possess as many as six rooms, besides the bath room. In the three-room houses there will be a combined living and dining room, a bed room and a kitchen; in the four-room ones the living room and dining room will be separate, and in the houses possessing five or six rooms the additional rooms will usually be bed rooms. The little houses are invariably of



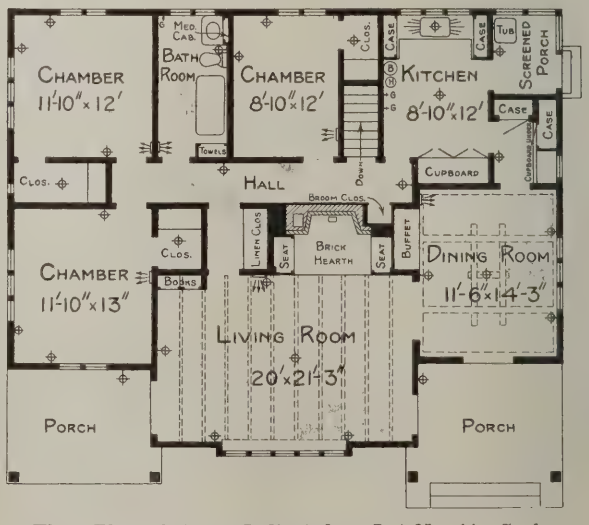
The Living Room Ingle Nook—Scale ¼ In. to the Foot



Elevation of Buffet in Dining Room—Scale ¼ In. to the Foot



Block Plan Showing Lay Out of the Court and the Position of the Various Cottages



Floor Plan of House Indicated on Lot No. 11—Scale 1/16 In. to the Foot

The Popular Bungalow-Court Idea—Plans and Various Constructive Details

General View of One of the Four-Room Bungalows Included in the Layout of the Court

pleasing and attractive architecture, and it is preferable that no two should be exactly alike in design. This not only makes the whole court more attractive in appearance, but enables the possible tenant to exercise a choice of style. The houses are artistically finished inside, and are frequently completely furnished by the owner.

The court illustrated by the accompanying pictures and plans, known as the St. Francis Court, is located in Pasadena, California, and was designed by Sylvanus B. Marston, an architect of that city, with offices in the Chamber of Commerce building. The Frank G. Hogan Company of Pasadena is the owner. It is an excellent representation of the idea, and the whole arrangement is most artistic. There is an imposing entrance, consisting of low street walls and massive gateway pillars, constructed of large boulders and cobblestones and

The Popular Bungalow-Court Idea—The Fountain and Seats at the Upper End of the Court

filigreed with red brick. Each of the two main pillars has two lantern-like lighting fixtures, one on the street side and the other on the court side. At the farther end of the court the automobile driveway circles a very artistic fountain arrangement, with stationary seats, the whole being designed to correspond with the entrance.

This court has a street frontage of 175 feet and is approximately 300 feet deep. It contains eleven very pretty one-story bungalows, of various sizes, styles and colors. Some of them have shingled outside walls, and some are weatherboarded; many possess masonry work of brick, and in a few instances either concrete or cobblestones is used. All of them have front porches—some of them two—and a brick or cement walk connects each house with the automobile driveway. Five of the bungalows have six rooms each, four of them five each, and the other two four rooms each. No two bungalows are exactly alike in design, and all of them are of particularly attractive architecture.

Each house constitutes a cozy and comfortable individual home. It is artistically finished and decorated inside and possesses many built-in conveniences. In the living room is always found an excellent fireplace, and in some of the smaller houses this room also contains a disappearing bed. In some cases this bed is so arranged that it can be used either on the inside or rolled out and used on the porch, and when not in use it occupies the space under two stationary seats—one on the inside and one on the porch.

Floor Plan of Six-Room Bungalow

In order to convey a clearer idea of the size and arrangement of these little court homes, the floor plan of one of the six-room bungalows is reproduced herewith. It will be observed that the rather large living room contains a fireplace with a brick mantel and hearth, located in a sort of inglenook, as well as a small built-in book case. The dining room has a fine buffet, the kitchen contains numerous cupboards and other conveniences, and each of the three bed rooms has a roomy closet. The rooms are conveniently connected by a small hallway, and from this hallway a stairway leads into the small basement. The ceilings of the living room and dining room are beamed and the floors are of oak. The two bedrooms at the left have pine trim and oak floors, while pine trim and pine floors are used in the remaining rooms. All the principal rooms have sand finish plaster.

This particular bungalow is one of the largest in the court, but all of the others are nevertheless charming homes. This one is also heated from a furnace, but some of the smaller ones are not.

The bungalows rent from $35 to $55 each per month. This includes free water and the use of all community features. The grounds are taken care of by the owner's attendant, and are therefore always kept in excellent condition, without labor or expense on the part of the tenant. In fact, the tenants enjoy all of the services and conveniences of the modern old-style apartment house, besides more privacy and purer outdoor air.

The average cost of constructing each of these eleven bungalows was about $1,800, which included its proportion of the court work, such as the fountain, the entrance features, the walks, and so forth. This, of course, does not include the cost of the ground. Furnishing the houses cost on an average about $300 additional for each. This means that the entire court, exclusive of the ground plot, represents a total expenditure of approximately $23,100, while the gross income from the investment is in the neighborhood of $475 per month.

Little houses arranged in this manner are always in demand, and vacancies for any considerable period of time are very rare. Because of the attractiveness of the whole arrangement, each house, by sharing equally with the others therein, has its own individual charm greatly enhanced. It also not only possesses all of the conveniences of the average apartment house, but is shut off from the street, and therefore affords much more privacy than the ordinary cottage or bungalow.

Making the Building Business Profitable

The success of a small builder's business is dependent to a large extent on his conducting it from the beginning on a sound economical basis, and the cause of many a downfall is undoubtedly the penny wise and pound foolish policy so often adopted by the man in a small way of business.

The first consideration of many builders is how much per hour they have to pay each workman, without any thought as to their skill at their particular craft. Such a narrow-minded view is at once fatal in the interest of true economy. While extravagance is not advised, often the penny and even more per hour paid to a skilled and experienced workman (instead of, as is so often the case, employing "improvers," who improve at the employer's expense) is money well spent. This sum on a week's work of, say, fifty-four hours, says Harrison Fielding in the London *Building World,* amounts to 4s. 6d., and it is quite possible that to save this sum it costs the employer twice and very often thrice the amount. Experience means smooth working, and this again generally means a saving of time, so that a man may easily pay more than this in time alone on one job.

Then, again, the skilled man is usually much more economical in the use of materials, cutting them up and using them to much greater advantage. This is a point that cannot be too strongly emphasized, especially in these days of advancing prices. Lastly, the better workman makes less mistakes, with the consequent loss of both time and materials, to say nothing of temper.

True economy is not always directly connected with £ s. d. For instance, there is another point which is not sufficiently taken into consideration. The small man, it is generally safe to assume, has at some time been an employee himself, and when he becomes an employer, is often prone to be either too harsh and strict or too lenient in the supervision of his workmen. In the first case, he will practically degenerate into a veritable nigger-driver, which is not conducive to good work or a continuance of steady working when he is absent. In the second case, advantage is invariably taken of slackness on the part of the master. It is better, however, to be too strict than too lenient, and it is even better to be either thoroughly than to earn a name for indecision. For the employer who knows not his own

The Popular Bungalow-Court Idea—One of the Three-Room Bungalows with Its Tropical Surroundings

The Rustic Masonry of Local Stone, the Curious Belt Courses and the Quaint Lanterns at the Tops of the Gate Piers Give an Entrance That Is at Once Unique and Impressive

mind is distrusted and disliked by all who have business with him, both clients and workmen. The ideal employer keeps a firm hand on every man in his employ, remembering, at the same time, that they are men with feelings like himself.

In the purchase of materials there is a wider field for the exercise of the soundest principles of true economy than is generally realized by the small man. The successful builder with a large business is fully alive to this, and makes the most of every opportunity. It is often the grossest extravagance to buy stuff because it is cheap. Take the man who is constantly buying up lots of stuff at low prices: knotty, shaky, and split timbers often out sizes not specified by the average architect, and consequently giving a lot of waste in cutting; odd lots of drain pipes, mostly untrue, cracked, and generally defective, with the consequent condemnation by a straightforward and conscientious architect; brick and tile "seconds"—generally containing about 25 per cent. of usable (one cannot say sound) stuff; and so on *ad infinitum*. Has he ever taken the trouble to calculate the actual intrinsic value of his purchase, the loss through waste of absolutely unusable stuff, the extra time entailed working in the remainder—to say nothing of the too often making good after the job has been so-called "finished"? If he would only work out these details he would certainly see the uttter folly of his method and drop all transactions of this kind.

On the other hand, there are often opportunities of buying good stuff at a really cheap rate, and these should never be allowed to slip. Particularly is this the case in picking up sound second-hand stuff. For instance, architects and owners are only too willing to pay extra for old weathered and toned-down roofing tiles in preference to the garish hues too often seen on the roofs of new buildings. These old tiles must be bought up whenever come across, and not wait until they are actually wanted, or the builder will usually find they cannot be obtained except at high prices. In picking up little lots of old tiles as he comes across them the builder can always rely upon their being a profitable investment. This applies with equal force to many other articles that will occur to the shrewd man who knows his business.

One often hears it said that the commercial prosperity of the country is based on credit; while not denying this in the broad sense of its meaning, it cannot be too strongly impressed upon the small man, the fact that he can always get better terms for cash; and if, as is too often the case, instead of going to the nearest builders' merchants with whom he runs an account, assuming that all wholesale prices are practically the same, he would only spend a little time with the small cost of postage in writing for competitive cash prices from two or three reputable wholesale firms, he would be much better off at the end of the year.

There is one other point that ensures the working of a business on methodical and economical lines, namely, that it is absolutely essential that proper and accurate accounts be kept of all transactions, enabling the principal whenever necessary to put his finger on, and effectually check, all wastage. If the business is not sufficient to carry the regular employment of a capable bookkeeper, it will be found wise to engage someone who will undertake it in his spare time, say a few hours per week. There are plenty of thoroughly competent men who are quite willing to do this at a reasonable figure, the result of which would prove that he saves his money many times over in the course of a year.

Compensation in Massachuetts

The Industrial Accident Board of Massachusetts has issued a bulletin in which is presented a plan for organizing safety in places of employment in the State. It offers to prepare, on request, accident studies covering the experience of each employer who undertakes the organization of a safety committee. These studies will show the cost of injuries prior to the establishment of a safety committee. Later comparisons will indicate the percentage of reduction effected by such an organization. The board has a growing index of the most approved safety devices. This is at the disposal of the employers of the state for the purpose of assisting them in solving the many problems which will confront their safety organizations.

The Massachusetts Employees' Insurance Association, 84 State Street, Boston, has issued the following table, which shows the increase in compensation benefits resulting from amendments passed by the last Legislature:

Compensation Benefits in Massachusetts Before and After October 1, 1914

	Per cent. of weekly wages		Duration of payments, weeks		Maximum payments	
	Before	After	Before	After	Before	After
1. Total incapacity.....	50	66⅔	500	500	$3000	$4000
2. Partial incapacity*...	50	66⅔	300	500	3000	4000
3. Death—						
Dependents totally dependent	50	66⅔	300	500	3000	4000
Partially dependent†	50	66⅔	300	500	3000	4000
No dependents.....	(Expenses of last illness and burial)				200	200
4. Specific injuries, calling for additional compensation—						
Loss of or loss of use of: (a) Both hands or Both feet, or One hand and one foot or the Sight of both eyes	50	66⅔	100	100	1000	1000
(b) Either hand.. Either foot... Or the sight of one eye...	50	66⅔	50	50	500	500
(c) Two or more fingers or toes at or above second joint	50	66⅔	25	25	250	250
(d) Loss of at least one phalange of finger, thumb or toe	50	66⅔	12	12	120	120
(e) Loss of use of one phalange of finger, thumb or toe	None	66⅔	None	12	....	120

*The percentages given are percentages of reduction in wages.

†The payments to partial dependents are that proportion of the payments to total dependents which the amount contributed to them by the deceased bears to his total earnings.

New York's Narrowest Office Building

One of the smallest office buildings in New York City will be the 12-story structure going up on Broadway, adjoining the Palace Theatre at Forty-seventh street. It will have a frontage of only 20 ft. and a depth of 80 ft. According to the plans of architect J. C. Green of Columbus Circle, the façade will be lime stone and terra cotta, and the style of architecture French renaissance.

Frame Barn of a Northwestern Farmer

A Building Designed to Meet Specific Requirements —Accommodations for Both Horses and Cattle

WE present in the illustrations which follow a general view and floor plan of a barn that was erected a short time ago upon the farm of N. J. Mitchell, Eden Prairie, Minn. The half-tone engraving clearly indicates the appearance of the finished structure, its gambrel roof surmounted by two ventilating aerators; the large doors in the end for filling the barn with hay; the position of the windows which light the several stalls and alleys, also the two windows in the upper part of the end gable for lighting the hay bays when the barn is nearly filled.

Referring to the floor plan on the following page it will be seen that there are at one end a series of horse stalls and on one side there are two box stalls, each of the latter being 10 x 12 ft. in size, together with feed bins for the horses and cattle. The box stalls are boarded up 5 ft. and fitted with wire netting above, the floors being of 2 x 10-in. elm plank. The four single horse stalls shown at the extreme left on the plan are 4 ft. 9 in. wide and the two double horse stalls are each 8 ft. wide, also floored with 2 x 10-in. elm planks. The mangers are 3 ft. 3 in. high and 2 ft. 4 in. wide.

There are two rows of Star Steel stanchions as clearly indicated on the plan with a feed alley 6 ft. wide extending between them. The gutters behind the cows are 14 in. wide and 8 in. deep. At one end of the barn is a 3-ft. alley and at the other end is a 4-ft. alley.

The dotted lines indicate the run of the litter carrier with which the barn is provided.

The posts and sills are of 8 x 8-in. elm and the studding and rafters are of 2 x 6-in. basswood. The outside frame is covered with 1-in. shiplap over which is placed 6-in. drop siding of Washington fir and the roof is covered with cedar shingles of assorted sizes.

The floors are of concrete mixed in the proportions of one of cement to 2½ of sand. The same proportions of concrete were used in building the 18-in. foundation walls and in addition the contractor put in several tons of small rocks.

The barn is fitted with F. E. Myers & Bros. Hay Carrier, combination fork and hay slings.

General View of the Farm Barn of N. J. Mitchell at Eden Prairie, Minn., Designed by Himself and Built by James C. Clark of That Place

Altogether, there are 16 windows, thus affording excellent light throughout. There is good ventilation and everything is as sanitary as the builder could make it.

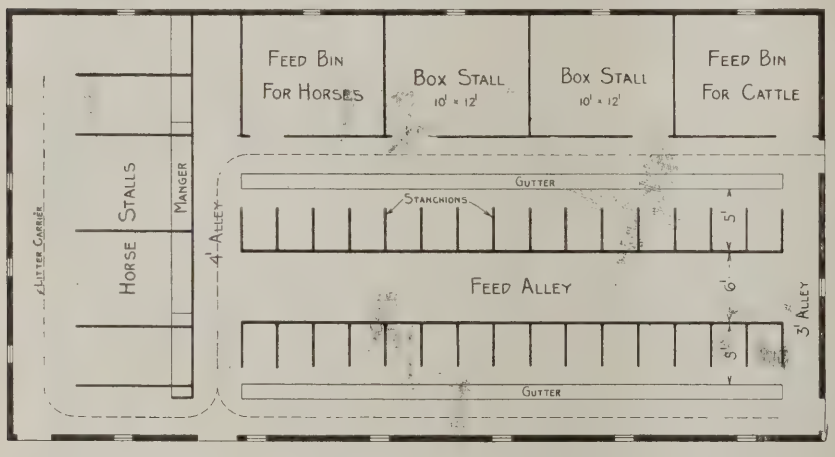
For purposes of ventilation the building is surmounted by two King aerators, made by the King Ventilating Company of Owatonna, Minn. There are two ducts on each side of the barn placed 13 ft. from the end and running from the floor to the aerators.

It may be interesting to state that the barn was planned by Mr. Mitchell to meet his individual needs, he being engaged in diversified farming and also keeping thoroughbred cattle of the beef type as well as some dairy stock.

The contract for the work was executed by James R. Clark, builder, of Eden Prairie, Minn.

Various Types of Roof Construction

A paper which was read a short time ago before the Incorporated British Institute of Certified Carpenters in London had for its subject "The Carpenter and Mason in Roof Construction," and dealt with the various types of roof used in classic and mediæval times. The author, George Arnall, pointed out that construction was largely influenced by two factors—climate and material. The temples at Luxor and Karnak, where a hot, dry climate necessitated the use of solid flat roofs and the material available, stone, which could only be used for small spans, led to the use of many columns.



Frame Barn of a Northwestern Farmer—Floor Plan—Scale 1/16 *in. to the Foot*

The Greek temples, although externally imitating wood construction, were probably roofed with wooden rafters supporting marble tiles. A temple at Pæstum has, above the entablature of the inner row of columns, a second series of smaller columns, forming a kind of triforium, and apparently used for supporting wooden rafters. Roman roofs were largely constructed of concrete, which gave no thrust at the walls. The Pantheon and the Baths of Constantine are good examples of this form of roof construction.

There are few early examples of timber roofs of domestic buildings in England. Most of the remaining examples are of purely ecclesiastical origin. There is no evidence from records or diagrams as to the method of construction used before the twelfth or thirteenth centuries.

The oldest roofs now in existence may be divided into, roughly, two main classes: one with simple beams thrown across the walls, and the roof built up from this, supported on upright posts, while the other is represented by what we know as the collar beam truss. This latter was probably the older. Some thirteenth-century examples at Stokesay, Peterborough, Coddesden, and Sutton Courtney show the various methods adopted to overcome the thrust produced at the foot of the rafters. Heavy stone buttresses, built outside the walls, or brackets fixed under the collar and to the principal rafter, were the more general means.

Examples of the fourteenth century of the beam type can be seen at Dunstable Priory, Polebrook, and Cirencester, and a fifteenth-century example at Magdalen College, Oxford. In some cases the beam is chamfered, but in most cases brackets are introduced under each end of the beam, bringing the weight of the roof on to the inner side of the wall. The roof in these cases was supported on upright posts, no attempt being made to truss the roof in the modern sense.

Roofs of the hammer-beam type may generally be regarded as fifteenth or sixteenth-century work, but a fourteenth-century roof at Woplode has an arched rib resting on two projecting beams, which, however, meet in the center. The thrust is taken to the wall by large brackets under. The earlier examples have high collar beams, with no trussing above; but the well-known examples at Hampton Court and Westminster Hall have this space trussed, and also a most elaborate system of windbracing.

Within the last few years attempts have been made to build timber roofs of fairly wide span by using modern market-size timbers. Mission halls at Cardiff, Croydon, and Burgess Hill have been erected in this way. The principal rafters are double, and are tied in at the foot by sloping collar beams, termed scissor beams. There are no wrought joints in the construction, butt joints and iron straps only being used.

These roofs, while proving very effective and handsome structures, have the additional recommendation of being much less expensive than the ordinary type.

Officers of Sand-Lime Brick Association

At the eleventh annual convention of the Sand-Lime Brick Association held at Dayton, Ohio, officers for the ensuing year were elected as follow:

President.....W. H. Crume, Dayton, Ohio
Vice-Pres....G. Sylvester, Calgary, Alta.
Sec'y.....H. W. Terry, Toronto, Ont.
Treas.....J. L. Jackson, Saginaw, Mich.

The attendance represented a majority of the concerns that are successfully engaged in making sand-lime brick in the United States and Canada.

A New Jersey Cottage of Neat Design

A Combination of Stucco and Shingles Forming an Artistic Exterior—Space Saved by Outstanding Chimney

THE English type of half-timbered house is constantly growing more popular in America as an architectural style for country houses. The present example combines a stucco treatment of exterior for the main story, with a shingle outer-wall covering for the second story. The English touch is apparent in the double gables, while a touch of the Dutch Colonial style appears in the right side of the house, with its gambrel roof and outstanding chimney. The lattice casement windows follow the Colonial style, while the ample screened porch at the right of the front entrance is which is lighted on two sides by single windows. A door from the kitchen leads to the cellar below, where are located the wash trays, an ample vegetable room, coal bins, and a modern steam-heating plant with gas water heater.

The first and second floor joists are 2 x 10 in.; the third floor joists, 2 x 8 in., and the ceiling joists, 2 x 6 in., all placed 16 in. on centers. The rafters are 2 x 6 in., placed 24 in. on centers. The partitions, outside studding, and door and window studs, are 2 x 4 in., the partition and outside studs being placed 16 in. on centers. The plates and ties are

A New Jersey Cottage of Neat Design—Architect and Builder, John Picken, Montclair, N. J.

a modern touch which greatly increases the comfort of those who dwell within.

The interior has three rooms on each floor, with a large butler's pantry adjoining the kitchen on the first floor, and a well-equipped bathroom on the second floor, which is easily accessible from the three bedrooms. The main entrance door is directly opposite the staircase which leads to the second floor. A wide passageway leads to the living room, which is provided with a fireplace flanked on each side with a built-in bookcase beneath a window.

The dining room is provided with a wide window seat beneath two mullion windows which face the street. From the dining room the kitchen is entered through the butler's pantry. A gas range, sink, and cupboard comprise the equipment of the kitchen, 4 x 4 in. The spruce girders are 6 x 8 in.; the sills, 4 x 6 in.; valley rafters, 2 x 8 in.; posts, 4 x 6 in.; ridges, 2 x 8 in.; piazza sills and bearing timbers, 4 x 8 in., and piazza floor beams, 2 x 8 in., placed 18 in. on centers.

The interior trim of all rooms is of chestnut, white wood and North Carolina pine.

The building is sheathed on the outside with $\frac{7}{8}$-in. North Carolina stock, covered with black Neponset building paper made by Bird & Son, East Walpole, Mass. All exterior finish for window and door frames, cornices, verandas and all other finish is composed of No. 1 dressed white pine.

The exterior of second story walls is covered with 16-in. white cedar shingles, laid 5½ in. to the weather. The ceilings of the porch of the

house are ½ x 2½-in. beaded North Carolina pine.

The roof is covered with 18-in. Perfection red cedar shingles, laid 5½ in. to the weather. The combs and hips are woven in and the hips and ridges have parallel courses laid on top.

The floors of the first story are red oak, and those of the second story are of ⅞ x 2½-in. No. 1 North Carolina pine.

The first and second-story floors are planed, filled and varnished two coats. The attic floor is of ⅞ x 2½-in. North Carolina pine. The porch floors are of white pine, tongued and grooved ⅞ in. in thickness. The bathroom is provided with a tiled floor.

The first-story hall, as well as the living and dining rooms, are trimmed in chestnut; the rooms on the second floor are finished in white wood; the kitchen, butler's pantry and attic are trimmed in North Carolina pine.

The entire exterior of the house, excepting the shingles, is painted with two coats of Atlantic white lead and linseed oil; the shingles have one brush coat of Cabot's stain; all tin work is coated with two layers of Prince's metallic paint.

The finish of the main rooms of the first story is filled with paste filler, over which are two coats of varnish, the last coat having a flat wax finish. The second story finish is painted with three coats.

A footing course of concrete is laid under all cellar walls, interior piers and chimneys which is 4 in. wider each way than the walls resting thereon, and 8 in. in depth.

All cellar walls are of concrete, as are also the porch piers. Concrete is composed of five parts of gravel and one part of Portland cement.

The chimney is built of clinker brick. The living room fireplace is built of red tapestry brick, with a 6 x 6-in. red tile hearth.

The walls and ceilings of the rooms are plastered two-coat work and have a white hard finish.

The second-story bathroom side walls are plastered to a height of 4 ft. with Keene's cement made by Best Bros., Medicine Lodge, Kan.

The kitchen sink is a 20 x 30 x 6-in. enameled iron fixture. The bathtub is made by the Standard Sanitary Manufacturing Co., of Pittsburgh, Pa. It has a 2¾-in. roll rim and is 5 ft. in length. The lavatory is 18 x 24 in. white enameled iron. The wash tray in the basement is a two-part fixture of Alberene stone, which is a product of the Alberene Stone Co., New York City.

A steam heating plant was provided and gas and electric lighting fixtures installed.

The house here shown was built for Alfred T. Gibbs, at Upper Montclair, N. J., in accordance with plans drawn and executed by John Picken, of Montclair, N. J.

Unusual Problem in Water Tight Construction

In connection with the construction of a very high tower it was required that the walls and two floors near the top, one being 160 ft., and the other 180 ft. from the ground, be cast as a monolith and be as water tight as a tank so that by no possibility could moisture penetrate from driving storms. Each of the two floors had an area 28 x 30 ft. and carried a load of 400 tons, the floor being supported on a central girder running the short way with beams running from it to the opposite walls. The unusual feature of construction mentioned required absolute prevention of all cracks from any causes, impermeable concrete and as near continuous work as possible. Under ordinary conditions there would be frequent joints between day's work of reasonable size which might allow penetration of water.

This problem was solved, says Leonard C. Wason in a paper read before the Boston Society of Civil Engineers, by using a little lower working stress in materials than is given by a rich mixture carefully proportioned for maximum of density; by designing forms for casting a large amount of concrete at one time, and by continuous work with different shifts of men, combined with very close supervision by more than the usual number of foremen, besides the inspector of the owner. The result, he stated, proved satisfactory in every way.

Labor Conditions in South Africa

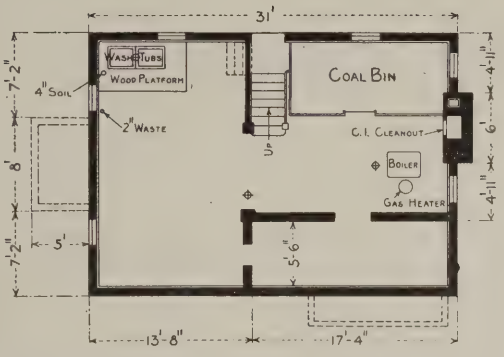
In response to inquiries as to existing labor conditions in South Africa, the United States Consul at Johannesburg furnishes the following:

It has not been possible to obtain the standard average wages paid by districts outside of the Transvaal owing to the statistical returns not being available, but those at hand are furnished with as much detail as circumstances permit. Carpenters, joiners and plumbers are paid $4.86 or £1 a day in Johannesburg, but carpenters and joiners in Bloemfontein, Orange Free State, receive 54 cents an hour and work nine hours a day, while plasterers and bricklayers in the Transvaal receive 60 cents an hour. All men coming under the classification of mechanics, plasterers, bricklayers, carpenters and joiners, plumbers, etc., work on an average of forty-eight to fifty hours a week or five and one-half days a week, approximately eight and one-half to nine hours constituting a day's work.

In this district as in South Africa generally there is no apprentice law. It is the general rule that all tradesmen serving their time sign articles for five years as an apprentice and eight to twelve months as an improver before receiving the standard wage of $4.86 a day. During the whole term of apprenticeship they receive wages on the following scale including overtime: For first year, 72 cents a day; for second year, $1 a day; for third year, $1.45 a day; for fourth year, $1.94 a day, and for fifth and final year, $2.43 a day.

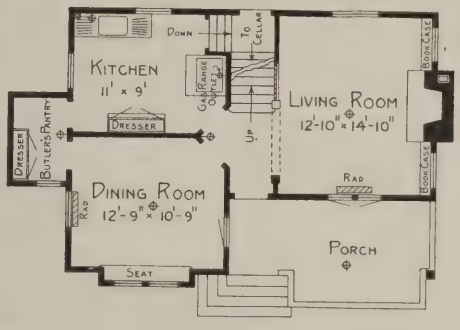
In the Transvaal a workman who has been injured in the course of his employment may choose one of two remedies—sue his employer for damages for the injuries sustained under the common law, or he may claim compensation in the manner prescribed in the workmen's compensation act of 1907. Under the workmen's compensation act it is the duty of employers to insure their employees and it is from this source that employees receive their compensation.

"Why are children so much worse than they used to be?"
"I attribute it to improved ideas in building."
"How so?"
"Shingles are scarce, and you can't spank a boy with a tin roof."—*Life*.

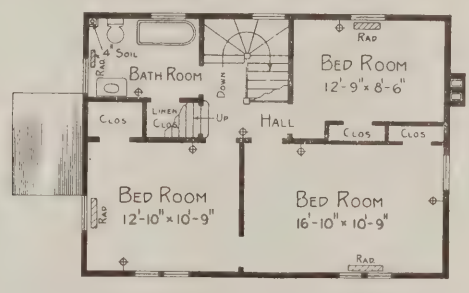


Basement Showing Position of Laundry Tubs, Boiler, Gas Heater, and Other Fittings—Scale 1/16 In. to the Foot

Right Side Elevation—Scale ⅛ In. to the Foot

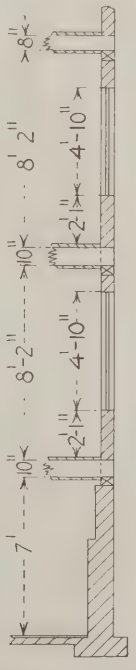


Main Floor Plan—Scale 1/16 In. to the Foot



Second Floor—Scale 1/16 In. to the Foot

Front Elevation—Scale ⅛ In. to the Foot



Section — Scale ⅛ In. to the Foot

A New Jersey Cottage of Neat Design—Plans, Elevations and Section

Elementary Perspective Drawing—I

The First Principles Involved—Definition of Linear Perspective—Illustrations of Real Objects

By George W. Kittredge*

ASIDE from the opportunity of oral or personal instruction, the only available means for acquiring a knowledge of the principles of linear perspective open to the student in the field of the mechanical arts is that afforded by published matter on the subject in the form of books, of which there are many, or in articles in current trade papers. So much has been written on the subject as to probably lead those unfamiliar with it to believe that its principles are very difficult to master, and to deter many from undertaking it. To those who are really familiar with the subject, it is very apparent that many who do profess to understand it have an imperfect knowledge of it, if the evidence of their work is considered. Such ignorance may be due to the fact either that instruction is not available or that, if at hand, it is not clearly or systematically set forth. To successfully master the principles of any technical subject one must begin at the beginning, have patience and take things in logical order.

The first principles of perspective drawing are in themselves quite simple, and the operations become complicated principally by the multiplication of details in the subject to be represented. There are a number of systems of perspective drawing, and in each system often a number of methods by which the position of a given point may be found, but all systems or methods which are correct must, of course, produce exactly the same result. In beginning the work it will be of great assistance to the learner if he is possessed of good imaginative powers, and he should understand the methods employed in making the elevations and plans from which the subjects which he is to represent are to be constructed.

Linear perspective is the method of producing upon a flat surface a pictorial representation of a given subject, such representation being derived entirely from the plans and elevations used or to be used in constructing the same. If correctly rendered the view thus obtained will be exactly the same, so far as outlines are concerned, as a photograph taken from the completed object, provided the chosen point of view in each is the same. This fact is mentioned because of the analogy of the operations of photographers, geometrically speaking, to those of linear perspective, and because the idea is entertained by many that lenses distort and proportions are exaggerted or otherwise falsified. This is true only when lenses of the landscape or single lens variety are used, and then only in a limited degree. Lenses of the type known as "rectilinear" give correct images. What is sometimes considered as distortion in photographs is occasioned by the use of that variety of rectilinear lens called "wide angle." This is because a photograph made with such a lens includes in its field of view more than could normally be seen by the eye without turning the head, and even this distortion disappears

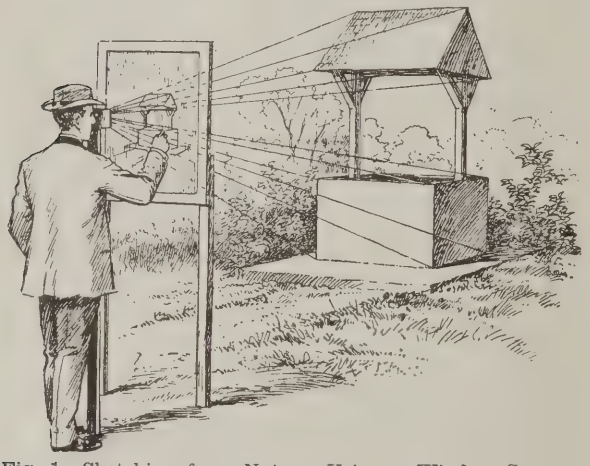


Fig. 1—Sketching from Nature, Using a Window Screen as the Picture Plane

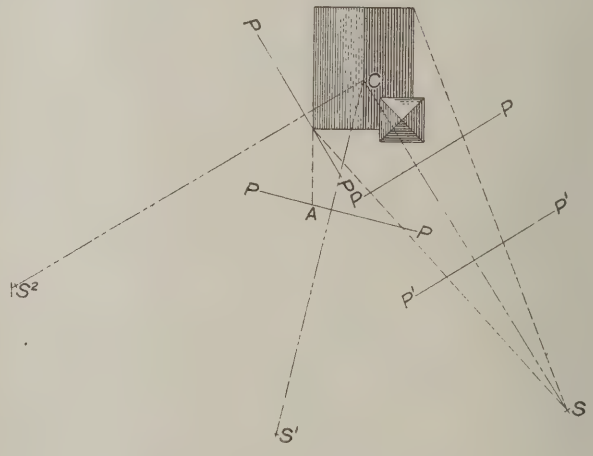


Fig. 3—Selecting a Point of View

Elementary Perspective Drawing—I

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

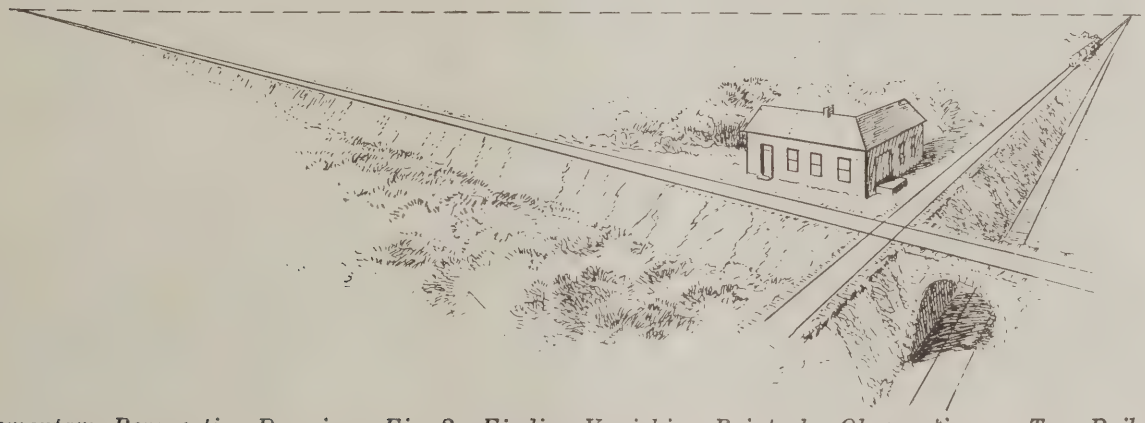
when the photograph is properly viewed. The same distortions will occur in the operations of perspective drawing under the same conditions. The angle of vision should not incude more than 30 or 35 degrees. Within this limit no distortion will appear.

The surface upon which the view is projected or drawn is called the "plane of the view" or the "picture plane," and the method by which the picture is constructed thereon is geometrically the same as that performed by nature in the taking of a photograph, in which operation the chief factor is the ray of light. Light moves in straight lines from all points of the object to form the image upon the sensitive plate, or otherwise, the picture plane. In the operations of perspective drawings, therefore, the rays of light must be replaced by straight lines drawn from the several points of the object to the point of sight, intersecting the picture plane in their course, thus locating each point of the object thereon.

In the operation of photographing the lens of the camera represents the point of sight, and the rays of light, instead of intersecting the picture plane in their course to the camera, cross in the lens and intersect it beyond, an operation which has no other effect geometrically than to invert the image or picture.

The idea to be kept in mind in the projection of an object upon the picture plane can perhaps be most simply and practically illustrated by supposing that a screen of wire cloth be firmly fixed in position in front of some object which it is desired to represent, as illustrated in Fig. 1, and that a point of view be selected from which the object can be seen through the screen. For accuracy's sake the point of sight could best be located by cutting a small hole through a piece of cardboard, which should also be fixed in position by any convenient means, so that the hole is at the chosen point of view, having it at the same time within arm's length of the screen. While looking with one eye through the hole in the cardboard, each point of the object beyond will be seen through a particular point of the screen at which its position can be marked by means of a piece of chalk. This sketching operation may be continued by drawing lines with the chalk, so that each line upon the screen shall cover or hide from view the corresponding line of the object beyond. Such an experiment will assist the beginner in forming an idea of how objects, as seen first in nature, will appear when afterward put into a drawing or sketch, and will greatly assist the imagination in conducting the operations of perspective drawing. It will also bring to his attention the apparent decrease in the size of objects as they recede from the observer, and the fact that these points of the subject being sketched which are below the level of the eye and near the foreground will appear lower down on the screen or paper than those which are more distant, while the reverse is true of those points above the eye.

To more fully illustrate this another observation may be made. Let the student take a position in the middle of a railroad track, standing behind a train which is about to move out of a station. At first he sees only the rear end of a car. As the train moves away the end of the car appears to diminish in size until bridges, hills and many objects, larger than the car itself, appear in view. If the track be straight for two or three miles the train becomes a speck on the horizon, and what remains in view is the long vista of track, the rails of which appear to rise before him and to meet at a point on the horizon exactly in front of him. Although the track is known to be perfectly level, the point of meeting (termed in perspective drawing the "vanishing point") will appear on a level with the eye. This will be equally true should the track be replaced by level street or road of any width or any inclosure whose receding lines are parallel and horizontal. If the point of view be raised or lowered, the vanishing point and horizon line will appear also to rise or fall an equal amount. Thus the rails of another track running parallel beside the first, but on a higher or lower level, will appear to meet at the same point on the horizon.



Elementary Perspective Drawing—Fig. 2—Finding Vanishing Points by Observation on Two Railroads Crossing Each Other

From this we reach the conclusion that all lines which are parallel and horizontal composing the parts of any view will meet at a common point of the horizon line. By the same course of reasoning we shall find that the rails of another track, crossing the first at any angle, will meet at another point also on the horizon. If it were now possible to apply the method of making a sketch of the railroad crossing by the use of a wire screen, as suggested above, taking a point of view far enough away to bring the crossing into the picture, as shown in Fig. 2, we should find that the vanishing point of one of the tracks would ap-

pear on the screen at a point exactly in front of us when standing so as to look in a direction parallel to the same; while the vanishing point of the other track—if the screen were large enough—would be exactly in front of us when turned so as to look parallel with the other track.

In the foregoing illustrations we have considered only real objects (not plans and elevations), and have spoken of rays of light as though they were threads stretched from points of the object to the eye. In conducting this work upon paper, of course only one view can be considered at a time. The view in which the projection of the points of an object upon the picture plane can be conducted to the best advantage is the plan or top view. In the upper part of Fig. 4 are shown the elevations and plan of a subject, very much simplified in outline, so as to best illustrate the principles and avoid the complications which would result from a more elaborate design. Before beginning the work the first essential is to select a point of view. Just as an individual would walk around a building at a suitable distance away to discover its most favorable aspect, so the point of sight may be located upon the plan at pleasure. Thus, in the plan of the building shown in Fig. 3 the point of sight may be located as desired, as, for instance, at S, S^1 or S^2. Supposing it to have been located at S, we may now draw a straight line from S, representating the axial ray, through the plan so as to pass approximately near its center C, then another line, $P\ P$, at right angles to the first, representing the picture plane. This may be drawn at any convenient distance away, remembering that the nearer it is to the point of sight S, as, for instance, at $P^1\ P^1$, the smaller will be the resulting picture, while the reverse is true if drawn nearer the plan as at $P\ P$.

(To be continued.)

Building Projects in Canton, China

The most important project for the ensuing year in Canton, China, is a new custom house, four stories in hight, which is estimated to involve an expenditure of $130,000. It will have a frontage of 152 ft. and a depth of 72 ft. The materials used will be granite from Kowloon, brick and reinforced concrete. There will be a dome clock tower the top of which will be 105 ft. upon the street level. In the main offices the floors will be of tile, while other floors will be of teak. The lavatory fittings will be of British and elevator of American make.

The Young Men's Christian Association is putting up a building in Spanish-American style of architecture, three stories in hight to cost $80,000, which was subscribed in the United States. On the ground floor there will be an auditorium 74 x 55 ft. in area with a seating capacity of 2000. The room will have a sloping floor and a suspended gallery. The gymnasium also on this floor will be 72 x 40 ft., and between the auditorium and the gymnasium will be an open swimming pool 60 x 20 ft., made of concrete and lined with tile. On the second floor will be class rooms, a dining room and a kitchen, while on the third floor will be dormitories for members.

Among the private structures at present under way may be mentioned the Karanjia building, which will be 130 x 80 ft. in plan, four stories in hight and built of brick and reinforced concrete, with a flat reinforced concrete roof. California red wood will be used for doors, windows and interior finish. It will cost about $75,000 and is expected to be finished by the end of the current year.

Binding Employees Against Unionism

The decision of the United Supreme Court lately handed down in the case of Coppage vs. Kansas, 35 Supreme Court Reporter 240, wipes from the statute books of several states a law which purported to make it a misdemeanor for an employer or his representative to induce an employee to agree to refrain from joining, or to withdraw, from a labor union, as a condition to employing him, or continuing his employment. Aside from Kansas, laws of this kind have been enacted in California, Colorado, Connecticut, Indiana, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oklahoma, Oregon, Pennsylvania, Porto Rico, and Wisconsin. Three of the judges of the Supreme Court, Justices Day, Hughes and Holmes, dissented from the decision, but the remaining six justices hold that the right of an employer to exclude union men from his employment is reciprocal to the right of union employees to agree that they will not work in an open shop.

Licensing Architects in Illinois

In his report presented at the Illinois State Convention of Licensing Architects, Francis M. Barton, secretary of the Board of Examiners, gave some very interesting information regarding the workings of the law which has now been in effect 17 years. The legality of the act has recently been established by the Supreme Court and the Board now proposes to enforce the provisions on its broad interpretation which heretofore has not always been the case. Secretary Barton said that to-day there are 863 licensed architects in the State, 410 having been admitted because they were practicing when the law went into effect, and 453 who passed the examination of the Board.

The present board holds that only a licensed architect can practice in the State or from the State, and that his license is not transferable or negotiable. Any licensed architect who assists others to practice who have no license is guilty of dishonesty as provided in the act and should have his license revoked.

Announcement has been made by the American Genetic Association of Washington, D. C.,, that two prizes of $100 each are offered for two photographs—one showing the greatest tree of a nut-bearing variety in the United States and one showing the largest broad-leaf tree which does not bear edible seeds. The contest will end on July 1, 1915.

There are somewhat more than 500 recognized tree species in the United States, of which about 100 are commercially important for timber.

Belgium and Some of Its Buildings

A Few Timely Comments on Some of the Interesting Examples of Architecture in the War Zone

By John Y. Dunlop

BELGIUM may be considered the home of secular Gothic architecture. Many nations erected domestic buildings in this way, but in no country is the style utilized for such structures and to such an extent as the country named. There, fine churches are to be found in the principal cities and there is hardly a town of importance which has not its Gothic town hall belonging to the various Guilds, a belfry, a market place and an abundance of domestic street architecture.

The town halls of Brussels, Louvain, Bruges, Mechlin, Ghent and Ypres are all buildings claiming attention. Most of them were built in the 15th century and the general aspect of these famous structures were notable and bold in mass and rich in color. The main buildings usually consisted of a long unbroken block surmounted by a high pitch roof with many little dormer lights. This is one characteristic of the Belgian building, whether it be that of a public or a private aspect, which appeals strongly to the visitor.

In construction the sides of these buildings present many stories filled by rows of windows and when taken into consideration with the steep roofs crowded with dormers carried up to the lofty ridge, there is strong evidence of a conviction that beauty was obtained by regularity and order rather than by unsymmetrical treatment.

The square towers with their projecting turrets were very prominent in these buildings. In many cases they have angle buttresses on which the corbels of the turrets were formed. These were all built in coursed work of exceeding strength. It is well known, however, that the heaviest masonry is no protection against modern projectiles, but the grace of the stone arch and the beauty of the stone carving must be preferred to the iron ornament which can stand the ravages of war.

Belgium and Some of Its Buildings—The Citadel at Dinant Showing River Meuse and Old Church (Now Destroyed)

In many of the prominent belfries and towers we find the masonry of the various features carried up to a great hight and the summit crowned with lead covered domical roofs of varying shapes. The belfry tower at Bruges is finished with a battlemented parapet in cut stone, while the spire of the town hall more simple in construction is of a mass and hight which is truly imposing. Bruges is probably (or at least was before the present war) the most charming of all Belgian cities with

its wealth of artistic and historical interest and its fine examples of picturesque old houses, bridges and waterways.

To look out over Bruges from the belfry tower the visitor is struck with the variety and shape of the gable ends of the various town houses. In all classes of buildings the roofs are steep finished with crow stepped and tracery gables of picturesque outline.

Belgium and Some of Its Buildings—View of the "Quai du Rosaire" at Bruges

In the construction of these domestic buildings a free use has been made of plaster. Inside and outside this material is utilized not merely to cover surfaces but to form architectural features. Cornices, panels and enrichments of all kinds modeled in plaster are constantly employed in the interior of rooms and buildings and there are to be seen architectural features appropriate to stone executed in plaster and assimulating stone.

In many of the public and Guild houses proportion plays an important part in the design. The actual shape and size of the window openings make the buildings appear bold and vigorous, although many display grace and refinement which the Belgian builder has been able to grasp and turn to account.

Flemish architecture, it is almost unnecessary to recall, has been a source of inspiration for other countries during a considerable period. For many years Belgium has been a favorite sketching ground and field of study for those who were interested in the art of building and its interest to-day may be seen in many of the modern façades, more particularly in the adoption of the gable which one continually meets in Flemish streets.

The greatest charm in Belgian structures of a modern type is to be found in the delightful examples of brick and stone street buildings in which the towns of Flanders are particularly rich. This charm is produced by the beautiful texture of the brick work and tiling, which is very pronounced by reason of the small bricks which are used in building—approximately 6 in. long by 3 in. deep.

The chimneys are, as a rule, well grouped together, for fireplaces are very much in use in Belgium homes.

The Flemish fireplace may be described as a sort of mongrel furnace praised for saving fuel and possessing the properties of a "*poe le de fonte*" without affecting the head by any emission of carbonic vapor. The width of the hearth is determined by the length of the billet burned, usually the opening above the fire bars being formed with a circular iron frame on which the brick front is built. The brick work extends back to the wall of the hearth recess, the chimney flue being formed at the crown of the iron frame. This opening is fitted with a damper made of tile or iron plate that is drawn by a handle backward and forward to open or shut the chimney flue.

There is little doubt about the power of the draft that was formed in these fireplaces, for they are not only able to expel their own smoke from the fire in all kinds of weather, but they heat the room much better than the ordinary open fire. This grated hearth for wood fuel may be reckoned to have been borrowed from the Dutch fireplace

Brick Chapel at Farm of Hougomont on the Battlefield of Waterloo

and the introduction of the damper does everything that could be done with this fireplace for comfort and economy.

The Belgians have a fashion of covering their roofs with slates and tiles, many of which are pan tiles with locking joints in which the piends and ridges are rendered water tight, all being covered with segmental tiles bedded in cement. Many of the old roofs are covered throughout with 15-in. long ridge tiles. These old tiles are tapered and measures 7 in. at one end and 9 in. at the bottom end. They are laid in courses on their back and the sides of two tiles are laid in the hollow, which make the raking joints water tight. The joints parallel to the eaves are lapped, that being arranged with the broad end of the tile over the narrow one.

The internal finish of the houses, including the staircases, windows and doors have a character entirely their own and the workmanship is the result of patient toil and careful craftsmanship.

Fine churches existed in all the principal cities, but they cannot be said to form a series differing from the churches of France. The principal cathedral of the low country is at Antwerp and is a building remarkable for its great width and for the wonderful picturesqueness of the interior and exquisite and daring spire. The gigantic system upon which the consummate flower of this architectural creation was to be at last unfolded was the plant of a whole century's growth. It rises to a hight of nearly 500 ft. over an edifice of as many feet in length.

Internally the church is a true impression of the Christian principal of devotion, everything pointing upwards, from the spire in the clouds to the arch which enshrined the smallest sculptured saint in the chapel below.

The main building is divided into five naves with internal rows of chapels, but separated by no screens or partitions, the temple forming an imposing whole in which the effect is most impressive. The vast and beautiful painted windows glow with sculptural scenes which are nothing less than gorgeous in their brilliancy, richness and harmony. In this building of large size it is difficult to find any stone heavier than two men could lift and the masonry is a perfect marvel of dexterity and skill as well as beauty. The art of the workers in the other material, such as carpenters, joiners, smiths and plumbers, has been carried to a high state of perfection.

Belgium also possesses a great number of other cathedrals of note, including those of Tournai, Brussels, Mechlin, Louvain, Liege and Ghent.

The Flemish fondness for bells caused the bel-

Belgium and Some of Its Buildings—Residential Section in Bruges with Tower of Belfry in the Distance

fry tower to be one of the architectural features of most of the towns. In order that the beautiful melodies played should be carried well out over the houses, these structures were high and characteristic of noble design. At Antwerp and Malines the belfry forms the cathedral tower, but in the case of Bruges it is built on the town hall, is 300 ft. high and forms a landmark for miles.

The town halls of Brussels, Louvain and Ghent were fine examples before the invaders devastated the country. Each was designed on the same lines and was several stories in hight.

The trade halls for the buying and selling of merchandise, especially cloth for which the country was famed, are also characteristic and one of the finest examples which is a monument to the importance of Ypres, is the Halles or Great Cloth Hall, which with its curious wooden ceiling is always looked upon with interest by the wood-worker.

In the basement below the covered market presents a fine and extensive example of brick vaulting and the quaint stalls with touches of color in the costumes of the Belgian peasantry form a scene which strongly appeals to the artist.

On the Cloth Hall is built the belfry tower with its bold flanking buttresses which give an impression of strength and dignity, though the effects are marred by the pitch roof which apes the never erected spire.

Many of the towns in Belgium are being brought into importance by their prominence in connection with the western theatre of the war with the result that the monuments of their importance are being particularly noted. What changes will be effected in their interesting buildings when next we visit them it is most difficult to say. It is to be hoped, however, that the reports of their destruction are exaggerated and that at most only a remediable degree of injury has befallen them.

Tall Buildings in Manila

According to a special correspondent of the United States government writing from Manila, there has gradually grown up a movement for taller buildings since the advent of concrete and steel construction. Heretofore, he states, three stories have been the limit on buildings in Manila and the islands, and not more than four or five reached more than two stories in hight. Within the last two years five or six new structures of concrete and steel have been built with three stories and one of four stories. One business block four stories in hight recently completed has proven so attractive for offices that two more stories are to be added.

There is also just completed a business block in the Chinese district and constructed by a Chinese firm that has six stories. The advent of the taller buildings is due to the belief that the reinforced-concrete structure will withstand earthquakes, which have rendered the buildings of ordinary masonry so dangerous. Thus far, however, there have been no severe shocks to test this form of construction.

A movement is on foot among the architects of Ohio looking to the enactment of a law compelling those who practice architecture to be licensed.

Adoption of New Form of Builders' Contracts

We are advised that at the meeting held at the Builders Exchange in Philadelphia on March 8, the Joint Committee of the American Institute of Architects and of the National Association of Builders Exchanges, ratified the contract documents that have been considered by these two organizations for the last two years. President Lewman officially approved the architects' new form of contract, and states that it is much fairer to building interests than the previous draft and is all that could possibly be expected at this time in the way of eliminating arbitrary powers that heretofore existed in the documents governing building construction.

A little over two years ago a resolution was passed by The Builders Exchange of Louisville, carrying with it a recommendation for improvement in contract documents. This resolution was endorsed by the various National Organizations connected with building and interested in financial ways, such as Credit Men's Association, bonding companies, etc.

Co-operation was heartily tendered by all of these organizations, and at the Washington, D. C., convention held in 1913, the National Association of Builders Exchanges started a campaign for the adoption of the recommendations.

A series of meetings have been held with the American Institute of Architects and at the National Association convention held in Columbus, O., January 26, 27 and 28, 1915, a tentative form was submitted by the architects to the builders. Several important recommendations were offered by the builders and were submitted to the joint committee at their meeting held in Philadelphia, as above stated. These recommendations are now incorporated in the new form.

Just as soon as the new documents are printed they will be promulgated for general use. This is the most important step taken by builders in a great many years and will be a great benefit to owners and investors, and will establish the building industry upon an ethical plane. It secures for all concerned a more reliable and better managed method of doing business.

The new documents provide for arbitration of all matters in dispute and make many other changes that have heretofore perceptibly increased the cost of erecting buildings.

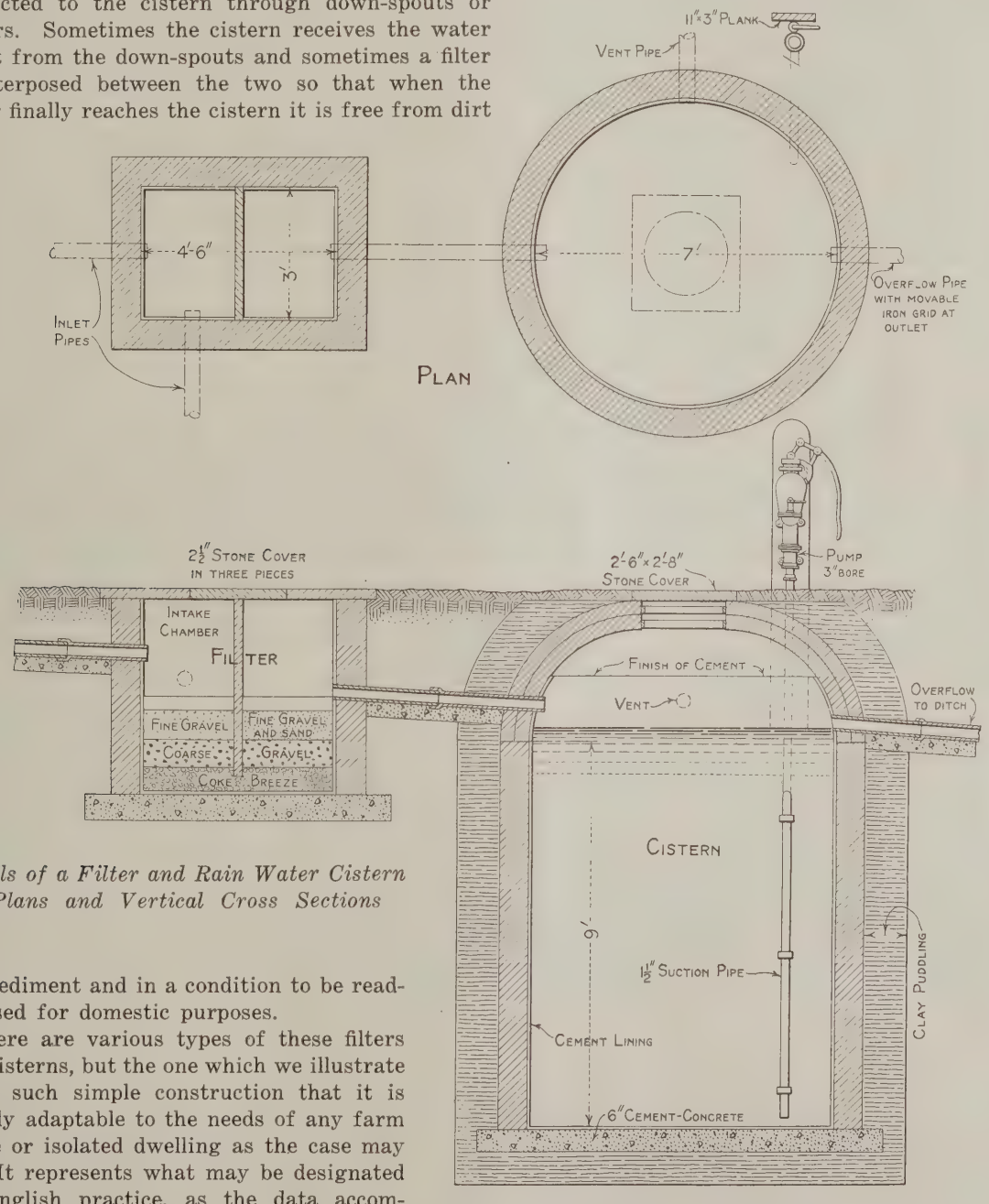
The firm of Schenck & Mead of New York City, composed of two women architects, won the first prize in a competition held under the auspices of the City Club of Chicago for plans for a "neighborhood center." The competitors were given permission to select any location in any city for their ideal "neighborhood center" and the prize-winning firm chose one square mile of the Bronx, between Washington Bridge and Macomb's Dam Park.

The University of Oregon at Eugene, Oregon, has recently established a School of Architecture, the term commencing with a class of 18 students under the direction of E. P. Lawrence, of Portland.

A Filter and Rain-Water Cistern

A Convenient Storage Tank for a Small Water Supply for Isolated Dwellings—Some Details of Construction

IT is the common practice in many sections of the country, more especially perhaps among those rural districts and suburban sections where a public water supply is not available, to make use of cisterns for the storage of rain-water which may be captured by the roof areas of a building and conducted to the cistern through down-spouts or leaders. Sometimes the cistern receives the water direct from the down-spouts and sometimes a filter is interposed between the two so that when the water finally reaches the cistern it is free from dirt and sediment and in a condition to be readily used for domestic purposes.



Details of a Filter and Rain Water Cistern —Plans and Vertical Cross Sections

There are various types of these filters and cisterns, but the one which we illustrate is of such simple construction that it is readily adaptable to the needs of any farm house or isolated dwelling as the case may be. It represents what may be designated as English practice, as the data accompanying the plans and sections of filter and rain-water cistern are gleaned from a recent issue of the *Building World*. The correspondent furnishing the information states that the filter tank is built of 9-in. brick work laid up in cement and resting on a 6-in. cement concrete foundation. It has a stone division which is carried down to within 4 in. of the floor, as may be readily seen from the cross section of the filter presented herewith.

The inside is rendered with ¾ of an inch of equal parts of cement and sand and finished with ¼-in. coating of neat cement finely troweled. The filter tank is 4 ft. 6 in. long; 3 ft. wide and 4 ft. 9 in. deep, allowing for a depth of 2 ft. 3 in. below the outlet, and 2 ft. 6 in. below the lost inlet. The inlet drain pipes are connected into the intake chamber as shown in the section.

The filtering material is 2 ft. deep and finishes

6 in. below the lost inlet. It therefore follows that the total depth of the filter is governed by the level on which the fall of the drains will permit the entrance of the lost inlet pipe into the intake chamber. The outgo is 3 in. below the lowest inlet, thus rendering it impossible for any floating matter to get back into the latter. The filtering material consists of layers of coke breeze, coarse gravel, fine gravel of layers of coke breeze, coarse gravel, fine gravel and fine gravel and sand, which combined, give a thickness of 8 in. The top of the filter is covered with three pieces of tooled stone 2½ in. thick and bedded in mortar.

The rain-water storage tank, or cistern, as it is called in America, is circular in cross section and bottle-shaped in vertical section and is built of 9-in. brick walls laid in cement with cement rendering and concrete foundation, the same as described in connection with the filter. The brick work is built with puddled clay 12 in. thick and over the dome as shown in the vertical cross section of the cistern. The inside dimensions are 7 ft. diameter by 9 ft. depth below the springing of the dome. These dimensions give a cubical capacity of nearly 2165 gallons, figuring 6¼ gallons to the cubic foot.

A 3-in. lift and force pump is fixed to a 3 by 11-in. plank with rounded top and set 3 ft. into the ground. The foot of the plank is treated with tar to prevent decay and is surrounded with lime concrete. The 1½-in. iron section pipe is carried from the pump through the walls of the cistern and down the sides, finishing at the bottom with a stopped end. Commencing at a point 9 in. from the bottom of the cistern the pipe is perforated for a length of 1 ft. 6 in., through which the water passes when being pumped from the cistern.

The overflow is taken to a ditch and has an iron grid fixed at the end. This may be either of ordinary drain pipes, cement jointed and bedded in concrete, or of agricultural pipes laid dry with open joints. The vent pipe is of cast iron.

The cistern has a dome top constructed of two segments built of half bricks laid in cement. The manhole is 2 ft. in diameter strengthened with iron rings as may be necessary and covered with 2½ York stone 2 ft. 6 in. square and provided with iron rings and an eye. Access to the cistern is by means of a ladder from the top.

The English correspondent points out in his comments that the filter tank should be cleaned out about every three months, while the rainwater storage tank or cistern should be cleansed at least once a year.

Organization of Master Plasterers

A movement that will bring together a number of old organizations of Minneapolis and St. Paul has taken tangible shape in the formation of what is known as the Master Plasterers of the Twin Cities. Incorporation papers have been filed with the Secretary of State and we understand that the new organization will hold much the same relationship to the plasterers as a Builders' Exchange holds to contractors. The incorporation papers were filed by Olaf Dahlstrom of 4000 Aldrich avenue, South, Minneapolis, Minn.

The Columbus Builders' Exchange and the National Convention

A movement to enlist the interest of Builders' Exchanges that have not yet affiliated with the National Association of Builders' Exchanges has been started as a result of the recent convention held in Columbus. All of the delegates who attended that meeting returned to their home cities with much enthusiasm. The splendid arrangements made by the local committees in Columbus have received a great deal of commendation. President Kunzman of the Columbus exchange took a lively interest in the proceedings, giving his entire time to the welfare of the visitors. He was recognized by the convention by election to the newly created position of finance commissioner and was made a member of the Board of Control of the National Association. Among the other members of the Columbus exchange who had a prominent part in the convention was George F. Mooney, chairman of the general committee on arrangements, who spoke on behalf of the Columbus exchange and also for the City of Columbus at the banquet.

The list of committees connected with the entertainment of the delegates to the convention under Mr. Mooney's leadership was as follows:

National Convention Committee

Geo. F. Mooney, General Chairman; Clarence Metters, secretary, and H. E. Kunzman, vice-chairman and treasurer.

Finance—H. E. Kunzman, F. O. Schrodinger and E. Elford.

Publicity—Orrin Bennignus, Chas. A. Klie and G. E. Snyder.

Halls and Decorations—J. E. McNally and L. C. Herschler.

Entertainment—B. M. Freeman, E. H. McGrath, Orrin Bennignus, E. Elford and H. E. Kunzman.

Hotel Reservations—E. H. McGrath and R. L. Watson.

General Reception Committee—Wm. Watson, Chairman. Each member of the Builders & Traders Exchange served on this committee.

Automobile Tour—L. G. Kallmerten.

Annex to Hotel McAlpin

There has just been filed with the Bureau of Buildings of the Borough of Manhattan, N. Y., plans for a 23-story extension to the Hotel McAlpin, West Thirty-fourth street. The feature of the annex will be the large amount of space allotted especially for women—four additional elevators and 200 rooms, as well as a large ballroom, private dining rooms and an extensive lounging room, opening into the present mezzanine restaurant. Another feature will be a children's playroom on the sixth floor with a stairway leading to the roof of a court, fitted up as an out-door playground. The plans were filed by architects Warren & Wetmore of New York City, who estimated the cost at $1,000,000.

A most encouraging feature of the situation in Seattle, Wash., is the gradual improvement in the lumber industry, as more plants are resuming operations every week. Orders for lumber, both domestic and foreign, are said to be increasing.

A Garage Built of Concrete Blocks

A Style of Building Which at the Present Day Is Becoming a Growing Necessity in All Sections of the Country

AN important adjunct of the country or suburban home at the present day is the garage for housing the favorite make of car, now counted as one of the greatest conveniences of the times, especially by those residing away from the business centers. The size of the garage depends of course upon the number of cars which the owner may possess, but even if there be only one, the garage should be sufficiently commodious not only to accommodate it, but also that of an occasional visiting guest. Then, too, it is a convenience to have plenty of room in which to wash the car and do any little repair work that may be necessary and not be cramped for space. In style of architecture it is well to have the garage in harmony with the dwelling house, thus producing an attractive effect.

At the present day all sorts of materials are used for the construction of garages, but those that are fire-resisting are much to be preferred by reason of the nature of the fuel that has to be kept about the place and the general accessories. A fireproof garage tends to invite a much lower rate of insurance, and painting and repairs are reduced to a minimum, while at the same time the life of the building is greatly prolonged. It is true that many garages are of frame construction, some having an exterior finish of stucco while others have monolithic concrete walls and still others are of brick or stone.

The example which we illustrate herewith is constructed throughout of "Ideal" concrete blocks and with their faces sufficiently varied in finish to give an exceedingly neat and attractive effect. The treatment of the front is especially clever and the use of leaded glass windows in the sides gives a tone and dignity which could not possibly be produced by the use of ordinary window glass. The cornice is of deep projection with a multiplicity of open brackets to support it, all as clearly indicated in the picture. The roof is of the hipped variety and is covered with shingles. The picture shows a one-car garage, but with ample floor space to readily move about without discomfort.

General View of a Garage Built of Concrete Blocks of Plain and Ornamental Face

Opening of the Panama Exposition

A Notable Event with Impressive Ceremonies—Architecture of Some of the Completed Structures

THE gates of the Panama-Pacific International Exposition were opened according to programme for a 288-day season on February 20 with an attendance that established a world's record. The total for the first three days, in spite of rain, was 442,957, as against an aggregate of 180,688 for the first three days of the World's Columbian Exposition at Chicago.

What the Architecture and Sculpture Symbolize

Held in commemoration of the building of the canal, the Exposition has been developed on a commensurate scale of magnitude. The multiform exhibits have been selected from all nations of the earth and as a whole epitomize concretely present-day world achievements in all lines. Similarly both architecture and sculpture express in poetic manner the purpose of the Exposition. The architecture of the buildings on the grounds embodies the ideas of many peoples, but in a combination new in effect and revealing marked originality. The sculpture, too, which adorns both buildings and grounds has a symbolic significance. The Fountain of Energy symbolizes the force that achieved the great Panama Canal. The column of Progress—the tallest sculptured column in the world—symbolizes the spiritual and material advancement which all races will enjoy because of the greater facility for communication made possible by the union of the oceans through the vehicle of the Panama Canal. The great Court of the Universe —the great radiating center of the main structural group of the Exposition grounds—represents the place where the world meets. The east and west boundaries of this Court are respectively the Arch of the Rising Sun and the Arch of the Setting Sun.

Pictures of Some of the Work

Upon the facing page are presented views of some of the more notable features of the completed work. No. 1 represents the entry portal to the Court of the Four Seasons from the Court of Palms. There are five principal courts in the architectural units embracing eight of the main exhibit palaces. The arrangement is such that it is possible for the visitor to view each of the eight exhibit palaces and the five courts without stepping onto a main boulevard.

No. 2 represents the great Arch of the Rising Sun, 160 ft. in hight and crowned by a huge sculptured group "The Nations of the East." The central figure is a huge elephant, richly caparisoned and bearing in the howdah a princely figure symbolizing India. The complementary figures represent Arabs, Mongolian warriors, camel riders, servitors, falconers and priests. Credit for the conception of this group is due to A. Sterling Calder, of New York, with whom collaborated two other famous sculptors—Leo Lentilli and Frederick G. R. Roth. The Arch of the Rising Sun is situated on the east approach of the central Exposition court shown in No. 9—the Court of the Universe. Upon the west approach to the court is a triumphal arch of similar proportions, crowned by a group symbolizing the advance of western civilization and known as "The Nations of the West."

No. 3 shows the colossal colonnades before the Palace of Fine Arts mirrored in the lagoon that lies between the Palace of Fine Arts and the Palaces of Food Products and Education.

No. 4 is the Court of the Four Seasons, showing the western portals to the left, while to the right are courts extending to the Marina and San Francisco Bay. There are many of these beautiful sunken pools in the various courts, reflecting, mirror-like, the splendor of the architectural and sculptural adornment.

The Column of Progress

No. 5 is the Column of Progress, crested by "The Adventurous Bowman." This commands the northern or San Francisco Bay shore approach to the Court of the Universe. The sculptured figures at the base, and the bas-relief that ascends the column are symbolical of the progress of mankind, the Bowman launching his arrow head being symbolical of the further spiritual and material advance of the peoples of the world.

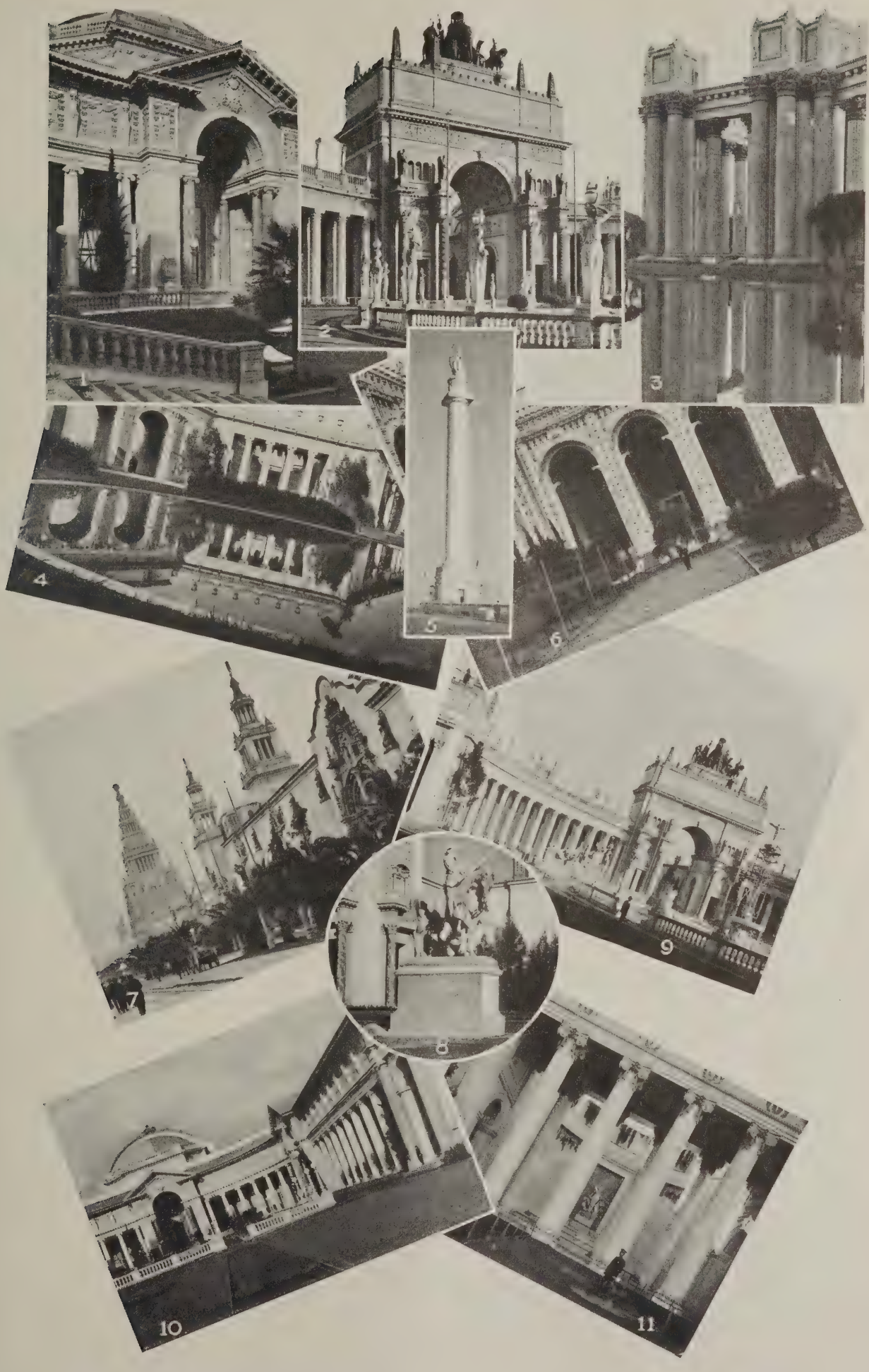
No. 6 shows the Court of Abundance of which Louis C. Mullgardt was the architect.

No. 7 is a view of the Avenue of Palms. On the left is the Tower of Jewels, 435 ft. high, and is in several successive terraces crowned by a globe, symbolizing the world. The tower is adorned with 125,000 cut glass prisms that tremble with the wind. At night they scintillate with all the colors of the rainbow as flashlights play upon them.

No. 8 is "The Pioneer" by Solon Borglum. This is one of the many notable equestrian figures that mark the avenues and courts of the Exposition.

No. 10 is a view of the Court of Palms, showing the portal to the Court of the Four Seasons and a vista, through the portal, of San Francisco Bay.

No. 11 represents "Winter," one of the four niches in the Court of the Four Seasons, the other three being Spring, Summer and Autumn. These niches have fountains and adornments typical of the seasons. To the right and left are the entrances to the colonnade which surround the Court, the space above the arches containing murals by world-famous artists.



Views of Some of the Notable Features at the Panama-Pacific International Exposition

A Suburban House with Tex-Tile Walls

A Cozy Cottage of the Bungalow Type with Roof of Shingles Stained a Tile Red

THE subject of our colored supplemental plate this month is a story and a half cottage intended for erection upon a lot with a 50 ft. frontage and designed to stand the wear of weather and time without constant painting and repairs. The exterior is of simple architectural treatment and suitable for any locality where a compact home for a family of four or five is desired.

The Exterior Covering

The exterior of the cottage is covered with a veneer of Tex-Tile laid up in a good mortar against the sheathing boards and eliminating the air space that is usually allowed for brick veneer owing to the fact that Tex-Tile have air spaces intended to check the transmission of moisture and heat. The tile are fastened to the sheathing boards with galvanized wire ties.

The roof is covered with cypress shingles laid 5½ in. to the weather with a heavy joint every third course. It is intended that the shingles shall be dipped in a tile red shingle stain before they are laid.

All footings and foundation walls are of concrete but may be of any other material that is cheap in the locality in which the house is built. The cellar is to have a clear hight of 7 ft.; is located under the kitchen, pantry and bed room, and is to have a concrete floor with cement finish.

The framing timbers are to be of spruce, the corner posts and sill plate being 4 x 6 in., girders 6 x 8 in., the first tier of beams 2 x 10 in., and the second tier of beams 2 x 8 in., placed 16 in. on centers and braced with rows of 2 x 4 in. cross bridging spaced 6 ft. apart. The rafters of the main roof are 2 x 8 in., and the dormer rafters 2 x 6 in. The porch floor beams are 2 x 8 in. and the porch ceiling beams 2 x 6 in., spaced 20 in. on centers. The studs are 2 x 4 in. spaced 16 in. on centers and the ridge boards are 1½ x 10 in.

The Floors

The rooms of the first story are to have double floors, the rough floor being of 1 x 6 in. pine and the finish floor in the living and dining rooms ⅞ x 4 in. maple. The rest of the rooms are to be finished with ⅞ x 4-in. North Carolina comb grain pine. The rooms in the attic or second floor portion of the house are to have single floors.

The plastering is to be two-coat work with a hard finish in all rooms except the dining and living rooms which shall have a sand finish.

An inspection of the main floor plan shows that the space has been well utilized. The living and dining rooms are connected by a broad open arch and from the former a doorway leads into a hall that connects with the sleeping rooms, the bath room and the stairway leading to the attic. In the opening between the living and dining rooms are shelves for books, and there is also a large fireplace faced with tile and tapestry brick. French casements open to the private porch.

The Rooms

The dining room is square in shape and especially suitable for a round table comfortably seating five people. French casements also connect the dining room with the private porch which latter can be screened in summer and glazed in winter at little extra cost, thus making it a comfortable summer dining room or a conservatory or sun parlor in winter. The kitchen is reached from the outside through an entry from which descend the stairs to the cellar.

The sleeping rooms in the attic or second floor have two windows in each and three large closets which are quite a necessity in a house of this type. An additional bedroom may be added in the future if the owner so desires, as there is a large unfinished space which may readily be finished by the use of wall board.

The interior woodwork is intended to be treated in a simple manner. The finish in all the first floor rooms is to be of clear cypress, that in the living and dining rooms being stained a warm brown and finished off with one coat of boiled wax. Above the wainscoting the walls are to be treated with a flat waterproof paint, subdued yellow in color, while the ceiling between the beams is to be a light cream. In the pantry and kitchen the woodwork is to be finished natural, with one coat of filler and two coats of varnish.

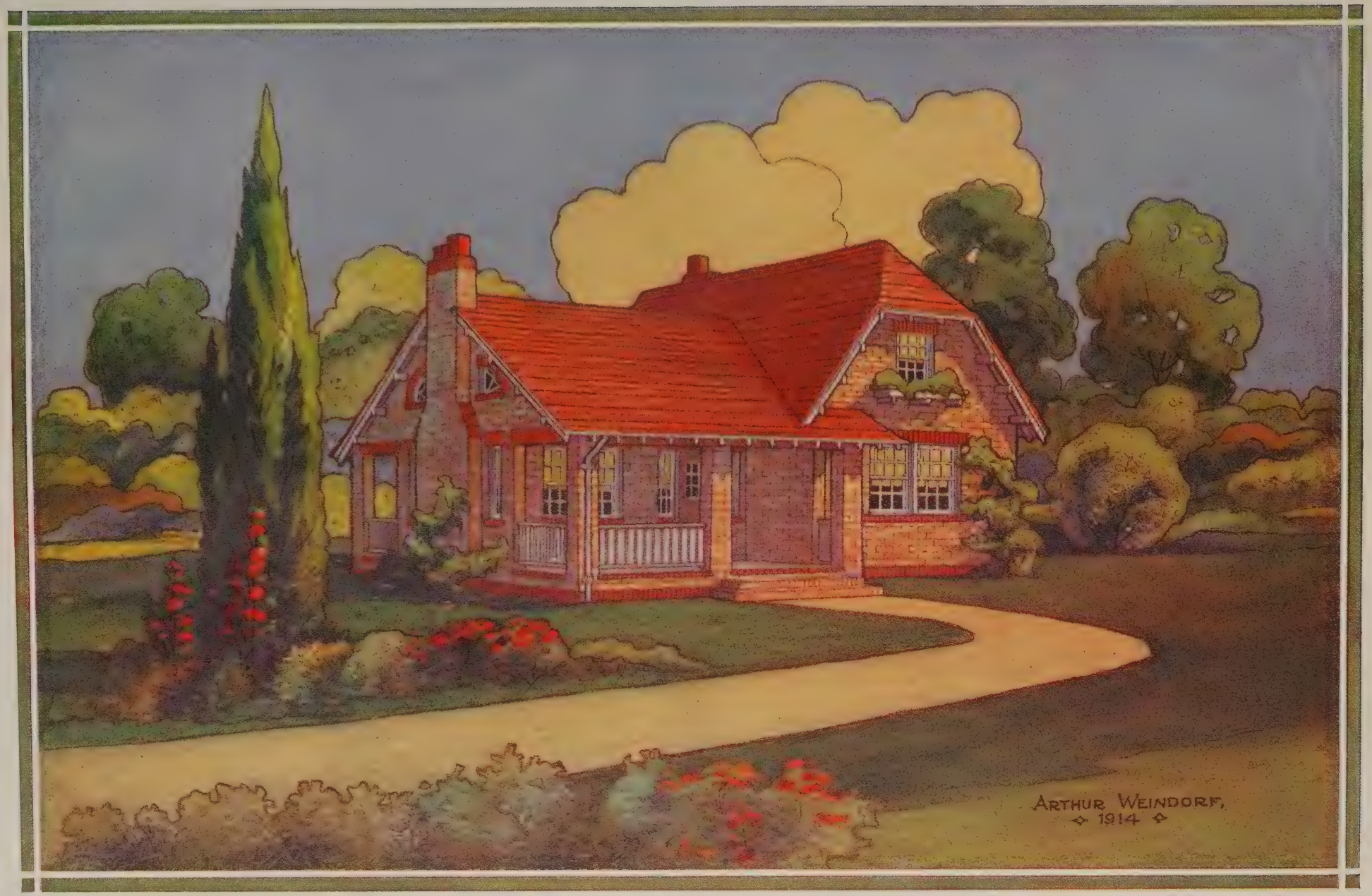
The hall continues the scheme of the living room, the woodwork being cypress, stained brown, but the woodwork in the bedrooms should be white wood painted ivory white and finished flat.

The Plumbing

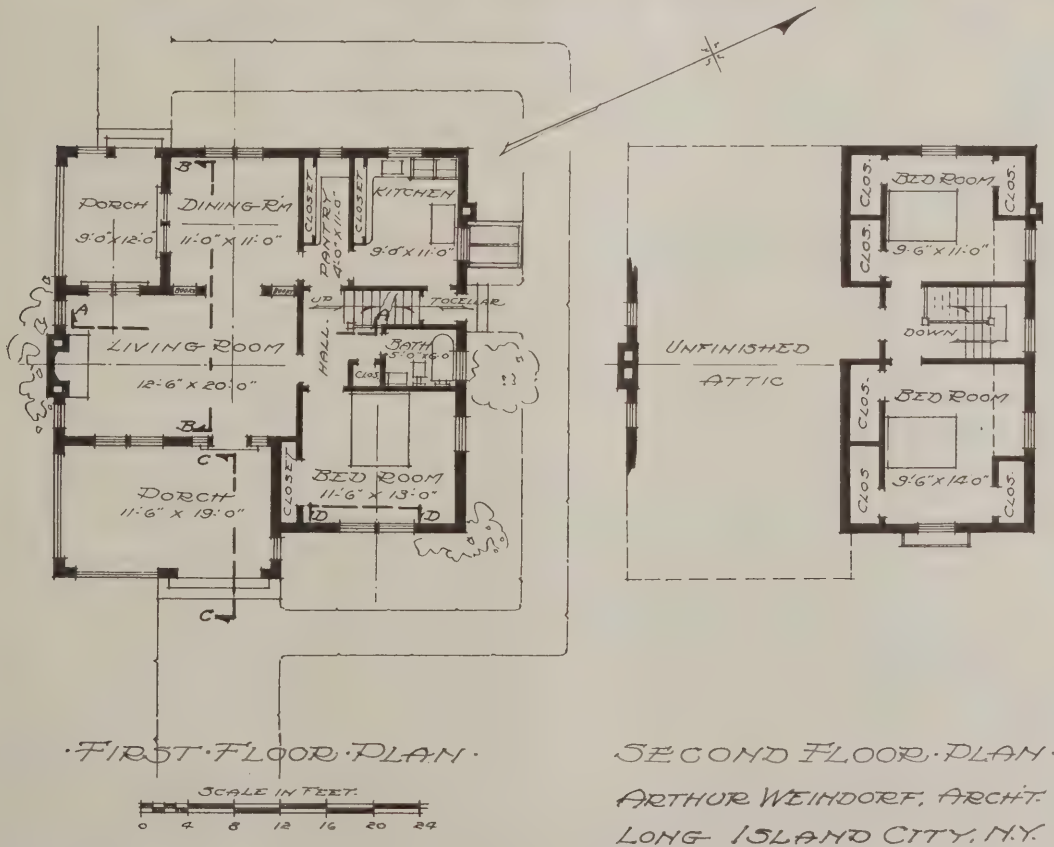
All plumbing in the bathroom is of the open type with porcelain enameled tub and wash basin. The watercloset is to have a china bowl and low down tank. Wherever pipes are exposed they are to be nickelplated. A small medicine closet is intended to be built in the partition over the washstand. The kitchen is to have a two-part soap stone or enameled iron wash trays and a galvanized iron sink. All the plumbing is to be exposed and all pipes coated with enameled paint.

The lighting may be by means of gas or electricity, although both are provided, and the fixtures will be of the combination type, extremely simple in design and of a bronze finish. The hardware is to match the lighting fixtures.

Provision is made for a steam heating system and radiators are to be located in all rooms and


ARTHUR WEINDORF.
1914

VIEW FROM REAR

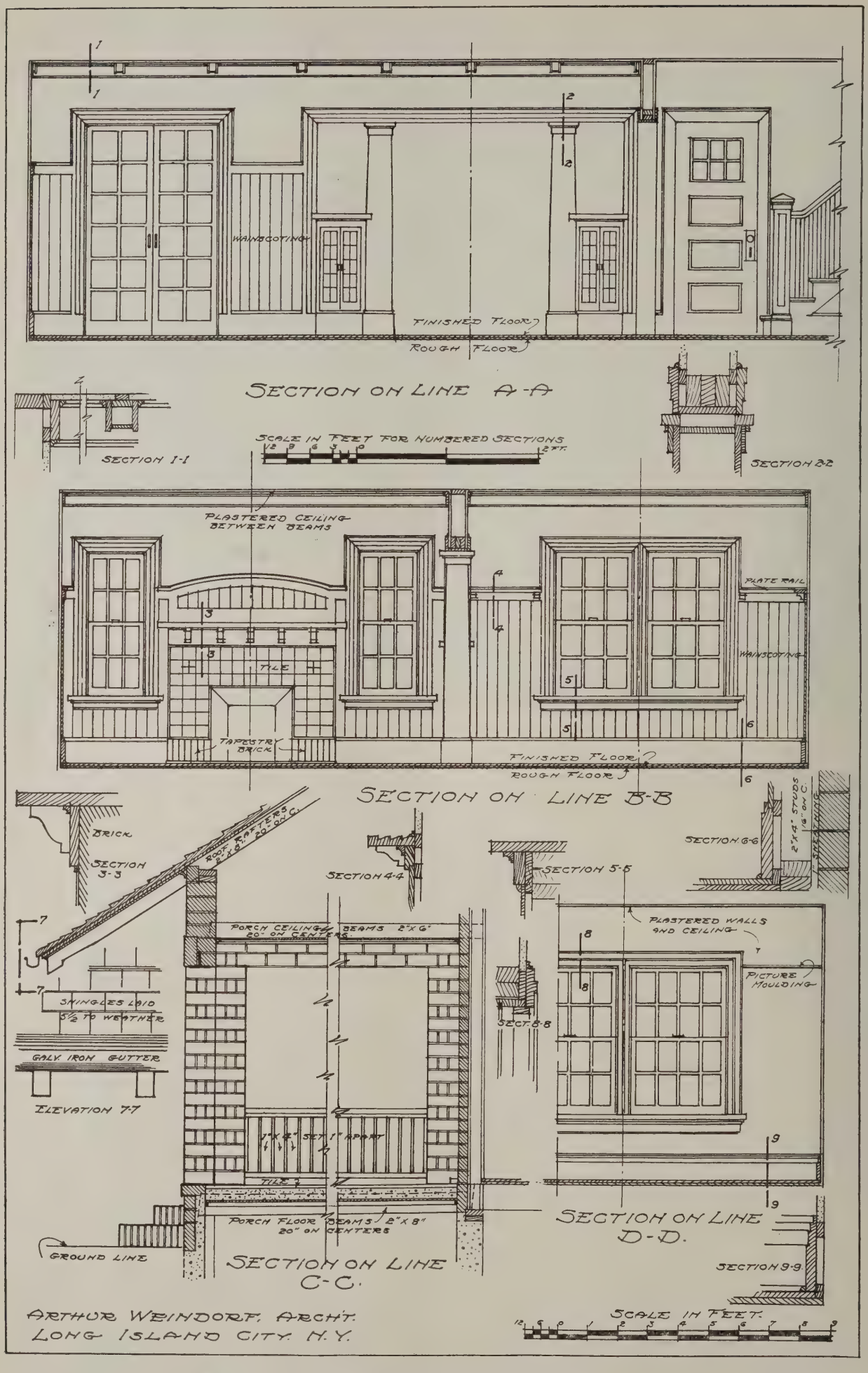


FIRST FLOOR PLAN

SECOND FLOOR PLAN

ARTHUR WEINDORF, ARCH'T.
LONG ISLAND CITY, N.Y.

Plans and Perspective of Suburban House Shown by Our Colored Supplemental Plate This Month



Miscellaneous Constructive Details of Suburban House Shown on Our Colored Supplemental Plate

of sufficient capacity to properly heat the house in zero weather.

Classified Estimate of Cost

According to the figures of the architect the house has a cubical contents of 23,100 cu. ft., which at 20c. per cu. ft. give an approximate cost of $4620, apportioned as follows:

Excavating and grading	$150.00
Masonry work, including concrete footings and foundation walls, exterior walls of building veneered with Tex-Tile, chimney and fireplace and tile work.	1,210.00
Plastering	330.00
Carpenter work, including lumber bill and mill work, glass, etc.	1,800.00
Hardware	90.00
Metal work	100.00
Plumbing and gas fitting	260.00
Heating	300.00
Painting, staining and tinting	250.00
Electric wiring and bell work	75.00
Combination lighting fixtures	50.00
Total	$4,615.00

The Tex-Tile cottage here illustrated and described was designed by Architect Arthur Weindorf, Long Island City, N. Y., who states that the figures above given include the contractor's 10 per cent. profit.

Effect of Fire on Concrete Construction

At the request of the Boston Manufacturers Mutual Fire Insurance Company, Leonard C. Wason, of the city named, made a critical inspection of the gutted buildings of the Thomas A. Edison plant, with the idea of determining how well the reinforced concrete structures had stood up under conflagration conditions. His conclusions bore out what has long been understood to be the fact in these matters. He says:

"Steel becomes ductile at a comparatively low temperature. The strength of a reinforced concrete structure depends upon the compressive strength of the concrete and the tensile strength of the steel. If the steel stretches, the floors will sag under load. If the stone crumbles under heat it will cause soft pockets to form between the films of mortar which hold the stones in place. These films will readily heat and break away.

"Accordingly, in order to secure a fire resisting concrete, it is necessary to select a stone which will not readily crumble under heat, and to bury the steel so deeply in the concrete that the heat generated by a fire in the contents of the building, cannot raise the temperature of the steel to its softening point, even after some of the concrete surface has been spawled off."

In his report he laid particular stress upon the desirability of making interior columns either circular or octagonal in cross-section. His argument was based upon observation of the buildings which were gutted during that fire. To quote:

"Considering the intensity of the fire the effect upon the concrete was surprisingly slight. The corners of the square columns suffered most, being spalled off to an average depth of about four inches. The shape of the final column after chipping off dead material was practically a circle owing to the loss of the corners. Neither of the two causes which combined in this spalling had to do with the dehydration of the cement in the concrete.

"The material is brittle, and under heat the temperature of the corners will rise more rapidly than the mass of the column, for the heat can penetrate from two sides. The result, in general, is the same as heating a piece of brittle glass on one side, where it will expand and crack away from the unheated balance of the sheet. In all the columns square twisted rods were placed vertically—some set well back into the concrete, some very close to the corners. When the heat reached these bars they expanded and buckled and helped to make a line of cleavage in the plane in which they occurred. The combination of buckling of the steel bars and strains in the concrete probably caused the serious spalling of the columns."

Convention of Builders' Supply Association

During the Cement Show one of the many interesting conventions held in the Windy City was that of the National Builders' Supply Association. The meeting was featured by the reading of many interesting papers. A record attendance was a feature of each business session and the character of the exhibits also created unusual interest.

The following officers were elected for service during the ensuing year:

President....James H. Allen, of the Nebraska Material Co., Lincoln, Neb.

Treasurer....John J. Voelkel, of the J. J. Clarke Co., New Orleans, La.

A large number of directors were also elected representative of the building trades in all parts of the country.

Skyscraper Model at Panama-Pacific Exposition

One of the exhibits of unusual interest at the Panama-Pacific Exposition, which opened in San Francisco on February 20, is a model of the 40-story pyramid-crowned steel and granite building of the Bankers' Trust Company of New York City. The model is about 40 ft. high and is an exact reproduction of the exterior of the building which towers 540 ft. above the street level. One of the architectural features of this building is its granite roof in the form of a stepped pyramid 94 ft. high.

The model was prepared under the direct supervision of Trowbridge & Livingston, the architects who designed the building. The model, divided into forty sections, was made into huge packages for shipment and forwarded across the continent by express freight. Upon reaching its destination it was assembled and erected in the Social Economy Building of the Exposition.

Competent opinion is that a considerable proportion of the building activity of the current year in New York City will be concentrated on Fifth avenue, Broadway and Park avenue. If building on the side streets were as active as it is on the important avenues contractors feel that there would be little ground for complaint.

Working Details of a Sewing Cabinet

Mill Bill and Instructions Which Will Be Found Convenient for the Mechanic Clever with His Tools

By Ralph F. Windoes*

WHAT to do with the sewing material that overflows from the machine drawers, is a question asked by every woman. In answer a number of sewing cabinets have been designed and offered by the trade. But all have their limitations, and the limit, generally, has fallen short of the overflow. As another solution, and one that has the capacity to take care of all of this material, the sewing cabinet illustrated on the facing page was designed.

The complete working drawing, mill bill, and instructions will make it easy for any man with ordinary tool-using ability to produce one during these long winter evenings, in his own home workshop. There is not a difficult mortise and tenon joint in the piece, in fact, the only joints are in the drawers, and these are very simple.

Order the lumber exactly as given in the bill, planed and sanded to these dimensions. Quarter-sawed oak will make a most attractive piece, but plain-sawed, or even chestnut, will work up well.

Instructions for Building

Pieces No. 1 are for the legs. They are planed to a taper at the bottom and given a slight round chamfer at the top. The three inner sections and the top, pieces Nos. 2 and 3, are next worked into shape. A piece 1¼ x 1½ in. is cut from each corner into which the legs fit. The latter are held in place by means of 3-in., 9's flat head screws, put in from the outside. The distance between the sections is shown in the side elevation. Pieces No. 13 are screwed on the top of each inner section, to make slides for the drawers. It may save confusion if these are screwed on before the legs are fastened. The 1½-in. piece, No. 8, is screwed into the bottom section. The back, No. 4, is held in place by screws fastened into these sections. This completes the framework of center.

The side pockets are built up, glued, blind-nailed, and clamped. They are fastened to the center by means of screws. The tops are hinged with one pair each of ¾ x 2½-in. brass butts.

The top drawer is detailed, and the other two drawers have the same construction with the inner partitions left out. Piece No. 5 is the top drawer front, and piece No. 14—pine, 9 ft. long—is to be cut up for the sides, end, and partitions. These drawers should have square oak knobs, which can be purchased at most hardware stores.

Be sure that you understand these instructions and the working drawing before touching the wood, as an exact idea of what you are going to do before you begin may save trouble afterwards.

*Instructor in Cabinet Making at the Davenport High School.

The finish for such a piece should match the machine by which it is to stand. If the latter is golden oak, and most of them are, the finish should be applied as follows:

Golden Oak Finish

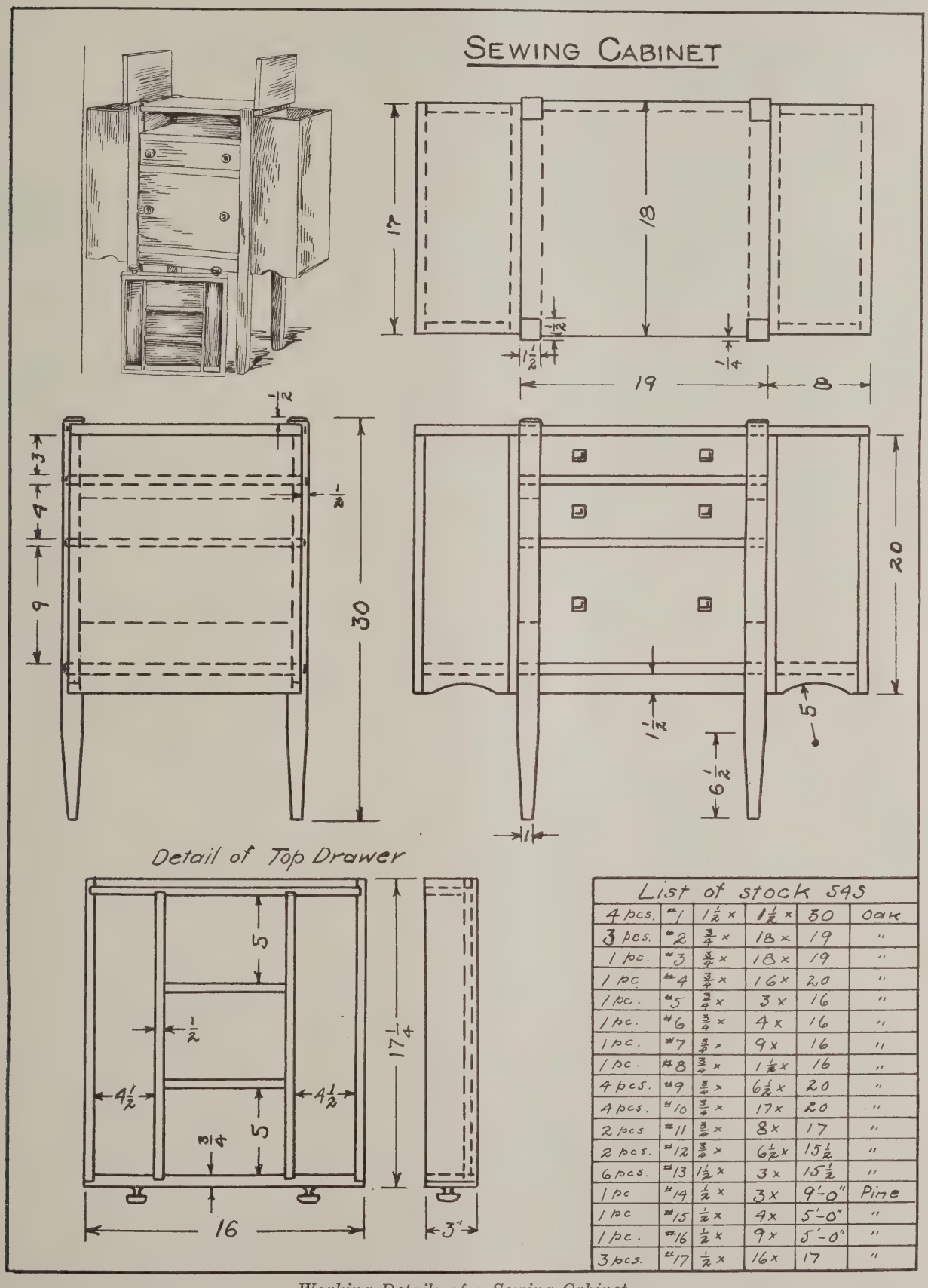
Secure a little asphaltum varnish and thin it out with turpentine or naptha until it is as thin as water and makes a yellowish stain. Apply it to the wood, and rub off with waste. The grain of the wood is open, so it will be necessary to "fill" it. Secure about one pound of "golden oak paste filler," or the "natural filler" darkened with burnt umber and drop black. Thin with turpentine, apply to the wood with the grain, and after 20 to 30 minutes rub off across the grain with waste or burlap. When this has had about 24 hours in which to set, varnish it with a good grade of "copal" furniture varnish. Apply the varnish with a bristle brush—plenty of it—so that it may even drip off the work. Then wipe off with the brush from which the extra varnish has been removed on the edge of the dish. Set it to dry in a dustless, warm, dry place for 24 hours. Repeat about four times. Between applications, wait about a week,, so that it will be absolutely dry and hard. When the last coat has thoroughly set, rub with a felt pad, powdered pumice-stone and water until the surface is smooth, unpitted and even, being very careful of the edges. Wipe it clean with a wet sponge and chamois skin, which will give a dull, "egg-shell' finish. For a polish, rub with a rotary motion, using a mixture of ½ sweet oil, and ½ alcohol.

If the craftsman experiences any trouble in the building of the piece or securing proper materials and supplies, the author of this article will be glad to answer, through the correspondence columns of this paper, any questions that may be asked.

First Lessons in Concrete Work

Under the above title there has just been issued from the press a little work which contains much practical information in regard to small concrete jobs. The author, Harold E. Smith, has written it especially for the use of the wide-awake and progressive builder, the carpenter-contractor and, in fact, for every man or concern who is just starting in the concrete business, or whose concrete work involves the use of small scattered amounts of concrete. It is in no sense intended for the big contractor. Within its covers are specific directions covering the construction of footings, small foundations, floors, walls, sidewalks, and other light concrete jobs. There are also valuable tables covering

methods of mixing concrete, the various ingredients to be used and the proportions of the mixtures. In addition will be found considerable data covering the cost of construction, a feature which cannot fail to be appreciated by the concrete worker at the present day, when this material is being so extensively used in all sorts of building work. The book is profusely illustrated in a way to render perfectly clear the features described in the text. Cold weather concreting and how concrete may be rendered water-tight are features of special interest, more especially the latter, when trouble from damp cellars is constantly arising. The little work is being sent out by the T. L. Smith Company, 3120AA Hadley street, Milwaukee, Wis., and we understand that anyone can secure a copy on application.



Working Details of a Sewing Cabinet

Cost of a Damp-Proof Timber Floor

Some Figures Which Will Be Found of Unusual Interest to the Architect, the Builder and the Engineer

ONE of the problems which often confronts the building contractor is to so construct the basement of a building as to render it impervious to moisture from the outside, and especially in the case of buildings used for industrial purposes does the problem frequently present perplexing aspects. While it is true that water under any considerable pressure may not be encountered it is essential that protection against dampness be provided. This of course applies largely to basement and ground floors where the practice was formerly to carry the floor on heavy timbers supported by piers, thus providing an air space and more recently by laying the floor directly on a concrete base and spiking the planking to sleepers embedded in the concrete. Neither of these methods, however, prevents decay. The more recent practice is to introduce a damp-proof construction under the wood surface directly on the ground, and if water is present a system of under-drainage is necessary.

Cost of damp-proof floor

Materials and Labor	Thickness of Material in Place	Quantity per Sq. Yd.	Unit Cost	Cost per Sq. Yd.	Per Cent of Waste and Shrinkage	Cost per Sq. Yd.*
Cinders	4 in.	0.151 cu.yd.	$0.50 per cu.yd.	$0.076	36	$0.076
Tar in cinders		0.0381 bbl.	2.00 per bbl. (57 gal.)	0.076		0.076
Sand	1 in.	0.045 cu.yd.	1.00 per cu.yd.	0.045	68	0.045
Tar in sand		0.0276 bbl.	2.00 per bbl. (57 gal.)	0.055		0.055
Felt	2 ply	3.10 lb.	35.00 per ton	0.054	21	
Pitch on felt		3.32 lb.	17.00 per ton	0.028		
Teaming, tar			0.50 per hr.	0.039		0.039
Labor, roofers			0.375 per hr.	0.433		0.358
Supt., roofers			0.50 per hr.	0.100		0.078
Kyanized plank	2½ in.	0.027 M.	33.50 per M.	0.905	00	0.756
Maple top floor	1 1/16 in.	0.0134 M.	45.00 per M.	0.603	40	0.603
Nails		1.2 lb.	2.10 per cwt.	0.027		0.027
Carpenters			0.41 per hr.	0.475		0.475
Labor			1.75 per day	0.230		0.230
Supt.			0.50 per hr.	0.080		0.080
Totals	9 in.			3.226		2.898
			Materials	1.869		1.638
			Labor	1.357		1.260

*Cost omitting felt, pitch on felt, labor placing felt and pitch and using untreated Hemlock plank at $28.00 per M.

Where the ground has sufficient natural drainage and no tile is required the foundation course is laid directly on the ground, says J. A. Holmes in *Engineering News*. On this foundation is spread a layer of tarred sand in which planks are bedded by ramming and on which the hardwood wearing surface is laid and nailed. A damp-proof floor of this kind was recently built on which a careful record of cost was kept. The floor was laid in the basement of a manufacturing building on the natural earth, hardpan and sand, without under-drains. The ground was prepared by the contractor for the building by rolling or puddling, therefore the costs given in the accompanying table are for materials and labor above the ground.

The soft-coal cinders used for the foundation course were purchased from the railroad and delivered in cars on a siding from which they were shoveled directly into the basement where used. Materials were delivered and the work performed in the winter, so that storage in the basement obviated the necessity of heating the cinders when mixed with the tar. Tar was purchased from the local gas works and 14 gal. used per cu. yd. of cinders.

Placing of the Mixture

The cinders were spread, rolled and tamped to a thickness of 4 in.; the shrinkage from measurement in cars to place being 36 per cent. Sand and tar were heated outside the building and mixed in the basement. This mixture, while warm, was spread over the cinders and screeded off ⅜-in. above the bottom of the plank; planks being laid to grade for screeding. Into the sand while still warm, the 3-in. planks were firmly bedded by ramming.

For specially prepared tars, 50 to 60 gal. per yd. of sand are specified. On this work the greatest amount of tar that the sand could be made to contain, without making a soft, wet mixture, was 35 gal. per cu. yd., the same kind of tar being used in both cinders and sand.

The plank was 3-in. kyanized hemlock, planed one side to a uniform thickness of 2¾ in. and not less than 6 in. wide, random lengths, square edged and saw butted; laid to break joints and toe nailed but not driven tightly together. There was no loss of plank by cutting.

Over the plank were placed two layers of felt and one of pitch. The felt weighed 14 lb. per 100 sq. ft. and was laid to break joints one-half the width of the sheet; no pitch was allowed to come in contact with either plank or top floor. The loss in area of felt due to lapping was 21 per cent.

Over the felt and at right angles to the plank was laid a maple-top floor 1 1/16-in. thick.

The waste and shrinkage due partly to laying, but mostly to manufacture, was 40 per cent.; in other words, while the market price of the flooring was $45 per M., the shrinkage in manufacturing that must be paid for, plus a small loss by waste in laying, brought the cost up to $63 per M.

Classes of Labor Utilized

In this work, two distinct classes of labor or trades were employed, roofers in this case and carpenters, and though they worked together, their organizations were separate. For this reason, the combined items for superintendence is high and that for superintendence of roofers unnecessarily so. Reducing the item for superintendence of roofers and using untreated plank and leaving out the felt and pitch between plank and top floor, the cost would be reduced as shown in the last column of the table presented herewith.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

IN Fig. 44 two beam sections are shown with the axes at right angles and the respective moments of inertia and section moduli are also given. The moment of resistance depends upon the square of the depth so that for two rectangular beams of homogeneous material, having the same breadth, the beam having a depth twice as great as that of the other beam, has a resisting moment four times as great. It will also be much stiffer so there will be less deflection with a deep beam. The most economical beam, considering stiffness and strength, with a rectangular cross-section has a breadth between two-thirds and three-fourths the depth.

A beam of I-section is possible in steel and iron because of the strength of these materials. The

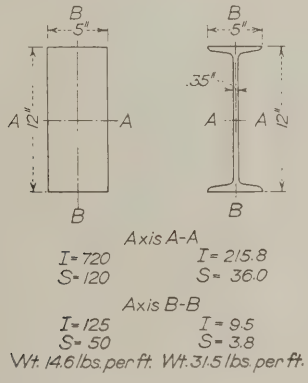


Fig. 44—Comparison of Moments of Inertia and Section Moduli in a Rectangular Beam and in an I-Beam

material is so disposed that practically all the metal highly stressed is concentrated in the flanges, the web transmitting the stresses and taking care of shear. When a beam of I-section is required having a depth greater than can be properly rolled, one is made of a plate having angles riveted along the edges, this being known as a plate girder. When a still deeper girder is required a latticed girder is used, this being known as a truss.

Wooden beams are made only in solid form, rectangular or round, for wood is composed of distinct fibers, many of which will be completely detached from the main fibers in shaping the section to provide broad flanges. Steel and iron will transmit stresses equally well in all directions, so while in the filleted section connecting the flange to the web there is some concentration of stresses, this has been taken care of in designing the beam. In all solid and rolled shapes the maximum fiber stress is the skin stress. In built-up sections, such as plate or latticed girders, the maximum fiber stress is assumed to cover the flange member and the whole action is on the line passing through the neutral axis. The stress is transmitted from the web, or the web members, to the flange through rivets, which must be properly proportioned in size and properly spaced to take care of the shear.

Shearing Resistance

A beam may be strong enough to carry the load without a bending failure which will crush the fibers at the top or pull them apart at the bottom, yet it may fail in shear. The direct shearing stress at any section on a beam is found by dividing the shear at the section by the area of the beam at the section. The direct shear, however, is seldom operative, this action being best represented by a punch making holes in a plate or by a large shear cutting a plate. The shearing stress which breaks a beam is diagonal tension resulting from the combined action of the horizontal and vertical shearing stresses.

The direct vertical end shear is equal to the maximum reaction. The horizontal shear is equal in amount and acts along the neutral plane where the fiber stress in bending changes from tension to compression, the stress being in reality a sliding of the fibers where they have no bending stress. The diagonal tension is the component of these two actions. Referring again to the statement that the area of the shear diagram between any section and the reaction multiplied by the length of this part of the beam equals the bending moment at the section, the diagonal shear at any section amounts to

$$s = \frac{V}{jd} = \frac{M_1 - M_2}{jd}$$

in which s = unit shear in pounds per square inch.
V = shear at the section in pounds.
M_1 = moment in inch-pounds at left of section.
M_2 = moment in inch-pounds at right of section.
jd = moment arm in inches.

The allowable shearing stress in steel is 10,000 lb. per square inch. After obtaining the size of beam to carry a certain load divide the maximum reaction by the web thickness multiplied by the depth of the beam. This will give the shearing stress in pounds per square inch. If it exceeds 10,000 lb. a

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 28 of the March issue.

larger beam is required. In the steel handbooks the total amount of shear for which a beam is safe is given in the tables of "Properties of Sections." For example, in taking out from the tables a beam of sufficient size to carry the load the total amount of shear the beam is good for should be equal to or exceed the maximum reaction. Thin webs act like long slender columns and may fail by crippling. The crippling strength of the beams is also given in the tables and this should be equal to or exceed the maximum reaction.

Shear in Wooden Beams

In wooden beams the dangerous shear acts along the neutral plane and the beam may split, thus by shearing action being converted into two shallow beams, which will then break by bending, for the upper half must carry the whole load and the lower half carries the whole load when the upper half is destroyed. The strength in shear of wooden beams should be tested by the following formula. If the distributed load found by this formula is smaller than that found by the bending formula, increase the size of the beam.

$$W = \frac{4bhs}{3}$$

in which W = the load the beam will carry without failing in shear.
b = breadth in inches.
h = hight in inches.
s = shearing stress per square inch, usually one-tenth the maximum fiber stress in bending.

Modulus of Rupture

The modulus of rupture is a measure which represents a combination of all the forces that tend to break a beam; *i. e.*, the combined action of tension, compression, shear and crippling. The modulus of rupture was formerly used in textbooks almost exclusively. To-day it is used only for materials in which it is difficult to separate the different stresses, as, for example, clay, stone and concrete. The modulus of rupture is not used in computations for beams of wood, steel, iron and reinforced concrete. For such materials one sees to-day the moment factor, or, properly speaking, the unit moment of resistance, sometimes designated by K and sometimes by R.

The unit moment of resistance is a number which contains all the known quantities in an expression, leaving only the unknowns to be found. For example, the moment of resistance of a wooden beam in which we can use a maximum fiber stress of 1,200 lb. per square inch is

$$M_r = \frac{1200\ bh^2}{6}$$

and by dividing the fiber stress by 6 the unit moment of resistance equals 200, from which we get

$$M_r = 200\ bh^2 = Rbh^2$$

Some men use R for wooden beams, but where the divisor is so small the only advantage is some slight simplification of the work, provided a table of values of R has been previously computed for the woods used. In reinforced-concrete work a number of factors enter into the formula for the resisting moment and the use of a table, or of a diagram which is really a graphical table, for all possible values of R is almost indispensable for the designer. Where a number of factors enter into a computation it is easy to forget to use some.

Deflection

The amount of deflection when a beam is loaded is measured on the bottom or top of the beam for convenience. The difference in elevation between the end of the beam and the middle is the deflection. The deflection actually used in computations is the deflection at the neutral axis, but the deflection measured on the bottom or top, which for obvious reasons is more readily obtained than the deflection of the neutral plane, is close enough for all practical purposes.

Deflection in beams and girders used in buildings is important only when the lower side carries a plastered ceiling. The deflection is limited to a maximum of one-three-hundred-and-sixtieth of the span to prevent cracks in the plaster. For beams and trusses under moving loads the deflection must be limited to an amount which will not set up dangerous vibrations, but with this the ordinary structural designer seldom has to deal, it being part of the work involved in the design of bridges. Deflection also affects appearance so a camber is given to trusses to hide deflection.

A beam may be amply strong so it will not fail by bending, shearing or crippling, and yet the deflection may be so great that it will not be suitable for use in the proposed location. The amount of deflection must then be found and if it exceeds the allowable deflection a deeper beam must be substituted. When using steel beams it is often possible to secure a deep beam which will weigh less than a beam of less depth of practically equal strength in bending and shear. For wooden beams experience shows the most economical beam, considering the two factors of strength and stiffness, has a breadth equal to two-thirds or three-fourths the depth.

Deflection Formulas

Deflection formulas as usually presented are formidable in appearance so tables are given in the steel handbooks which enable the deflection in inches to be found by dividing a factor in the table by the depth of the rolled section in inches.

Similar information for wooden beams was not so readily obtainable until in 1913 the Yellow Pine Manufacturers' Association issued a book entitled "A Manual of Standard Wood Construction," following the lines laid down previously by the steel manufacturers in their handbooks. Copies of this book may be obtained from the secretary of the above association in St. Louis, Mo.

(To be continued)

Tool-Chest Dialogue

"It is 'plane' that I love you," he began.
"Is that on the 'level'?" she asked.
"Haven't I always been on the 'square' with you?"
"But you have many 'vices,'" she remonstrated.
"Not a 'bit' of it," he asserted.
"What made you 'brace' up?" she queried coquettishly.
"The fact that I 'saw' you," he replied, with a bow.
"I ought to 'hammer' you for that," she answered saucily.
"Come and sit by me on the 'bench,'" he urged.
"Suppose the other should 'file' in?" she murmured. "You shouldn't let your arms 'compass' me."
"I know a preacher who is a good 'joiner,'" he suggested, and they rushed off for the license.—*Exchange.*

CORRESPONDENCE

A Department Where Those Interested Can Discuss Trade Topics—Every Reader is Invited to Participate

Interesting Features of Dining Room Finish

From John Wavrek, Jr., Fullerton, Pa.—The picture and sheet of details sent herewith relate to the dining room in my house, and although at first glance it may not appear worth while to make it the subject of special mention yet the room contains several features which are somewhat out of the ordinary and brief reference to them may therefore prove interesting to some of the readers of the paper. The dining room as it appears in the picture, Fig. 1, is not as yet in every detail what the owner has planned it should be like. In fact, when fully completed it will in several respects be quite different from what it appears in the picture. It may not be out of place to state that the writer designed and executed the different pieces of furniture which are shown, including the table, chairs, colonnade and nearly everything shown in the picture.

The special features to which I desire to call attention are the gas dome shown depending over the dining room table and the paneled window with art glass in its upper portion shown in the left wall. The trim is of chestnut and it is the scheme of the owner to have the finish of the room and the furniture to harmonize. Therefore, he designed the gas dome for this particular room so that it would be in harmony with the trim.

A gas dome, Fig. 2, constructed mostly of wood presents several difficulties which have to be overcome. Because of the heat thrown by the gas light it is necessary to protect the woodwork so that it will not catch fire and cause trouble. To guard against this danger the canopy marked "brass" in the half section through the center shown in Fig. 3 was obtained from a firm dealing in gas supplies and the wooden pillar was made to fit. The lamp, which is an inverted Welsbach mantel, and the other necessary hardware was obtained from the same concern.

For the purpose of making the work still more fireproof asbestos was placed between the canopy and the pillar so that in case the brass should become quite hot it could do no damage to the

Interesting Features of Dining Room Finish—Fig. 1—Interior View in Home of Mr. Wavrek, Jr.

wood because of the asbestos lining. The inner part of the neck is also covered by asbestos, as shown in detail, Fig. 3.

The ornamental part of the dome, that is, the scroll work, was sawed out by means of a small foot power jig saw by two sons of the writer, aged respectively 13 and 14 years, and the work is regarded as highly creditable to their individual skill. The woodwork is of dark finish and the art glass is green relieved with a yellowish hue, the whole presenting a pleasing effect.

The cornice at the ceiling is made up of the same style and size as the colonnade cornice, it being the scheme of the owner to have a beamed ceiling at some future time, and it is therefore obvious that the members of these two cornices should be alike so that the beams will member with both. The detailed drawings presented herewith will aid in understanding the construction of the gas dome and the work can readily be done by any carpenter clever in the use of his tools.

The other feature mentioned is the paneled window shown in Fig. 4. Owing to certain circumstances this window was of very little service and rather than tear it out it was decided to panel up the lower sash inside and outside and place art glass in the upper sash—which really is the lower one but slid up into the raised position shown. The other sash can be lowered between the two panels or may be used as a storm sash in winter.

The owner proposed to place a buffet and china closet on either side of this window and a set of drawers directly under the panel, the top of the drawers to serve as a seat. In Fig. 4 is shown how the paneled scheme is worked out.

Proper Proportions of a Flag Pole

From O. K., Wapinitta, Ore.—I have been watching the Correspondence Department to see if anyone would reply to the query of "W. R." regarding the proper proportions of a flag pole which appeared in the issue of the paper for October last. So far as I can recall no one has replied, so I will start the ball rolling and then perhaps some others will comment on my mistakes and in that way "W. R." will obtain the information he desires.

My boss used to tell me to discard set rules and learn to apply principles, so I think that is what we will have to do in the present case, for the same ratio would not apply on a country schoolhouse as on a city skyscraper. If I were "W. R." I would take the length of the flag pole that I have, lay it off to scale and then with that same scale determine the size of the flag I would use, as I think the proportioning is merely a matter of taste.

The standard width of the United States flag is 10/19 of its length and the regulation flag for a schoolhouse is 8 ft. long.

The rule for determining the size of a flag pole from 30 to 60 ft. in hight is that its diameter at the roof shall be 1/50 its hight above the roof, and that the top shall be ½ the lower diameter.

To profile the pole divide its length into quarters, making the lower or first quarter 15/16 the diameter of the base; the middle ⅞; the third quarter ¾ and the top ½.

Perhaps what I have said may help "W. R." to some extent provided he has not erected that flag pole long ago. In this connection it may be inter-

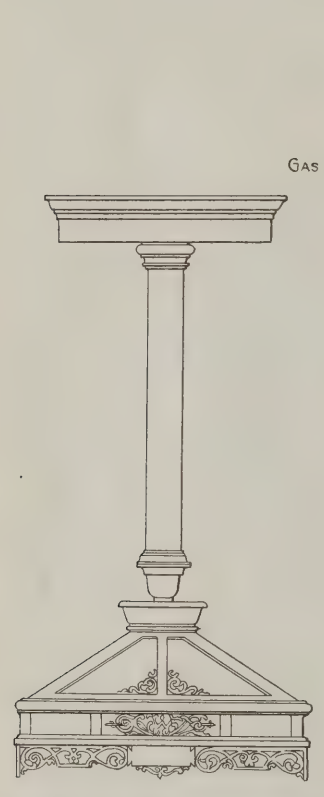


Fig. 2—Elevation of Gas Dome for Inverted Light

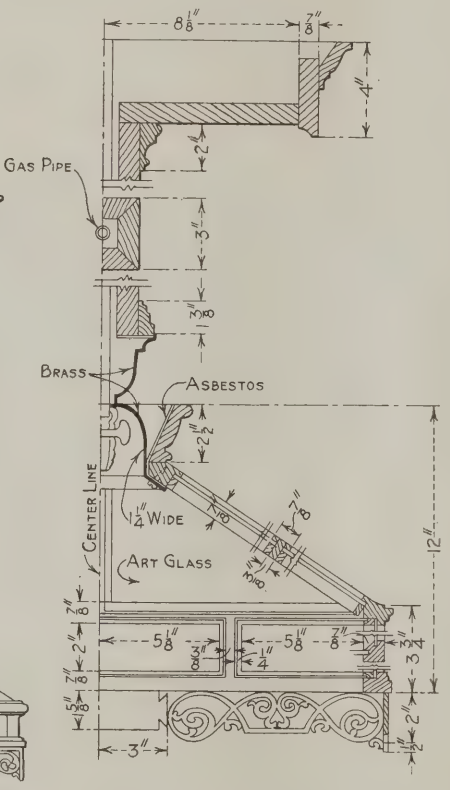


Fig. 3—Half Section Through Center

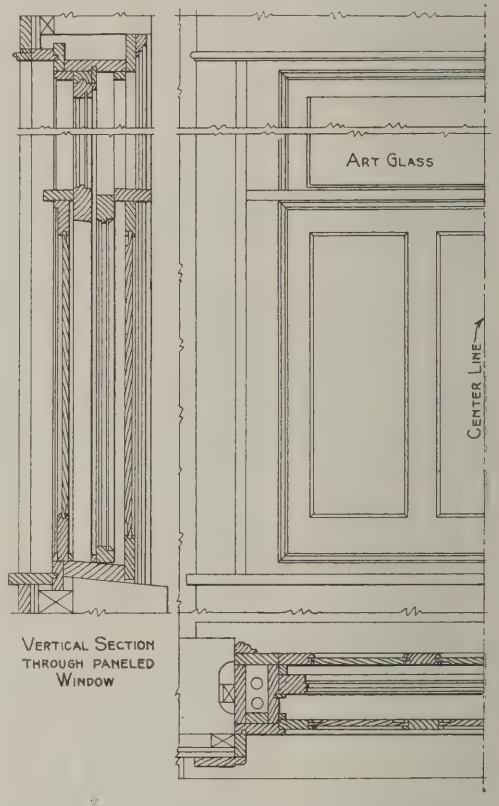


Fig. 4—Partial Plan and Elevation of Paneled Window

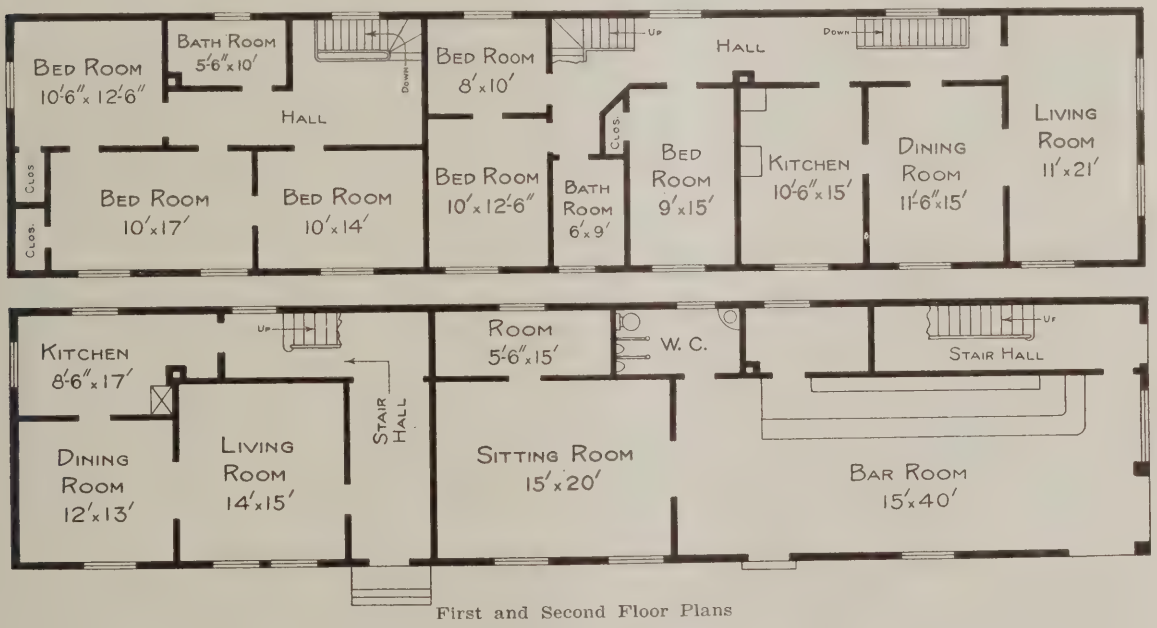
Interesting Features of Dining Room Finish—Some Details of Construction

esting to state that the Oregon flag pole at the Panama-Pacific International Exposition at San Francisco is 232 ft. high and carries a 48 ft. flag. At the moment I cannot recall its diameter.

Design for a Two-Story Frame Building

From D. N., New York City.—I am sending herewith elevation of floor plans for a two-story frame building such as I understand "F. A.", Brooklyn, N. Y., requested in the February issue of the paper. He stated that the building was for a corner lot 25 x 100 ft. in size, and that he was obliged to keep 3 ft. away from both side lines. He wanted a bar-room to face the front on the first floor and living rooms on the second floor. The manner in which I have solved his problem is clearly illustrated in the sketches. I have, as requested, placed the bar-room on the front and the sitting room adjoining so that anyone entering the bar-room can easily look into the sitting room.

Front and End Elevations of a Two-Story Frame Building as Requested by "F. A.," of Brooklyn, N. Y., in a recent issue



First and Second Floor Plans

Design for a Two-Story Frame Building as Contributed by "D. N.," of New York City

Some Questions in Concrete Construction

From Builder, Redford, N. Y.—If "G. S. B.", Lewiston, Idaho, whose query appeared in the March issue of the paper, can obtain quarry or field stone he can make his basement wall faster and cheaper than of concrete alone. The stone should be well bedded in the concrete, thus forming a sort of rubble concrete or cyclopean masonry. The basement wall should be more than 10 in. thick; in fact, it should be thick enough to carry bond timber for the joists. This would leave 8 or 10 in. inside the blocks.

The difference in the color of the blocks and the stucco will prove to be an advantage rather than otherwise.

If lumber is reasonably cheap in his section the best plan will be to set up a balloon frame with 2 x 2 in. studs and board this outside with roof lumber; then build the concrete wall against it as a "form," anchoring to the concrete with wire knotted in it. This inside frame should be left there and plaster applied. Plastering on the bare concrete is not good building practice in cold or damp climates. The stucco should contain 5 per cent. to 10 per cent. of Maltha, which is a Standard oil product but which can probably be obtained from almost any paint store. Set up the studs outside, bracing them, and anchoring to the inside studs will serve for "form" supports. The best manner of providing the center air space is to use old tin cans 2½ to 3 in. in diameter. Set them on end an inch or less apart and simply bury them there. In fact, to leave a 2 in. air space

with "forms" will worry time and patience as will nothing else. Old stove pipe flattened out to 2 in. will also serve a good purpose. For such work as this or beam filling nothing is so satisfactory as the tin cans. No time is lost and the concrete can be worked around them with a stick and a boy can place them between batches.

Polishing Plate Glass

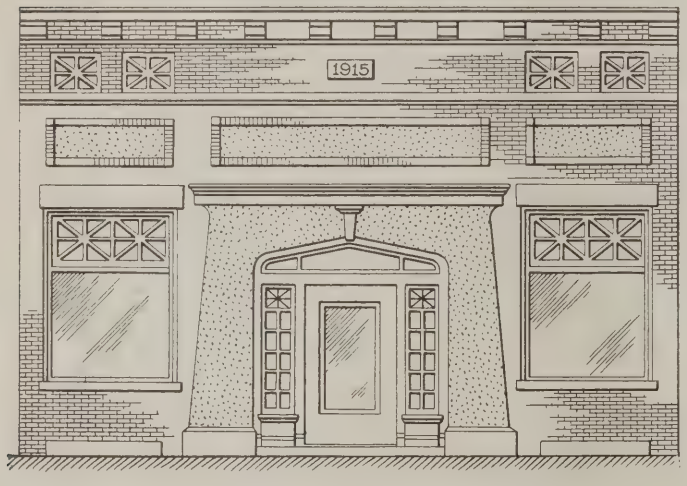
From G. W. N., Toledo, Iowa.—I would like very much indeed to have some of the practical readers of the paper tell me in detail the best way to polish plate glass.

Flat Brick Arch Construction

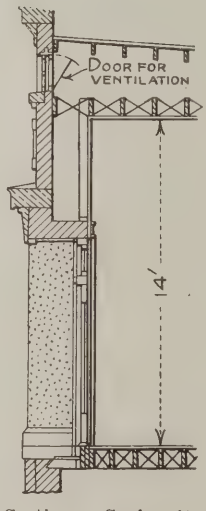
From P. N. R., Prescott, Ont.—I would take it as a favor if some of the practical readers of the Correspondence Department would tell me how flat brick arches connecting piers at the roof of a veranda and forming battlements are held in place. I presume that T-iron is used, but a man in this place last summer made use of 2-inch plank and painted them red. This he did on a $5000 house. What do the readers think of it?

Front Elevation for Small Bank Building

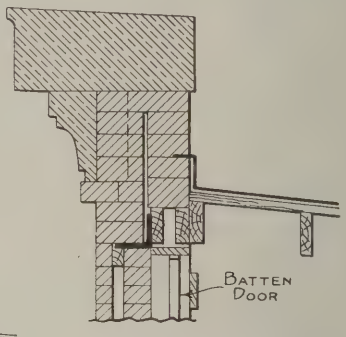
From J. A. R., El Paso, Ill.—I am enclosing drawings of a front elevation for a small bank building which I trust may prove of interest to "A, B.," Marthasville, Mo. There are also a few details which indicate the construction.



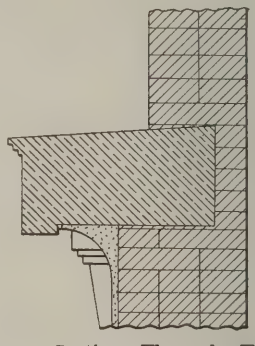
Front Elevation—Scale ⅛ In. to the Foot



Section — Scale ⅛ In. to the Foot



Section Through Cornice—Scale 1/16 In. to the Foot



Section Through Entrance Arch — Scale 1/16 In. to the Foot

Front Elevation for a Small Bank Building—Sketches Submitted by "J. A. R.," El Paso, Illinois

The Leaky Chimney Problem

From W. K., Highland Park, Ill.—In reply to the inquiry of "W. A. W.," Danvers, Mass., in the February issue of the paper it is my opinion that the apparent leakage is caused by condensation of moisture produced by the warm air coming in contact with a cold surface. The air during a rain storm is heavily charged with moisture and a well constructed chimney of hard materials is a good conductor of heat and cold. A tight damper to keep the warm air of the room out of the chimney will probaly remedy this trouble. It is true that a poorly built chimney, being a poor conductor of heat and cold, will not do this. In my opinion there should be an ash drop from all fireplaces to the ash pit in the basement and the hearth be slightly pitched toward this drop.

From C. R. H., Columbus, O.—In deply to the difficulty described by "W. A. W.," Danvers, Mass., in the February issue of *The Building Age* I am inclined to think that the trouble occurs at the reducer or off-set in the chimney, and at the point where it joins the brick wall of the house. This wall is exposed to a northeast storm and probably receives a good share of the blunt of the northeasterly wind.

Rendering a Cellar Water Tight

From C. H. H., Waldwick, N. J.—Some time ago we moved into a house where the water came up through the cement cellar floor and in order to remedy the difficulty I have thought of covering the floor with tar paper and then placing over it a coat of about 1 in. of neat cement. It is, however, inconvenient to find anyone who has a large tar pot so that I can tar the present floor before laying the tar paper. Can the readers suggest any other binder?

After I bind the tar paper to the walls would the cement stick to it when the cement is just thick enough to hide the tar paper?

How much material will be required to cover a cellar floor 24 x 26 ft. in area with a 5 x 15 ft. off-set, and extending up the side walls for a distance of about 5 ft. above the floor level.

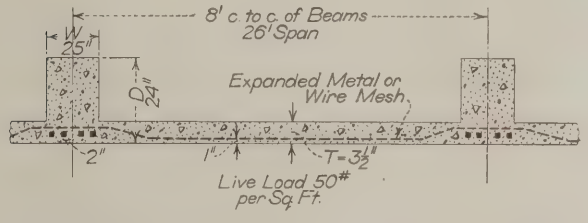
Figuring Strength of Concrete Roof Slab

From C. H. B., Schenectady, N. Y.—I am enclosing sketch of a reinforced concrete roof with the slab supported at the bottom of the beams and would like to know how the beam and slab as well as the steel reinforcement are figured. If it is possible to give a sketch showing this and how the steel reinforcement should be placed I shall appreciate it very much.

I have been a reader of *The Building Age* for the past five years and have obtained from its columns many good pointers.

Answer—The above inquiry was submitted to Ernest McCullough, who furnishes the following comments in reply and who has inserted in the correspondent's original sketch certain dimensions as well as the position of the reinforcing material.

From tables and diagrams in the office an approximate thickness of 3½ ins. is selected for the slab. The weight of this, if the concrete with steel weighs 150 lbs. per cu. ft., is 44 lbs per sq. ft. Adding 6 lbs. for roofing and 50 lbs. for live load, the total load per sq. ft. = 100 lbs. The end span must be computed first, as the slab is resting freely on the wall at one end and fastened securely to the beam at the other end. For this condition the bending moment = $wL^2 \div 10$, which gives the result in foot pounds. Multiplying by 12 the bending moment in inch pounds = $1.2 \times 100 \times 8 \times 8 = 7680$ inch pounds.



Figuring Strength of Concrete Roof Slab

Nothing was said about the fiber stresses to be used in the materials. Assuming a tensile stress of 16,000 lbs. per sq. in. in the steel and a compressive stress of 650 lbs. per sq. in. in the concrete with a ratio of deformation = 15, the moment factor = 108 and the steel ration = 0.0078. The ratio times 100 is the percentage of steel.

$$d = \sqrt{\frac{M}{Rb}} = \sqrt{\frac{7680}{108 \times 12}} = 2.44 \text{ ins.}$$

to the center of the steel. Adding one inch of covering and 0.06 in. from the center of the steel to the bottom gives a total thickness of 3.5 ins.

Steel area per 12 ins. width = $0.0078 \times 2.44 \times 12 = 0.228$ sq. ins. Use expanded metal or wire mesh having an equal or larger area per foot of width. The mesh should go up within an inch of the top of the slab about 18 ins. from the beam and keep in the top to the same distance the other side, then gradually drop to within an inch of the bottom for the middle of the span. The interior spans are tied at both ends to the beams so the bending moment equals $wL^2 \div 12$. Multiplying by 12 the bending moment = $100 \times 8 \times 8 = 6400$ inch pounds. The depth to the center of the steel = 2.44 ins. and the moment arm (the distance between centers of gravity of tensile and compressive areas) = $\frac{7}{8} \times 2.44 = 2.14$ ins. The steel area = $M \div (jd \times f_s) = 6400 \div (2.14 \times 16000) = 0.187$ sq. ins. of steel. This completes the slab design.

The beams are not continuous so the bending moment is found by the formula, $wL^2 \div 8$, which gives a heavy beam. The slab being attached to the bottom compels the use of a rectangular beam. If the slab were attached at the top the beam could be made in a T section and considerable material saved. Assume a beam 24 ins. square, the thickness of the slab being included in the depth. There must be 2 ins. of concrete under the slab and if we assume bars 1 in. square for reinforcement the depth from the top to the center of the steel will be 21.5 ins. At 150 lbs. per cu. ft. the beam will weigh 600 lbs. per lineal foot. The six feet of slab between the beams will weigh 600 lbs per lineal foot, so the total load on the beam is 1200 lbs. per lineal foot.

The bending moment = $1.5 \times 1200 \times 26 \times 26 =$ 1,220,000 in. lbs.

$$\text{The width} = \frac{1{,}220{,}000}{108 \times 21.5^2} = 24.4 \text{ ins.}$$

This is an increase of less than 2%, so we will let the original assumed width of 24 ins. stand.

$$\text{Steel area} = \frac{1{,}220{,}000}{\frac{7}{8} \times 21.5 \times 16000} = 4.06 \text{ sq. ins.}$$

This also is less than 2% more than 4 ins., so we will use 4 one-inch square bars.

The next thing to determine is the question of shear. Half the total load goes to one support as the reaction. This is also the maximum shear. Dividing this by ⅞ the depth to the center of the steel times the width of the beam the shear is found to be a trifle over 33 lbs. per sq. inch of cross section. This is safe for some cities permit a unit shearing stress of 60 lbs. per sq. in. expressed in terms of diagonal tension, but a general value is 40 lbs. per sq. in. The concrete assumed to be used in this problem is a 1:2:4 mixture with carefully selected materials well mixed.

It is not necessary to bend up any of the steel bars in the beams, but it is advisable to do so in order to help reinforce the web of the beam and take care of cracks near the supports. The quantity of steel computed is at the center of the span. Two outside bars should remain in the bottom the full span length. A third bar can be bent up at an agle of 45 deg. at the quarter span point and the fourth bar can be bent up similarly at the sixth span point. The steel should go to within two inches of the top and then go horizontally to the end of the beam. This then gives two pieces in the top and two in the bottom at the supports with four in the bottom for half the span length in the middle.

Designs of Two-Family Houses

From Congenial Reader, Paterson, N. J.—I have read *The Building Age* for a few years but have not as yet seen any suburban two-story homes for two and four families. Many people prefer to live double than be alone, and I should therefore like to see some designs of the character indicated.

Note:—If our correspondent has files of *The Building Age* as far back as January, 1910, he will discover a number of designs of two-family houses

which have been published. We refer especially to the issues for January and October, 1910, November, 1911, and February, May and July, 1912. The designs in February and May, 1912, were arranged for four families each, and a design of this character will also be found in the issue of the paper for February, 1914.

A few years ago we published a long series of designs for two-family houses submitted in competitions covering this class of building.

Platform Stairway Construction

From Morris Williams, Bronx, N. Y.—Under the above title there appeared in the March issue of *The Building Age* a request from "M. C. G.," San Diego, Cal., in regard to the operation of drawing an easement upon the wall stringer shown in my Figs. 4 and 6 in the January issue. Because the stringer proper is too narrow to contain the easement a short piece is glued upon its upper edge, as shown at *C* in Fig. 1 presented herewith. This piece was not considered in my January sketches for the reason that my purpose there was to show the two different methods in practice for drawing the easements on top and bottom of wall stringers, taking it for granted that intuition was sufficient to safeguard the reader against attempting to draw the easements without having first prepared the necessary material to contain it. Fig. 2 indicates the method of connecting base and stringer when an easement is not required.

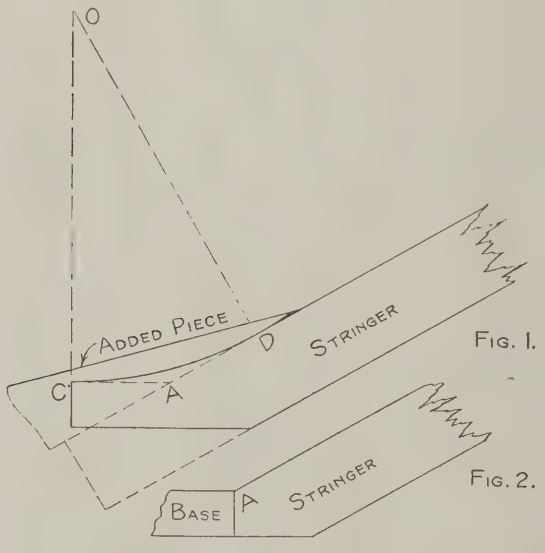


Fig. 1.

Fig. 2.

Regarding the method of bending the cove and carpet strip around the curving end of a step which "M. C. G." desires to have discussed, I present Fig. 3 representing four cross sections of steps and designed to show the varying methods in use for assembling the members that constitute a step. In order to make a good job in turning the cove around the circular end, it must be worked solid, for it is a well established fact that any attempt at bending a cove is doomed to result in miserable failure. A passable job by bending a steamed piece may be done in the case of the carpet strip because it is a quarter-round molding, or rather because it is not a cove. It is the cove of all the moldings that resists attempts at bending, and consequently should be worked out of a solid piece of board of the same thickness as the depth of the cove. It can be worked upon the shaper with very little trouble and if worked with a suitable round plane it takes but a very short time to accomplish it.

The method indicated at *D* in Fig. 3 is undoubtedly the one most to be preferred. The cove according to this method is worked solid all around and is of sufficient width to extend to the back of the riser, so that it may be nailed to it solid, as indicated in the sketch and also in Fig. 4, which gives a partial view of a step and indicates not only the method of fastening the cove at the upper edge of the riser but also all the other operations pertaining to the construction of a complete circular step.

If "M. C. G." is desirous of becoming a thoroughly competent stair builder he cannot do better than send to "*The Building Age* Book Department" for its new book on the subject, which explains every process of operation in the construction of stairways, hand rails, etc.

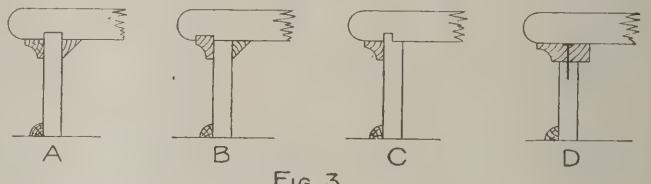


Fig. 3.

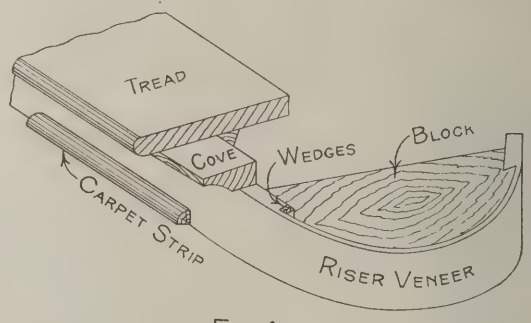


Fig. 4.

Platform Stairway Construction—Sketches Accompanying Comments of Morris Williams

Remodeling an Old Dwelling

From T. B., Va.—I have an old dwelling house that is now covered with weather boards which are too rough and worn to be restored by paint. I do not like the stucco process on wood or metal lath, but would like to cover the sides with something requiring no paint or repairs in the future.

I have thought of two ways of accomplishing the purpose. One is to cover the outside frame with tarred paper first, then use a small slate, say 8 x 7, and about ¼ in. thick, and so put on as to show 8 x 2½ in. to the weather, resembling bricks.

The other way is to use a 4-in. brick wall set about 1 in, away from the wooden frame of the house and tied with metal wall ties nailed to the studs through the old siding.

The slate will be much cheaper, but I would like to have the practical readers advise me as to which is the preferable method under the circumstances. Do they recommend either method, or can they suggest something better?

In case the stucco process is used, is it better to apply the stucco to metal lath or to wooden lath?

Should the Builder "Carry a Stock?"

Some Phases of the Builders' Business Which Are Especially Pertinent for Discussion Just at This Season

By G. D. Crain, Jr.

THERE are two kinds of discounts, one of which is for quantity and the other is for time. The first is earned by the buyer who orders in larger lots than the average, and the second by the man who pays his bills promptly.

The most successful concerns, in nearly all lines, are those which take both of these discounts. Though in some lines an attempt has been made to eliminate the quantity discount on the ground that it makes for price-cutting, and gives the big buyer an unfair advantage, the reduced quotation by virtue of the big order is as old as the hills, and is the real explanation for the dealer's discount. The latter may now be given irrespective of quantity, but it is based on the idea that quantity is necessarily involved.

In discussing the question of how the builder should purchase his materials, therefore, one bumps immediately into the proposition of buying in quantity. Is it good business for him to do so? Can he afford to carry a stock, as it were? Or is it better policy for him to concentrate his attention on the main issue of building, use all his capital for actually carrying forward building operations, and tie up as little of it in material, in advance of actual needs, as possible?

There are two sides to the question, of course, and yet a consideration of the subject suggests that some of the easiest money it is possible to make can be added to the profits account by liberal buying. The thing to remember is that the usual interest rate of 6 per cent. per annum is a good deal less than either of the discounts it is possible to secure in the manner indicated. The quantity buyer, getting a dealer's discount, frequently has an advantage of 25 per cent or more, represented chiefly by the retailer's cost of doing business, and while the builder who puts in a stock of material has to pay the carrying charges, involving interest and handling, as well as the cost of the land on which it is stored, the margin is always sufficiently large to make it worth while.

The discount for prompt payment is much greater than the cost of the money, that is, the interest on the amount at the usual rate, and hence it is worth while to take his reduction even if the money must be borrowed. Aside from the beneficial effect which such a plan has on net profits, the result is always a boost for the credit rating of the concern. Any builder or other business man on whom it is reported that he "discounts his bill" can usually buy up to the limit from anybody he cares to patronize. And a lot of large and important houses, which watch their discounts closely, find that they contribute enough to enable dividends to be paid even in very lean years.

The material which lends itself most readily to stocking is lumber. Cement, lime and some other materials are subject to deterioration in storage, and market quotations vary more than on lumber. While the latter is of course subject to fluctuations, these are not as great as in some other lines. At that, it is not a wise plan to attempt to carry enough lumber to run over a season, as this might involve losses due to the shrinkage of market value.

In most cases where the builder is doing a business of any importance, car-lot buying is the proper system. He can get his stock at so much less that it is well worth his while. As suggested, he will have to possess a place to store this material, and he must remember that he has to pay the cost of handling it and the interest on the money; but these carrying expenses are not prohibitive, and the difference between the quantity price which is secured by buying in large lots and the retail price, which is quoted by the dealer for delivery in wagon-loads, is sufficiently great to justify the outlay.

A successful builder, who is a strong advocate of the quantity method of purchasing, said recently that he would not consider buying in small lots.

"I get most of my stock in car-load lots direct from the manufacturer," he said. "Even if I bought from the retail lumberman, the purchases would be so large that I would be entitled to, and would get, a big reduction in the price. Some builders think that it is the best plan to wait until a job is secured, and then buy the stock for it, having it delivered to the job. This, of course means that no yard room is needed to take care of the lumber, and that no capital is tied up in it; but there the advantage ends, for the builder pays for all these things in the retail price, which has to be figured to take care of these expenses of the dealer, as well as the latter's profit. While this is not excessive, it is nevertheless worth saving, I think, and consequently I buy not for individual jobs, but with

reference to what I may require during the season.

In view of the fact that many if not most builders operate woodworking shops where lumber is cut to size, and where some millwork is manufactured, the purchase of material in quantity is of advantage in that it enables dull periods to be utilized in the manufacture of certain staple stock. Instead of having to lay off his men entirely, the builder can put them in the shop; and then, when business opens up again, he will have a start on the material for the job, and will be ready to push forward at rapid speed.

It goes without saying that it takes more money to do business this way, and that the builder who has a hard time paying for the lumber he buys in small lots would have a much harder time taking care of the carload invoices. On the other hand, however, the man who buys in big lots, and does business on a larger scale, can go to the bank and secure assistance in financing his purchases, especially when he explains to the banker just what will be the result of his policy.

Fear of Debt

Some builders have the idea that it would never do to get in debt for material, or to have a note at the bank hanging over them. The man who never borrows money is doing a very small business. Most of the trade of the world is done on credit, and it is only by making use of one's credit that larger operations can be handled. Of course, there is nothing to be said in favor of making debts just for the sake of making them; but to use the bank for legitimate purposes, for which it was established, is merely to adopt modern business methods. If you can make a profit out of the use of borrowed money, whether it be in the purchase of up-to-date mechanical equipment, material, or whatnot, don't be afraid to go to your banker and tell him so; he will be glad to take your note on such a proposition.

Hardware can be bought in the same way, if the work which the builder is doing is of the moderate-price variety. Of course, on extremely high-grade jobs, a very large range of selections, both as to design and quality, is needed, and this the builder would not be in a position to provide, as a rule. But for the man who is putting up a goodly number of houses, the requirements of which in this direction are rather uniform, it is frequently good policy to lay in a stock of hardware, on which a good discount for such purchases can be secured. The builder quoted above has been such a large buyer that the concern with which he deals gives him the regular wholesale price, so that he is able to reduce the cost of his work considerably.

Advantages of Buying in Quantity

Here is an interesting point to consider. The man who is buying in quantity, and is making a saving in the cost of his material, is in a position to handle a job at less cost, in respect to stock, than his competitors. He can either make the price as low as his reduced expenses will permit, or he can take the extra profit. The latter course is probably to be advised, both because the builder is entitled to the profit for carrying the stock, and performing the function of a dealer, and because he can afford to let his competitors establish the average price for materials used in building jobs, instead of putting the figures fairly below the average.

Another buying kink which is worth investigating is the opportunity to pick up desirable material in old houses which are being destroyed to make way for new buildings. There is a marked tendency at present to stress "Colonial" and other designs which revive ideas that were in use a good many years ago, and mantels, lighting fixtures, balustrades and other materials which would be hard to duplicate, except at great cost, can be gotten out of these old houses and put into use in new ones.

The writer recently saw a very handsome Colonial mantel being installed in a new house. It was explained that, though it looked as if it had just come from the factory, it had merely been scraped and refinished. It gave the interior of this home a touch of the antique that many people find attractive, and cost the builder a nominal amount. Yet it was more satisfactory to use in this particular case than anything else could have been.

Boston's Building Operations

The fiscal year of the Department of Buildings of the city of Boston, Mass., ended on February 1, and, according to figures compiled in the office of Building Commissioner, Patrick O'Hearn, there were 5971 permits issued for buildings of various classes and for alterations, involving an expenditure of $24,796,353. For the previous fiscal year 4480 permits were issued, of which 478 were for buildings of the first and second classes, 1194 for buildings of the third class and 2804 for alterations, involving an outlay of $24,996,900.

About a year ago, by and with the advice of Mayor Curley, amendments to the Building Laws were obtained, among them being one which authorized the Building Commissioner to placard buildings which he had reason to believe were not provided with sufficient means of egress in case of fire, etc.; also the Commissioner was empowered with the written approval of the Mayor to see that such buildings were vacated. The enactment of this law and its rigid enforcement is considered a long step in reducing fire hazard and risks.

Officers of Concrete Institute

At the recent annual meeting of the American Concrete Institute, held in Chicago, the following officers were elected for the ensuing year:

President.....L. C. Wason of Boston
Vice-Presidents,
Wm. K. Hatt of Lafayette, Ind.
Henry C. Turner, of New York.
Treasurer..Robt. W. Lesley of Philadelphia
Secretary..Charles L. Fish of Philadelphia

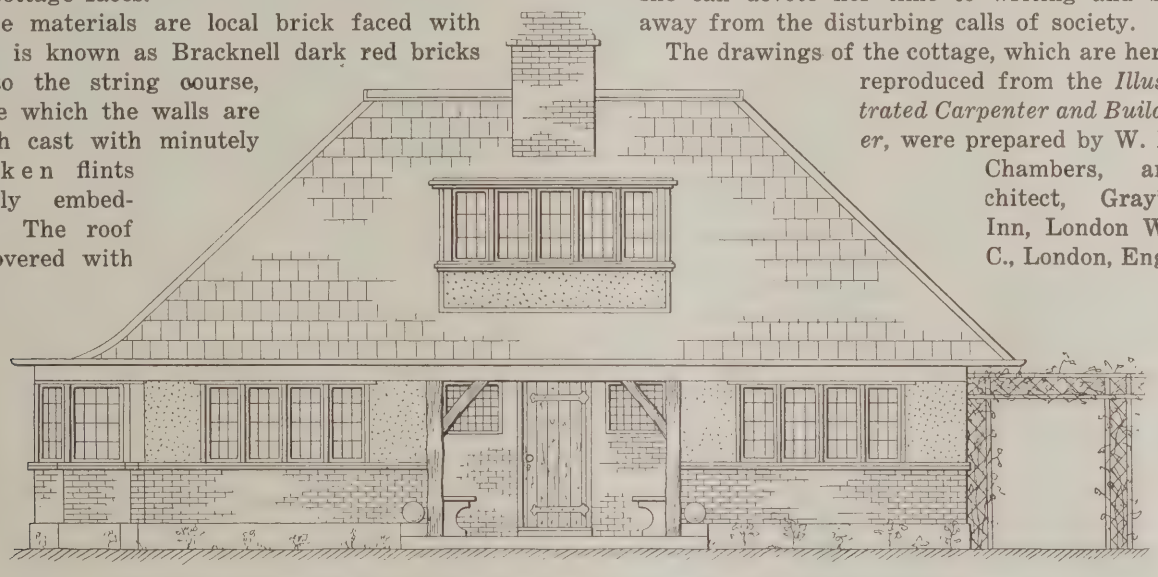
It is interesting to statee that the new president is a consulting concrete engineer and since 1895 has been president of the Aberthaw Construction Company, which has built some of the largest structures with this material in the country. Mr. Wason's organization has made a detailed study of cost-keeping and efficiency along all lines and states that these studies have produced some wonderful results in the execution of construction work.

An Attractive English Cottage

The Architectural Treatment and General Arrangement Such as May Interest Some American Readers

WE take pleasure in presenting to the attention of our readers the front elevation and floor plan of an attractive cottage which has recently been erected near Guildford, in the County of Surrey, England, for a well-known authoress. It stands on the site of a small disused chalk quarry which had been converted into a most delightful garden. The cliffs are at least 20 ft. high on all sides except the south, toward which the cottage faces.

The materials are local brick faced with what is known as Bracknell dark red bricks up to the string course, above which the walls are rough cast with minutely broken flints thickly embedded. The roof is covered with tiles, dark brindle in color, giving pleasing effects.



Front Elevation Showing Exterior Treatment with a Combination of Brick and Stucco Effects

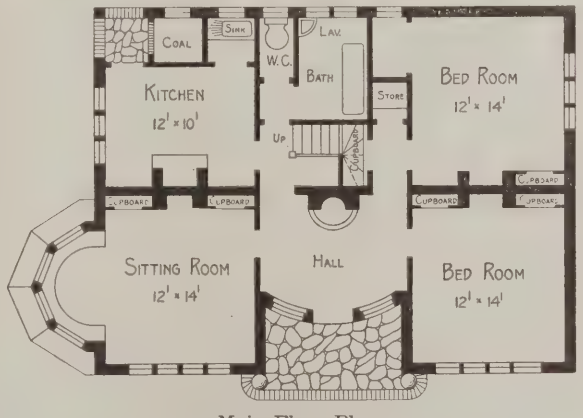
An inspection of the floor plan shows a central recessed entrance with a seat on either side of the front door. Opening from the spacious hall at the left is a sitting room with a large bay window provided with cushioned seat. There is also a large window at the front so that practically two sides of the room are made up of windows. Passing from the hall toward the rear the visitor reaches the main flight of stairs which rise from a point directly opposite the door leading to the kitchen. Beyond the stairs is the bath room and the water closet, the latter being separated from the bath room, an arrangement highly to be commended.

Coming back to the main hall, which by the way is fitted with a circular open fireplace, we find two bedrooms at the right each fitted with commodious cupboards. The bedroom at the rear has an alcove lighted by a window. Near the door of the bedroom is a store room or what in America we would probably designate as a linen closet.

The floor of the hall is of marquetry and that of the sitting room is of oak. The walls of the room instead of being plastered are lined with Beaver board divided into panels by oak moldings. The joists of the upper floor are left exposed and are stained a dark oak in order to match the rest of the trim.

On the second floor there is a large room which is fitted up as a library or lady's writing room and unusual precautions were taken to render this cool in summer by placing asbestos sheeting under the roofing tiles and by other methods. The idea has been to provide a quiet retreat for the authoress where she can devote her time to writing and be away from the disturbing calls of society.

The drawings of the cottage, which are here reproduced from the *Illustrated Carpenter and Builder*, were prepared by W. I. Chambers, architect, Gray's Inn, London W. C., London, Eng.



Main Floor Plan

An Attractive English Cottage

A Market for Mechanics' Tools

According to J. W. Evans, city engineer at Belleville, Ontario, "there is a very large market for fine tools in Canada—small files and tools for carpenters, joiners, cabinetmakers, etc., a large proportion of which have heretofore been imported from Switzerland, Germany and Belgium.

New Goods Seen at the Cement Show

Many Manufacturers Take Advantage of Annual Exposition to Launch New Models in Building Contractors' Equipment

THE thousands of readers of *The Building Age* who were interested in the Cement Show and were not able to attend are presented in the following pages with an exceptional opportunity of learning of the manufacturers' latest inventions and improvements in their respective products. Each apparatus briefly described is accompanied by an illustration in order that the reader my gather an idea of the general constructive and operative features in addition to what is explained in the text. One of the special features which created considerable interest in the show was the guessing contest conducted by the Archer Iron Works, of Chicago. The prize was a No. 1 "Archer Special" concrete mixer, which was given to the contractor, builder, or in fact any one directly engaged in concrete construction work, who guessed the nearest to the number of stones contained in the batch-hopper attached to one of the machines in the company's exhibit. During the last evening of the show the stones were counted by a committee composed of trade paper representatives, the total showing 13,299 stones in the hopper. The nearest guess was 13,313, made by N. G. Rasmussen, 293 Thirty-fourth avenue, Milwaukee, Wis., a member of the firm of Charles Fisher & Son, of that city, makers of cement products and contractors for miscellaneous concrete construction work. The No. 1 "Archer Special" concrete mixer is one of the successful smaller type machines which has been on the market for a number of years. It possesses the distinctive feature of having the engine mounted on top of the mixer frame out of the way of the workmen. The mixer has an end discharge, and is portable. It has a daily capacity of 50 cubic yards of wet concrete.

The New Goods

There was displayed for the first time the new No. 6 portable saw rig, made by the C. H. & E. Manufacturing Co., Milwaukee, Wis., and shown in Fig. 1. It is claimed that each attachment has as much capacity and will do as accurate work as an independent machine, four men being able to work at one time. None of the attachments interferes with the operation of the others, each one having its own clearance. Every device is driven by an endless belt, and when not in operation, is stopped, thus reducing wear to a minimum and saving power. An exclusive feature claimed is the belting arrangement in that the power drives to a pair of tight and loose pulleys on a countershaft, and from the countershaft to the arbor and thence to the other attachments. This provision gives the machine much better pulley proportions and longer belt centers, and a much larger belt surface than where the saw arbor pulley is driven direct from the engine flywheel. By this arrangement, all the attachments can be brought to a standstill by shifting the power belt to the loose pulley without stopping the engine. The equipment has a 4 h.p. water-cooled "C. H. & E." gasoline engine, though an electric motor can be installed if the purchaser desires, direct or alternating current. The frame construction is entirely of structural steel, so assembled that its constant rigidity and durability are assured. The table is built of ¼ in. steel, measuring 42 in. wide and 56 in. long. The band saw has a capacity for lumber 20 in. wide by 8 in. high. The table is 41 in. from the floor, and can be tilted to 45 deg. and locked in position. The jointer has the capacity for 6 in. stock. The tables adjust for depth of cut and for alignment,

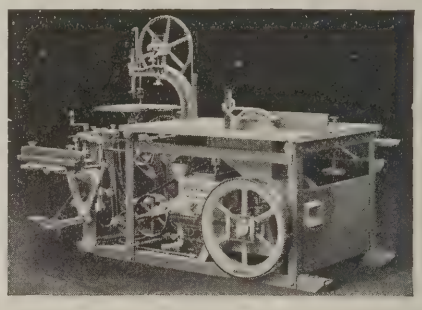


Fig. 1—New Portable Saw Rig

and are arranged for ½ in. rabbetting and fitted with tilting fence. Ripping capacity for 12 and 14 in. saws is 3 and 4 in., respectively, up to 16 in. in width. Boring can be done up to 1½ in. The hollow chisel mortiser can be easily applied and takes square hollow chisels up to ¾ in., cutting perfect mortises of any length and angle desired. The net weight of the equipment is 1450 lbs.

The Norwalk Vault Co., 44 Seminary street, Norwalk, O., whose booth is shown in Fig. 2, entertained the contractors present with details of a new proposition which is calculated to bring in substantial returns for a comparatively small cash investment. Started as a side line, many contractors have developed it to a point where they consider it almost as profitable as their regular business. The company proposes not only to sell the molds for making these concrete vaults, but to form a giant partnership of local manufacturers all

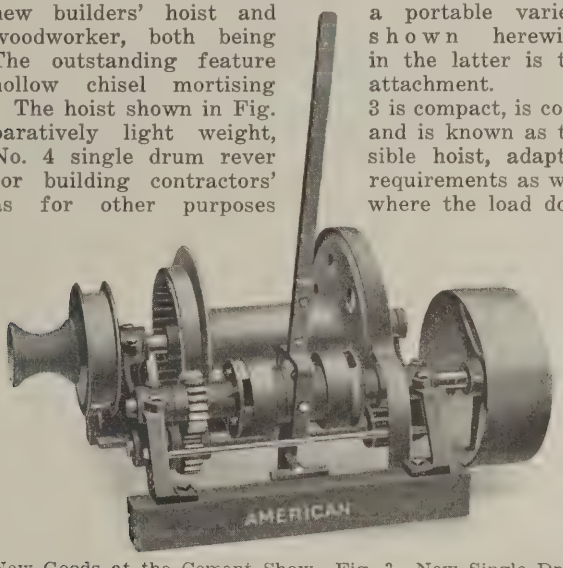
Fig. 2—Exhibit of Norwalk Vault Co.

over the country. In other words, the Norwalk Vault Co. makes arrangements with a building contractor in a certain section of the country to take over the local manufacturing rights. The contractor also forms a partnership with the local undertakers for them to sell the vaults while the contractor manufactures them. The vaults sell for not less than $20, and on each one there is a substantial profit for both the contractor and un-

dertaker. The amount of money to be invested depends on the size of the territory occupied. One man, for example, recently bought the rights for the entire state of Maine, while another started on a royalty basis in a half county in Ohio. The contractor, therefore, has the option of acquiring his territory outright or sharing it with the vault company on a royalty basis. It is said that more than 12,000 vaults are already in use. The vault is a trade-marked product fully protected by patents.

The American Saw Mill Machinery Co., Hackettstown, N. J., considered the show a most propitious time to launch its latest inventions, and accordingly offered a new builders' hoist and woodworker, both being a portable variety shown herewith. The outstanding feature in the latter is the hollow chisel mortising attachment.

The hoist shown in Fig. 3 is compact, is comparatively light weight, and is known as the No. 4 single drum reversible hoist, adapted for building contractors' requirements as well as for other purposes where the load does



New Goods at the Cement Show—Fig. 3—New Single Drum Reversible Builders' Hoist

not exceed 1000 to 1200 lbs. on the direct lift. The drum, sheave, and winch head are reversible, and may be used independently of each other. The winch head is for "snubbing" or quick, short and general utility work. The sheave is for double platform elevator work and the drum is utilized for heavy single line lifting. Forward and reverse motion is obtained through the operating lever which controls the clutches. A powerful band brake is controlled by a tread lever convenient to the operator. A safety ratchet and pawl are provided for holding the load at a desired height, and guards are equipped for all gears. The hoist may be driven by belt from any convenient power or directly connected by gearing or sprocket and chain to a gasoline engine or electric motor. It weighs 475 lbs. and occupies floor space 27 x 42 in. The hoist's capacity is 1000 lbs., 100 ft. per minute. Its drum is 5 in. diameter, capable of holding 500 ft. of ½-in. cable.

The woodworker illustrated in Fig. 4 is a portable compact and rigid machine, with self-contained power.

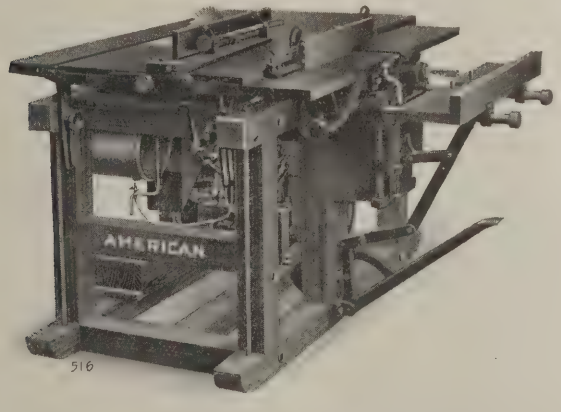


Fig. 4—The "American" Variety Wood Worker

The hollow chisel mortising feature to which special attention is called will work bits from ⅜ to ¾ in., cutting a clean, smooth mortise with square corners accurate to size. The table has a vertical adjustment of 3½ in., and a travel of 4 in. in line with the spindle. A foot treadle has been installed for feeding the work to the bit, and a coil spring operates for return motion. One ⅜-in. bit is furnished with the machine. The equipment also consists of a combined rip and cut-off saw bench, and has boring and jig saw attachments. A 6-in. jointer and dado heads are also provided, and the power equipment, either electric motor or gasoline engine, is mounted in the frame beneath the table and directly connected to the arbor. The top is 54 x 30 in., and is readily raised and lowered without interfering with the jointer table. An adjustable ripping gauge is furnished with a tilting fence for bevel sawing. It opens out 14 in. from the saw and has a rapid, fine adjustment and locking device. The floor space required is 54 in. square, and the total height is 3 ft.

The Ceresit Waterproofing Co., 110 S. Dearborn street, Chicago, displayed a new product in "Ceresitol" which is a transparent liquid to be applied to concrete surfaces with a brush, and is said to effectively waterproof them by entering the pores. It is absolutely colorless, and cannot be classified as a paint as it leaves no film on the surface. Cement mortar, porous natural stone, clay ware and art stone are said to be rendered waterproof by one application. The company also states that it makes an ideal foundation for the application of oil color paints. "Ceresitol" requires no mixing, as it is sent ready for use, one gallon having the capacity to cover from 150 to 200 sq. ft. of surface. The directions state that the surface to which "Ceresitol" is applied must be dry. This product is shipped in 1-, 5- and 10-gallon cans, and half and full barrels, the latter holding 25 and 50 gallons, respectively.

The Yaeger Machine Co., 216 Rich street, Columbus, Ohio, fitted up an exceptionally large booth in which a new 10 ft. mixer and the 4 cu. ft. "Little" mixer were featured. It was stated that the small machine was placed on the market in response to requests made by

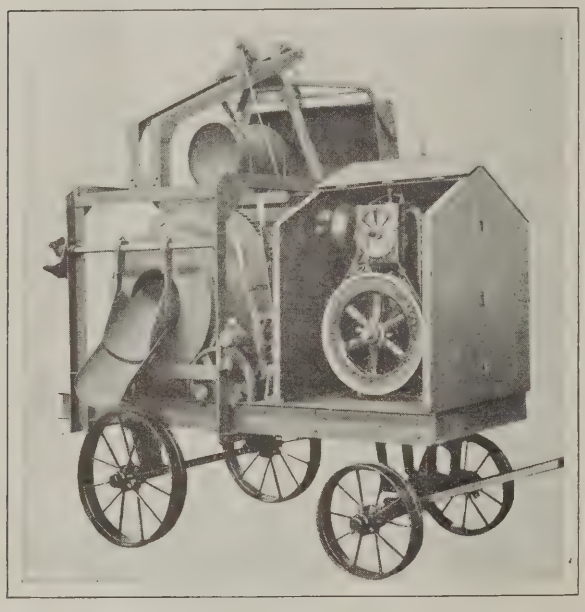
Fig. 5—General View of the Yeager" Concrete Mixer

hundreds of contractors for a mixer of high-grade workmanship, low cost and a capacity of not less than 3 cu. ft. The price of this mixer is very reasonable, and it contains the same design, materials and construction as the rest of the company's line. It is guaranteed to be dependable, and weighs but 1000 lbs. The drum is substantially constructed of semi-steel and steel plate, equipped with plows so arranged that proper mixing is accomplished. The levers at the right of the apparatus control the discharge, and power is supplied by a 1¾ h.p. gasoline engine. The frame and trucks are all-steel construction, the former being rigidly braced for long wear. The mixer is especially adapted for most all kinds of concrete, mortar, plaster work where the contractor does not have great quantities to handle at any one place. It is shown in Fig. 5.

O. G. Mandt, representing the American Machine Co., Keokuk, Ia., entertained booth visitors with a talk on the latest improvement in the "Boss" concrete mixers. Mr. Mandt said that cement, grit and sand,

combined with water, have been one of the worst enemies of a concrete mixer on account of cutting out bearings and rendering continual rebabbitting necessary. He stated that "Boss" mixers have been equipped with "Hyatt" roller bearings, guaranteed to withstand wear and tear. These bearings run in oil, encased in special dust and grit-proof boxes. From exhaustive tests it was found that their installation saved 17 per cent. of the power and 70 per cent. of the oil bill, and had the additional advantage of only one oiling per week. The bearing used is known as the flexible heavy duty type, which absorbs shock, consequently adding life to the mixer. The company has been unusually successful with its 6 ft. "Little Boss" mixer, as it has appealed to building contractors preferring a combination mixer and hoisting engine on their small jobs. It can also be equipped with a batch hopper or low charging barrow hopper with hinged loading platform.

The Eureka Machine Co., Lansing, Mich., displayed the first model of its new No. 5 batch mixer, shown in Fig. 6, a machine completed after three years of study by the company's engineers. It has capacity for 5 cu. ft. of unmixed material, and is operated by a 3½-h.p. "New-Way" motor. Especial attention is called to the



New Goods at the Cement Show—Fig. 6—The New "Eureka" No. 5 Batch Mixer

substantial drum which is built with a series of mixing blades and buckets which insure a uniform mixing and a quick discharge. It has double cones of unequal taper comprising only three parts, the large semi-steel conical head with gear and a slightly smaller rounded head being joined together by a shell of heavy boiler plate steel. It is of the non-tilting type, gear driven. The side loader is the pivoted type, provided with a clutch which is automatically released when the bucket reaches the discharge position. The trucks are all-steel, and the main frame is 83 in. long and 36½ in. wide. The water tank is the positive measuring type, 18 in. long, 14 in. diameter, having a 12-gal. capacity and 100 lbs. working pressure.

The Schaefer Manufacturing Co., Berlin, Wis., showed a light weight portable rig saw which is new to readers of *The Building Age*. It is a combination rip saw, cross cut saw, dado saw, grooving machine, jointer, jig saw, boring machine, sander and emery wheel, and a general view of it is given in Fig. 7. The equipment carries its own power plant, and the entire outfit is guaranteed for a period of two years against defective workmanship and material. The general construction of the equipment insures rigidity, minimum vibration and perfect alignment of gauges. The table top is made in two parts, the main section being built of semi-steel. A wooden extension is hinged to the rear end of the metal half, making the entire top 37 in. wide and 68 in. long. The rear of the extension is fitted with a hardwood roller which takes the weight of long lumber in ripping. The engine is accessible by raising the wooden table. The frame and main bear-

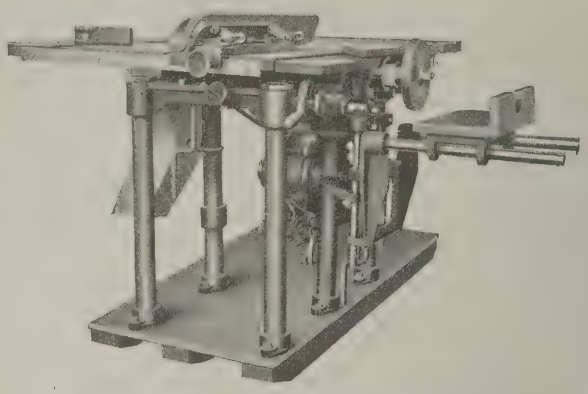
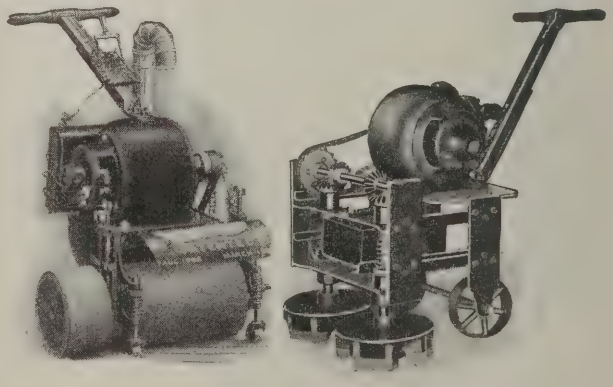


Fig. 7—The "Schaefer" Portable Saw Rig

ings are cast semi-steel, made in one piece. The former is supported by 2-in. extra heavy pipe legs on wood skids. The bearings which are cast integral with the frame are exceptionally large, being 1½ in. diameter and 5 in. long. They are of the self-oiling type, supplied by a reservoir cast into the frame, one oiling per week being sufficient, it is said, except when the machine is new. The left bearing is stepped to take the thrust. The metal is genuine babbit, cast in place, and scraped to a running fit. The pipe legs which support the frame have shoe castings on the lower end which are bolted to the skid.

M. L. Schlueter, 225 West Illinois street, Chicago, Ill., whose products are known to readers of *The Building Age*, interested visitors in his new "Marvel" stone floor surfacer. Mr. Schlueter also told of his recently invented "Baby" wood floor surfacer. Both machines are shown in Figs. 8 and 9 of the cuts. The "Marvel" grinder is constructed for smoothing marble, tile, terrazzo, cement and composition floors of all kinds. It will be seen from the picture that the apparatus is equipped with two discs, fitted with "Carborundum" blocks which revolve in opposite directions at 225 revolutions per minute. They are self-adjustable, and will grind to within one-quarter of an inch. The speed at which they operate insures a quick and efficient job. It is said to be the only flexible, automatic ball-bearing machine on the market. It is light in weight and most substantially constructed, and is guaranteed against defective workmanship and material for one year. The frame is 20 in. square, and is connected and braced with T and angle irons. The weight of the apparatus

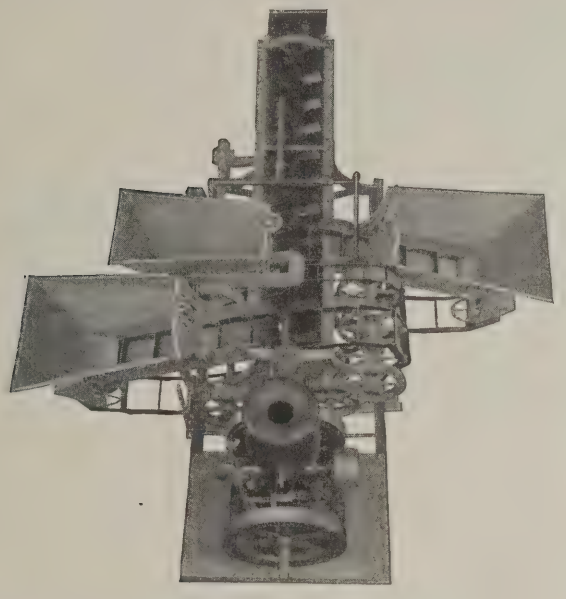


Figs. 8 and 9—Schlueter's Floor Surfacing Machines

is 130 lbs. without the motor or discs. Each disc weighs 20 lbs. The 1, 1½ and 2 h.p. motors weigh 80, 135 and 165 lbs., respectively. The "Baby" wood floor surfacer is a small model of the company's regular line of scrapers. It is built in four sizes, the rollers in each case being 8½ in. diameter, while the lengths vary from 9 to 18 in. Mr. Schlueter called attention to the

fact that he has an excellent exhibit at the Panama-Pacific International Exposition in the Palace of Machinery, Block 31, facing Third street.

The Elite Manufacturing Co., Ashland, Ohio, emphasized a distinctive feature which has been recently



New Goods at the Cement Show—Fig. 10—Top View of the "Elite" Mixer

adopted in connection with its low-down concrete mixers. In Fig. 10 is shown a top view of this machine. This mixer is the company's regular type heretofore manufactured with the exception of having a hopper on either side of the machine so that material can be shoveled in from both sides. The operation is unchanged, but the provision described allows more material to be mixed due to the fact that the workmen are not crowded. This machine is particularly adapted to road and street construction or where a large amount of concrete is being used continuously. The company also exhibited its well known scaffold bracket, the constructive features of which have already been presented in the columns of *The Building Age*.

The National Mixer Co., Fifth street, Oshkosh, Wis., featured its new mixer, shown in side view in Fig. 11, a model having a 5 cu. ft. capacity of unmixed material. The power is supplied by a 4-h.p. "National" engine, and the chain drive which connects with the drum is of the steel pin type. The sprockets are constructed from a special composition semi-steel. The drum is substantially constructed in two parts, and has a diameter of 32 in. and a width of 34 in. The interior arrangement has a series of four combination blades

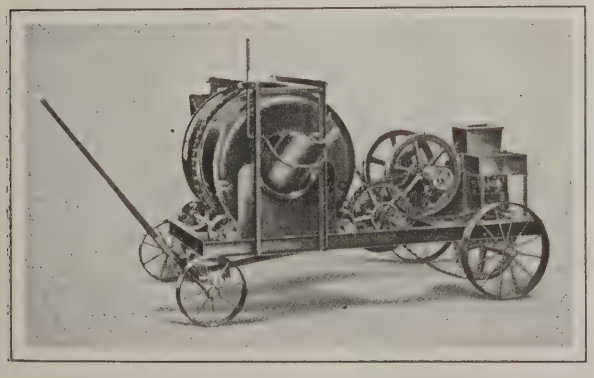


Fig. 11—The New "National" Concrete Mixer

and buckets which are designed to produce a thorough mix and quick discharge. The discharge chute is made from steel plate. When in its discharging position it extends to the center of the drum, but while the batch is mixing, it is held out of the drum by means of a catch. The latter can be released easily when the mixture is ready for precipitation. The lower frame of this equipment is constructed of 4 in. x 5.25 lb. channels, hot riveted together with heavy angle clips, to three cross channels. On the channels at the rear of the frame a large steel plate is riveted to serve as a squaring plate and a floor around the engine. The engine is bolted directly to the channels under the plate, thereby providing a rigid foundation. The upper frame is constructed of angles which not only run as high as the hopper and discharge chute, but entirely round the drum. The construction of this frame allows a quick change from a standard to a batch or side loader. Semi-steel trunnion rollers are provided, 8 in. diameter, with a 1¾ in. face. They are fastened solid to the shaft which runs in two wide babbitted bearing boxes, fitted with oil wells and dust-proof covers.

W. H. Tuohy, of Eagle, Wis., made his debut at the show by exhibiting a flexible concrete form which has just been placed on the market. It can be used in the construction of any wall or building which does not require a structural iron framework. The illustration, Fig. 12, shows the machine closed, ready for filling. The apparatus attracted considerable attention on account of its simplicity, rapidity of operation, and low cost. The form and core are built of sheet metal, mak-

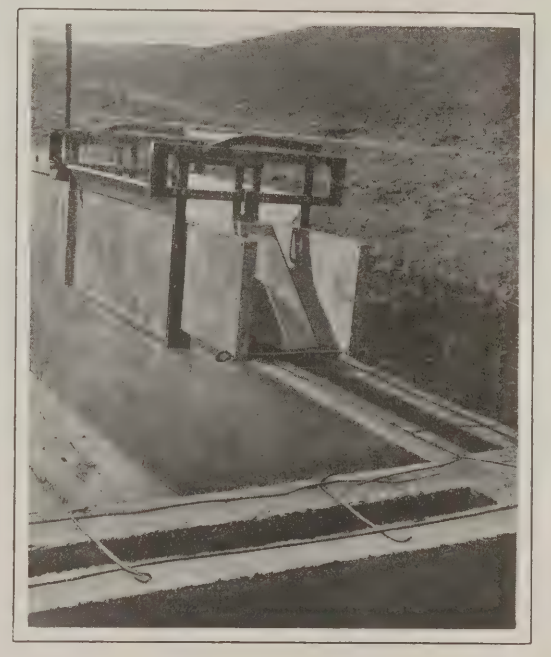
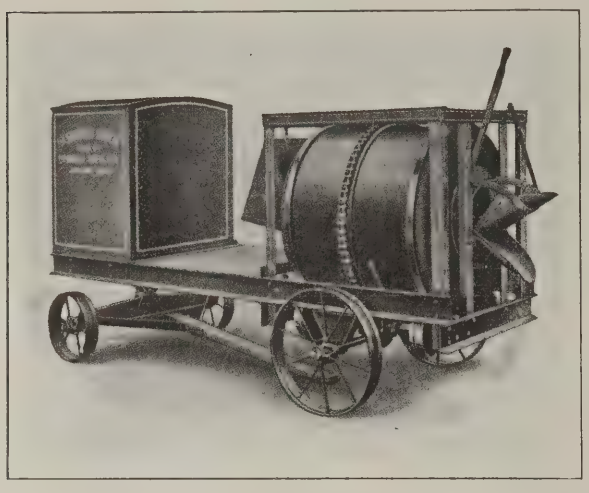


Fig. 12—The Tuohy Flexible Concrete Form Clamped onto a Wall Ready to Fill

ing them of exceptionally light weight. This product is readily adjustable, and is constructed to build either a solid or hollow concrete wall from 3 to 14 in. thick. It is said that one operator can keep three men busy carrying concrete to the machine. There is no waiting for the concrete to set. When the material has been spread and tamped, the raising of the lever on top of the "form" releases the machine from the wall. It can then be moved forward, clamped, and the operation repeated. The only lumber needed is a plumb or corner board with the necessary braces. The standard length of the form is 5 ft. 4 in., but forms can be furnished in lengths from 3 to 9 ft.

The Miles Manufacturing Co., Jackson, Mich., was one of the many companies showing new concrete mixers. Mr. Vining, who had charge of the booth, explained that the "Simplex" batch mixer No. 8, as shown in Fig. 13 is of the revolving drum type. The engine is housed and the drum located at the extreme end of platform, so that the former is free from all dust and dirt while the mixing is taking place. The large steel platform in the center is said to be convenient for dumping the wheelbarrow, and a bracket put up on either side allows the wheelbarrow to be

taken up one side and down the other. This mixer has a capacity of 8 cu. ft., or what is termed a one bag batch. The company states that an end discharge has met with universal favor, but those contractors who



New Goods at the Cement Show—Fig. 13—The "Simplex" Concrete Mixer

prefer the side feed and delivery can be accommodated. The "Simplex" drum does not tilt to discharge. It is driven from the centre by a heavy sprocket band and extra heavy riveted link chain belt, the latter, it is said, being superior to the gear drive, as there is no chance of stripping the teeth by small gravel stones falling in. The design of interior blades and buckets produces rapid mixing and discharging. Wear in the runways and drum rolls supporting the drum has been minimized by keying the drum rolls onto the shaft, so that they both rotate in long babbitted bearings lubricated with hard oil which is forced in by dust-proof grease cups. The discharge chute is made in two pieces, the outer end being fixed stationary to the frame, while the inner or upper end of the chute is pivotal, affording ample clearance for the wheelbarrow. The chute is built of boiler-plate steel for durability. The upper chute is reversed by a heavy spring to assist in mixing the material. The equipment includes a 4-hp. gasoline engine, an "Ideal" or a "Novo" being furnished as desired.

The Ideal Concrete Machinery Co., Cincinnati, O, shipped from its factory the new "Cincinnatus" No. 12 batch mixer which is shown in Fig. 14 of the illustration. The exclusive feature claimed by the company

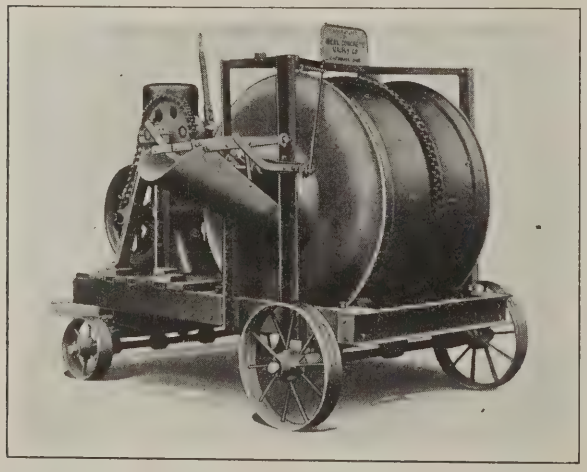


Fig. 14—General View of the New "Cincinnatus" No. 12 Concrete Batch Mixer

is the flexibly hung roller bearings. In mixers of this type, the drum is supported and revolves on four trunnions, having chilled surfaces running in roller bearings, so that the entire weight of the drum and contents finally rests upon the trunnion shaft bearings. By hanging these in flexible boxings and running the shafts in well oiled roller bearings, any binding which might result from twisting the frame, through its standing on uneven ground, is eliminated. Such provisions have the tendency to reduce wear, to make the mixer run easier, eliminate breakages and generally prolong the life of the equipment. The compactness of this mixer is another of the company's strong talking points. In its well-balanced design the best materials are used, and its construction is such that wear is reduced to the minimum. The equipment has a capacity of 12 cu. ft. of loose materials, and can be furnished with either steam or gasoline engine. It is built in four different types: Regular with wheelbarrow hopper; regular with batch hopper; regular with power loader, and as a rear discharge paver.

The Lansing Company, of Lansing, Mich., showed a line of 1915 model concrete mixing machines that combine the advantages of both the chain and the gear drives. A general view of the new No. 7 mixer is shown in Fig. 15. The machines are smooth running and it was almost impossible to hear any noise as they used a silent chain drive from the engine to the countershaft running over steel cut gears, which gives great strength, long life and eliminates noise. The drums have large bearings and the latest thing is the single cable control on the No. 10 mixer with side loader. On this outfit they use a regular hoist such as is in use on the big steel building hoist. They use a little heavier

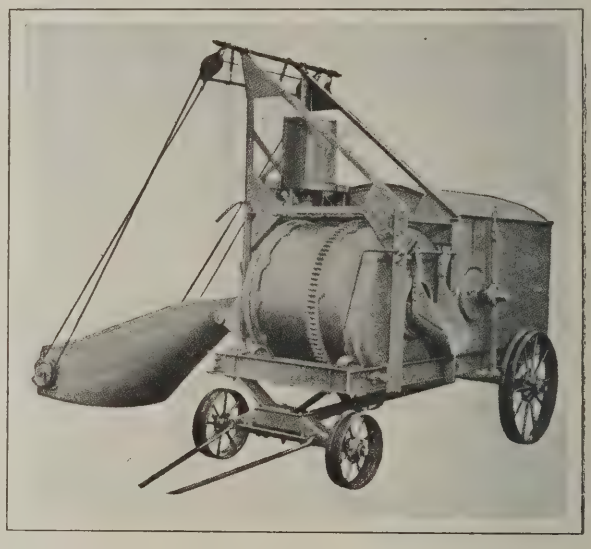


Fig. 15—New No. 7 "Lansing" Concrete Mixer

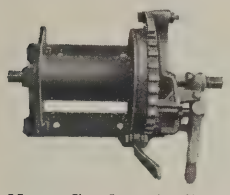
frame and wheels and other materials for the same size than most mixers and customers spoke very highly of the speedy mixing qualities and output per day. Sixty batches an hour or a batch a minute is said to be not an unusual run. The style of engine and type is a reliable and well known brand. The mixers combine the advantage of batch hoppers or side loaders if wanted. They involve a novel system in that they furnish one more horsepower engine for side loader outfit giving extra power to take care of the added load. The new 1915 models show these improvements, including the spout arrangement for sidewalk and "form" work which is a very handy attachment and enables the discharging of concrete directly into the "forms" without the necessity of handling.

The Universal Portland Cement Company occupied 12 spaces along the north wall of the Coliseum and many phases of concrete construction were portrayed. These included typical specimens of good and bad concrete made with superior and inferior aggregates, respectively; various types of cement products, such as building blocks and floor tile, sewer and drain tile, the economy of concrete roads and pavements, the fire resistiveness of concrete, suggestions for the farmer and rural concrete contractor, demonstrations of concrete products made in manual training schools by student

classes and the permanence of concrete as shown by specimens up to several thousand years old.

The essential feature of the fireproof booth consisted of transparencies showing the most striking scenes at the recent Edison fire, around which were grouped smaller transparencies, giving several pictures of this conflagration. The results of the Salem fire were also shown by a series of transparencies.

An attractive booth of interest to building contractors was that of the Sasgen Derrick Co., 2053 North Racine avenue, Chicago, Ill. Mr. Sasgen called visitors' attention to his latest invention — a single-shaft geared winch, details of which are illustrated in Fig. 16. This apparatus can be operated direct or in gear without changing the motion of the cranks, and by the movement of a small lever the winch can be changed from direct to compound immediately. It is claimed that a winch with such advantages is indispensable to building contractors having materials to hoist of varying loads. The winch has a capacity of 3,000 lbs. The drum is 4 x 8, and will carry 250 ft. of 5-16 in. cable.



New Goods at Cement Show—Fig. 16 — Single Shaft Geared Winch

The Whitman Agricultural Co., St. Louis, Mo., had a most diversified display of contractors' equipment, among which saw rigs, gasoline engines, hoists and

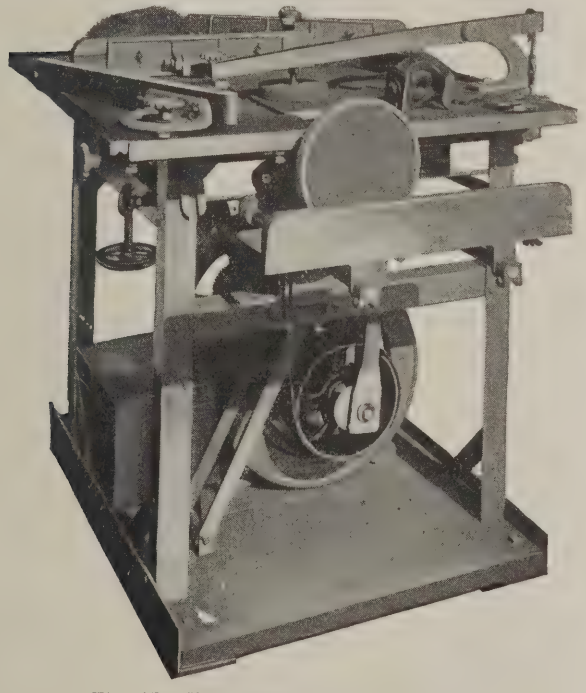


Fig. 17—The "Sultan" Portable Saw Rig

cross-cut saws were conspicuous. There are many features about the "Sultan" portable sawing rig which buyers of good machinery will appreciate, and from Fig. 17 of the illustrations some idea of its compactness and general construction can be obtained. The apparatus is equipped with 33 appliances, all high-grade tools of standard design and workmanship. It has a rigid all-steel frame and machine-surfaced table top; dust-proof engine of special design, and gravity blower to carry away all sawdust from the engine. In addition to this No. 1 model, two other types are built. The No. 1 has a ripping capacity from 3 to 4 in., is operated by a 5 h.p. engine, and the complete net weight is 882 lbs. The second size has about 20 appliances, with ripping capacity from 1½ to 2½ in., and a net weight of 650 lbs. The "Sultan Midget" will rip 1½ in. lumber, and is designed exclusively for ripping, cross-cutting, and tool grinding work. The company has issued a handsome 75-page catalog, which gives full details of its entire line, each product being clearly described and profusely illustrated.

The Chain Belt Co., Milwaukee, Wis., offered the contractor interested in small mixers, the "Rex," a new machine designed for work where the purchase of a high-priced machine is not justified. It has a capacity for 5 cu. ft. of mixed concrete per batch, and will

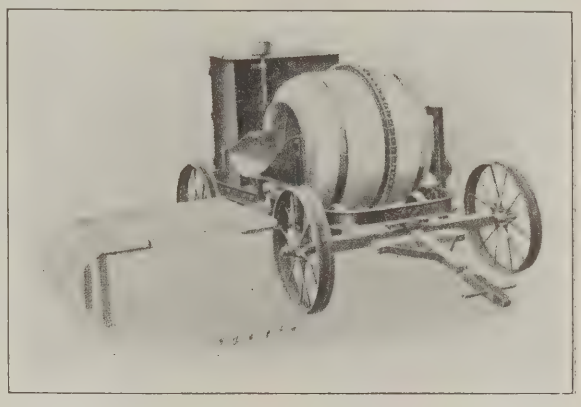


Fig. 18—The "Rex" Concrete Mixer

thoroughly mix and discharge a load in 45 seconds. This equipment is designed for the contractor building concrete sidewalks, curbs and gutters, silos, culverts, basements and floors. The mixer is built most substantially from steel and refined semi-steel materials. The drum is in two sections, securely bolted together in the middle, and is supported on large rollers which are lubricated by compression grease cups. The power used in a 3 h.p. "Novo" gas engine which makes connection to a riveted chain belt, as shown in Fig. 18. This method of drive is described as durable and efficient. The charging platform is low, being 18 in. from the ground. The opening for charging is 21 in. diameter, and the discharge is the pivoted type, 16 in. diameter, 20 in. from the ground. The countershaft which the engine drives is equipped with a friction clutch so that the engine can be started without turning the mixer drum. The wheels have been specially constructed for rough usage and are standard wagon gauge, 28 in. diameter with a 4 in. face. The dimensions of this mixer are 8 ft. long, 5½ ft. wide and 5 ft. high. Every machine is tested under its own power and is rigidly inspected before leaving the factory.

The Knickerbocker Co., Jackson, Mich., exhibited a concrete mixer calculated to invite the consideration of the contractor who is anxious to operate continuously at maximum capacity with maximum efficiency. The machine displayed was one of the features of the com-

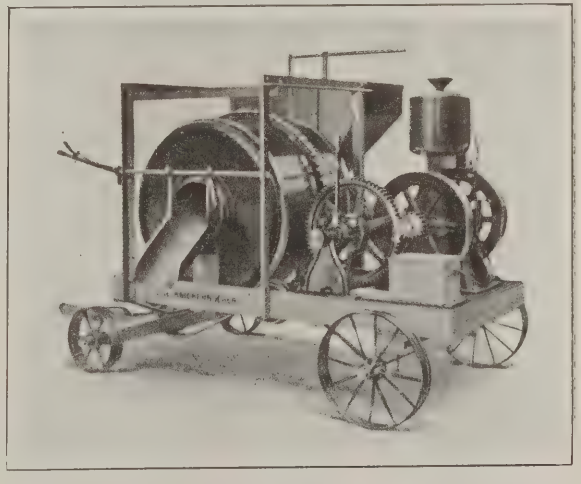
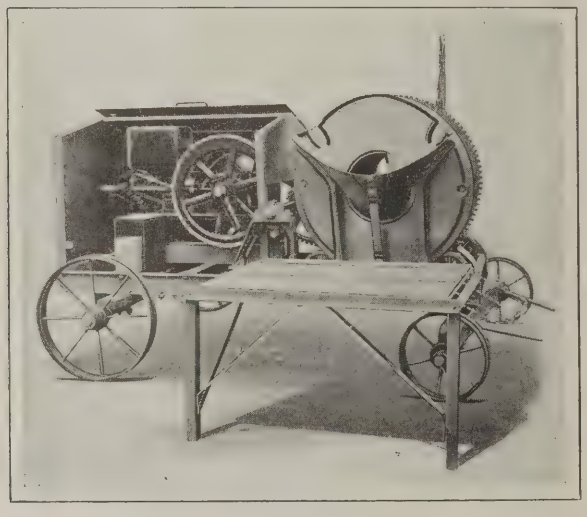


Fig. 19—The Knickerbocker Mixer with Engine Housing Removed to Show the Operating Mechanism

pany's booth. In Fig. 19 is shown a finished model, with the engine housing removed to reveal the drive. Two types are manufactured, with respective capacities of 6 and 10 cu. ft., both with a side discharge. To prevent excessive vibration this mixer is constructed with

an all-steel frame, and the castings are riveted to the channels to insure a rigid bearing for truck wheels. On the loading side of the frame over the front axle is a shaft controlled by a hand wheel so that it may be lowered to rest on the axle to prevent tipping or straining the frame when a power or stationary batch loader is being used. On both machines the same rolls are used, fitted with bronze bushings and compression grease cups. The mixing drum is made of tank steel plate, and the blades are so arranged as to insure a well-mixed concrete. Sufficient pitch is given the discharge spout for a rapid, continuous flow. The bottom of the spout is 25 in. above the ground, allowing ample clearance for a barrow. The buyer has his choice of having either a "Novo" or an "Ideal" engine, 3 hp. for the smaller mixer, and 6 hp. on the 10 ft. A heavy malleable link chain is used to transmit power from the shaft to the drum.

The Contractors Machinery Co., Keokuk, Ia., maintained a diversified display which included two new models of "Packard" concrete mixers, both having a 5 cu. ft. capacity. One is equipped with a low loading measuring batch hopper which allows the latter to be loaded while the batch in the drum is being mixed and discharged. The "Handy" size with a detachable hinged loading platform is shown in Fig. 20. This type of mixer is provided with an automobile pattern steel housing, complete with lock. The drum has ends manufactured from heavy iron, while the body and interior blades are constructed of No. 12 boiler plate steel. The size of the drum is 30 x 30 in., and is operated by a 3-h.p. "Packard" engine. The equipment is mounted on a rigid, substantial steel frame, having steel trucks which run in wagon tracks. Specifications call for gears made of pure semi-steel that are keyed to the shafts. All braces and straps are also steel. Dust-proof wick oil boxes have been provided for uniform



New Goods at the Cement Show—Fig. 20—Side View of the "Packard" Concrete Mixer

distribution, together with an oil reservoir. The engine provided is said to be larger than absolutely necessary, and gives reserve power. It has been built especially for these mixers and is referred to as being of simple construction and operation.

The Ransome Concrete Machinery Co., Dunellen, N. J., occupied a large booth in which the salesmen directed particular attention to the company's "Bantam" mixer, a machine which has been marketed quite recently. The illustration Fig. 21 shows the mixer from its discharge side with the discharge door open to allow the mixture to fall into the wheelbarrow. While the mixing operation takes place this door is closed tightly, and by simply moving the lever at the left of the drum backwards, the mixture discharges immediately. It has a capacity for one bag batch, and is driven by a 3-hp. engine. The drum is constructed of No. 10 gauge iron, and the mixing blades are built of the same material. The height to the feed platform is 27 in., and to the discharge 26 in. The wheels are 20 in. in diameter, with a 3-in. face. The specifications include platform and runways as part of the equipment shipped. The company stated that the good workmanship and

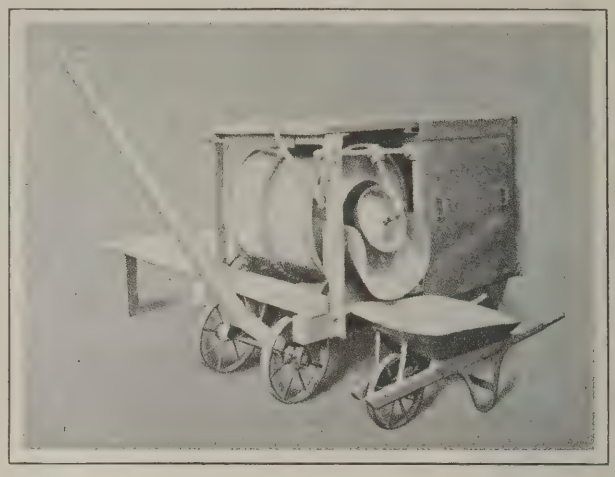


Fig. 21—The "Bantam" Mixer as Viewed from the Discharge Side of the Machine

material is the same as that which has made the larger "Ransome" mixers known the world over.

North Carolina Builders Elect Officers

At the recent meeting in Durham the North Carolina Builders' Exchange elected the following officers to serve the ensuing year:

President.....J. T. Salmon of Durham
1*st Vice-Pres*....J. W. Stout of Sanford
2*nd Vice-Pres*....J. R. McLlamroch of Greensboro
Treas.....L. D. Berry of Charlotte

A new constitution and by-laws were adopted in order to render it possible for the new building associations in various sections of the state to affiliate with the state organization.

Meeting of Southern Builders' Supply Dealers

At the second annual convention of the West Virginia Lumber & Builders' Supply Dealers' Association, held in Parkersburg, W. Va., the following officers were elected:

President....W. E. Minler of Huntington.
Vice-Pres..George M. West of Clarksburg.
Sec. Treas..G. J. Dickerson of Huntington.

E. L. Davidson of Parkersburg and A. M. Finney of Charleston were elected members of the board of directors.

A Mammoth Sugar Pine Tree

The United States Government has received $99.40 in settlement for a single sugar pine tree, which was cut in trespass in the Stanislaus National Forest in California, and which yielded more than enough actual lumber to build a good-sized suburban frame house. The tree scaled 18,933 board feet and was valued at $5.25 per thousand feet. Not many trees contain enough lumber to build a two-foot board walk nearly two miles long, and this is believed to be the first case on record in which a single tree felled in a National Forest was valued at almost $100 on the stump, although National Forest timber is frequently sold at considerably higher rates.

Stucco Board vs. Standard Built Walls

Results of a Series of Tests Demonstrating the Comparative Strength of the Two Forms of Construction

IT is a well known fact that when the wind acts on the side of a building there are stresses set up in those walls at right angles to the surface upon which the wind acts. Those stresses tend to "rack" or cause a movement in the plane of the walls which movement, although slight, is injurious to the interior or exterior plastering. For the purpose of determining the resistance to stresses approximating those caused by pressure, offered by sections of walls made of Bishopric stucco board nailed on studding and of sections of walls of standard construction, an interesting series of tests were recently made by H. W. T. Collins, a mechanical engineer of Norwood, Ohio, and the results of them are presented herewith.

The sections of walls to be tested were five in number, the first of which consisted of a frame

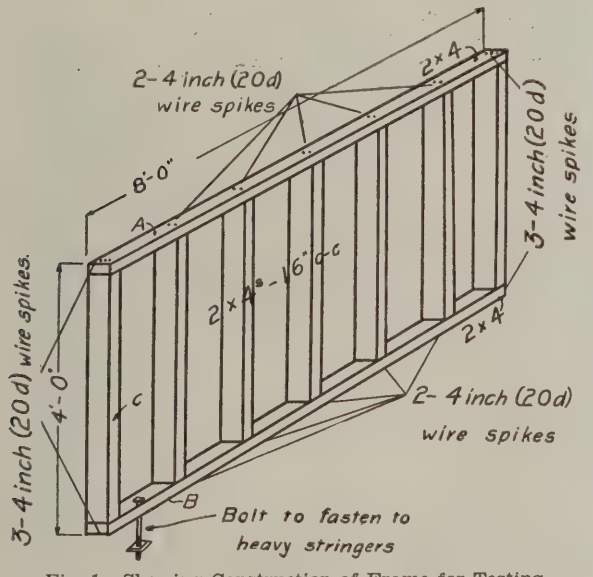


Fig. 1—Showing Construction of Frame for Testing

4 ft. high by 8 ft. long and made of 2 x 4-in. rough studding spiked together with 4-in. wire spikes as indicated in Fig. 1. Bishopric stucco board was nailed to both sides of this frame with one 1½-in. (4d.) nail in each lath in each stud, the lath being laid horizontally.

Test section No. 2 consisted of a frame of the same size and construction as No. 1, but with common lath on one side and sheathing on the other. The sheathing boards were 1 in. thick, 5½ in. wide and 8 ft. long. Each board had two nails 2½ in. long (8d.) in each stud. The sheathing was neither dressed nor matched, but closely laid and securely nailed. The other three test sections were modifications of those just described and their details are indicated in the table at the close of this article.

According to Mr. Collins the principal apparatus for testing the sections consisted of a screw jack for applying the load, a bell crank lever constructed of timbers and a Fairbanks platform scale, the arrangement being as indicated in Fig. 2 of the illustrations. It will be seen that the force was applied

Fig. 2—Showing Test Section No. 1

in a horizontal direction by the jack, and transmitted through the bell crank to the platform of the scale. The fulcrum of the bell crank lever consisted of a round steel bar fitting loosely in a hole drilled in the timber.

In carrying out the work the bottom sill "B," Fig. 1, of the sections to be tested, was securely spiked and bolted to the timber "B" of Fig. 2, but in the shorter specimens a light brace was used to prevent their being sprung sidewise by the load. The block was adjusted on the scale platform and the jack so placed that the vertical distance from the center line of the jack to the center of the fulcrum was the same as the distance from the center of the block to the center of the fulcrum. The

Fig. 3—Test of Section No. 2 Being Made

dimensions are shown in Fig. 2 and were the same for each test. The dead weight of the bell crank and blocks was measured on the scale and balanced by a tare-poise.

The force applied by the jack was transmitted by the bell crank to the scale platform. The load as measured by the scale was considered equal to the force at the jack.

The jack after being placed in position was tightened sufficiently to hold itself in place. This produced a force of about 200 lbs. on the scale. A steel rule was then fastened to the top of the frame and a steel plate in the upright, E, Fig. 2, which was independent of the section tested, was set up at a definite point on the rule. As the force was applied the rule moved under the steel plate, thus indicating the amount of the deformation in a line parallel to the direction of the application of the force. The load was applied in 100 or 200 lb. increments and the deformation measured at each load.

Fig. 2 is a photographic reproduction of No. 1 with stucco board on both sides of the frame after a load of 2,650 lbs. had been applied. At this load the rule showed deformation of 1 3/16 in. On examination it was found that the spikes in the bottom of the first stud, "C," Fig. 1, had been pulled out, allowing the stud to rise. This upward movement increased, to some extent, the deformation as measured. The paper backing of the stucco board was also ruptured near the point where the stud had been pulled out.

Fig. 3 is a photograph of test section No. 2, with common lath on one side and sheathing on the other, after a load of 1,650 lbs. had been applied. The deformation at this point was shown by the rule to be 5 11/16 in. The stud "C," Fig. 1, was pulled up in a similar manner to that in test section No. 1, but to a less extent.

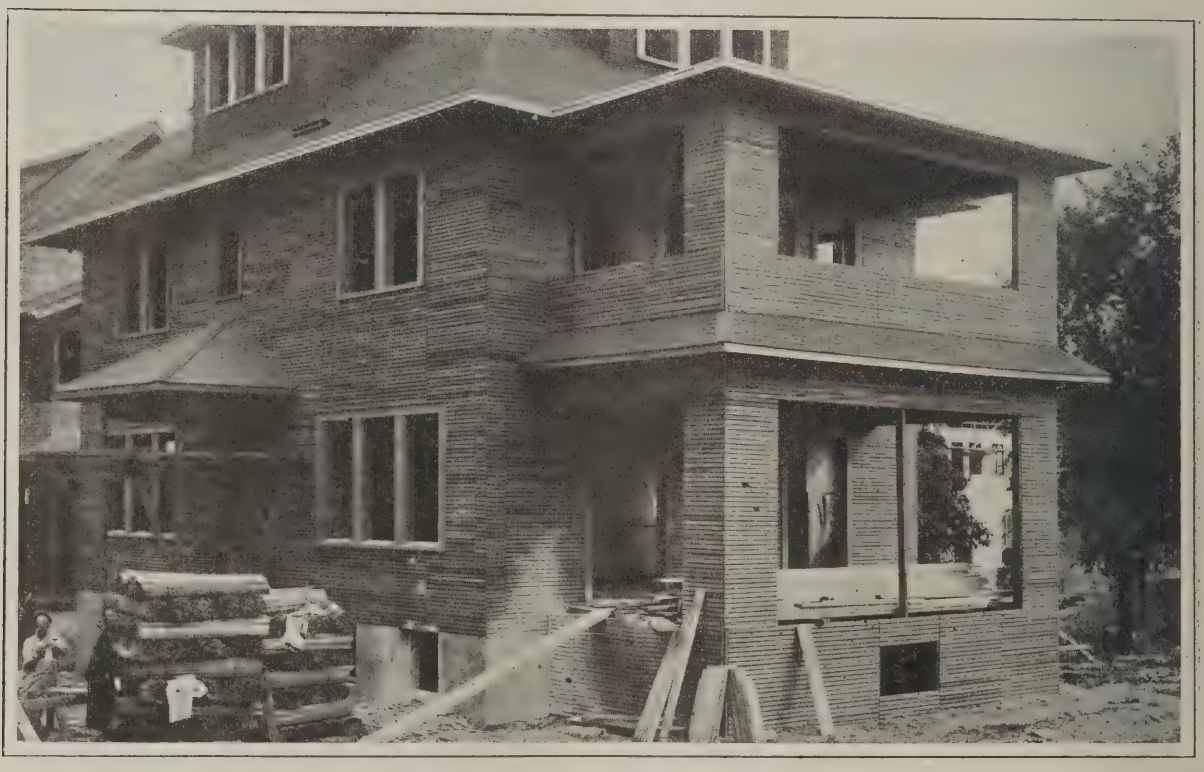
In Fig. 4 is shown the exterior of a dwelling house to the frame of which Bishopric stucco board has been applied and is ready to receive the plaster.

Section No.	Size Ht. Lg.	Construction	Deformation at Loads of		
			300	600	900
1	4 by 8	Stucco board on both sides.	0.05 in.	0.07 in.	0.10 in.
3	4 by 4	Stucco board on both sides.	0.05 in.	0.17 in.	0.38 in.
5	4 by 4	Stucco board on one side, lath on the other.	0.08 in.	0.30 in.	0.75 in.
2	4 by 8	Sheathing on one side, lath on the other.	0.10 in.	0.35 in.	0.90 in.
4	4 by 4	Sheathing on one side, lath on the other.	0.35 in.	1.30 in.	3.55 in.

The above table gives as a summary the deformation of each section at three loads—300, 600 and 900 lbs. respectively. The test sections are listed in the order of their rigidity and the results clearly demonstrate that under the same conditions stucco board is stronger than sheathing as represented by sections of walls of standard construction.

The plans have recently been filed for a structure to house a large mail order and parcel post business to be erected at Jackson avenue and Tenth street, Long Island City, N. Y. The structure will be 12 stories in hight and is to cost $500,000. It will be provided with elevators which will carry loaded automobile trucks to every story, thus greatly facilitating shipments.

One of the latest improvements in the Grand Central Terminal zone, New York City, is a 12-story apartment building to cost $750,000. The plans were drawn by Warren & Wetmore. The structure will be located at the northwest corner of Park avenue and Fifty-fourth street.



Stucco Board vs. Standard Built Walls—Exterior View of a Dwelling House to Which Bishopric Stucco Board Has Been Applied Ready for the Plaster

New Publications

Concrete Stone Manufacture. By Harvey Whipple. 256 pages. Size 4¼ x 7 in. Profusely illustrated. Published by Concrete-Cement Publishing Company. Price $1.00.

This is the first comprehensive work on the manufacture of concrete-stone in many years, during which period concrete block and stone manufacture has shown remarkable progress in many ways. The author, who is managing editor of *Concrete-Cement Age*, has treated the subject in a way to be of special value to those engaged in the branch of industry indicated, and in the preface he expresses the hope that "its influence may in some degree discourage efforts in concrete-stone manufacture by those incompetent to add something to the sum of progress in that industry and that it will be the means of putting many others in the possession of such information, developed in successful work, as will lend impetus and direction to important industrial growth."

The subject matter is comprised in ten chapters, the first of which deals with the development of concrete building units. Next the author takes up location, equipment, layout, materials, mixtures, manipulation and curing; describes special molds and illustrates various patterns, discusses treatment of block surfaces, shop records and cost keeping, and then gives various building regulations, tests and specifications. The closing chapters are devoted to selling the products and examples of layout and operation.

Power Heating and Ventilation. Parts I and II. By Charles L. Hubbard. Size of each 6 x 9 in. 300 and 308 pages respectively. Profusely illustrated. Bound in cloth covers. Published by McGraw-Hill Book Company. Price of each volume $2.50.

Part I is devoted to the design of small and medium-sized steam power plants and constitutes a treatise for designing and constructing engineers, architects and students. It is a second edition of the work indicated and has been fully revised and the type reset. The fundamental elements are first considered in some detail, after which various pieces of apparatus employed in power work are fully described. The later chapters are devoted to equipment for different conditions and the assembling of it in the completed plant. Care has been taken to treat the subject in a simple and concise manner, yet sufficient space has been devoted to the derivation of formulæ and to the principles involved in the various methods of procedure to make the book of value to both student and practicing engineer.

Part II deals with the physics of heating and ventilation and gives applications of the methods of determining the transmission of heat from air, water and steam, thus adapting the work alike to the needs of the furnace man and the steam and hot-water fitter. A comprehensive treatment is given of furnace heating, showing how to determine the size of furnace needed after the heating requirements have been ascertained on the thermal unit basis. It gives the means of determining the size of the hot-air pipes, and the area of round, oval and rectangular pipe. Different types of sectional boilers and horizontal return tube plate boilers are shown and the methods of arriving at their capacity for their work are described. One chapter is devoted to direct steam heating, another deals with indirect steam heating by gravity, while another has to do with methods of ventilation by means of aspirating coils or vent hoods at the termination of the flue. Still other chapters deal with hot-water circulation by gravity and by forced circulation; heating with exhaust steam and different types of vapor and vacuum systems of heating. In the closing chapter attention is given to the care and management of heating and ventilating plants.

Heating and Ventilating Buildings. By Prof. R. C. Carpenter. 605 pages. Size 6 x 9 in. Illustrated by 290 figures. Bound in cloth. Published by John Wiley & Sons. Price $3.50.

This is the sixth edition of a well known work on the subject indicated and has been largely rewritten, while considerable new matter has been added. In fact, the size of the book as compared with the first edition has been increased by nearly one-half. Several new chapters have been added relating to fans or blowers for moving air, also to the general subject of mechanical systems of heating and ventilation, to schoolhouse heating and ventilation and air conditioning. The volume is regarded as a standard work of reference for engineers and as a text book for any institution, as it covers the different methods of heating and much of the detail of their design and installation.

Heating Questions and Answers. By Alfred G. King. 214 pages. Size 6¼ x 9¼ in. 127 illustrations and 21 tables. Bound in cloth covers. Published by Norman W. Henley Publishing Company. Price $1.50.

The book contains 500 plain answers to direct questions on steam, hot water, vapor and vacuum heating. The contents are so arranged that it takes up step by step the theory of heating, with methods, the effect of chimneys and fuels, with boilers and boiler fittings, radiation, steam and hot-water heating, as well as the different methods of installing both types of heating. The illustrations tend to render more clear the answers to the questions, which naturally confront the man who must design the equipment for a building. In this way the various systems and fixtures used, valves and air valves, are shown, with a brief explanation of their purpose. The questions are arranged to require illustrations that will show the method of connecting two boilers to be used on the same heating system, the method of arranging expansion and swing joints, and making connections to radiator. There are also tables of the size of the main and return connections required for the various types of heating systems that are in common use. In addition, the list of contents is so arranged that any particular subject may be readily found, the list of illustrations showing where any particular type of installation may be located.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in February, 1915, and February, 1914

THE improvement in the building situation throughout the country, noted in our last issue, is emphasized in the reports which have come to hand from 116 cities covering the month of February. Whereas in January the decrease, as compared with a year ago, was 27.7 per cent., the figures for February show a falling off of only 11.6 per cent. as compared with February, 1914. Of the 116 cities reporting 47 show increases and 68 decreases.

A notable feature of the cities of the eastern states reporting is the continued gain in the boroughs of Manhattan and the Bronx in Greater New York. Philadelphia also shows an important gain in the new work projected as compared with the same month a year ago, the total being the greatest for any February since 1906. The building that is going on in the smaller cities is due more to the natural growth of the communities than to speculative operations, and is therefore of a more significant nature. Of the 44 eastern cities reporting 25 show increases and 19 decreases, but with a gain for the entire section of 10.1 per cent. This, indeed, is the only section of the four into which we have divided the country, showing an increase over a year ago.

CITIES IN EASTERN STATES

	1915.	1914.
Albany	277,115	200,650
Allentown	67,385	49,500
Altoona	16,843	98,907
Atlantic City	117,349	42,768
Binghamton	38,871	73,005
Boston	1,375,810	2,964,032
Bridgeport	237,495	154,628
Brockton	56,130	41,890
Buffalo	308,000	395,000
East Orange	182,607	42,678
Elizabeth	40,184	23,210
Erie	109,168	58,150
Harrisburg	38,425	41,875
Hartford	151,600	99,165
Hoboken	6,695	178,084
Holyoke	4,560	13,800
Jersey City	319,154	318,301
Lawrence	66,775	14,200
Montclair	65,926	48,987
Newark	955,391	1,247,933
New Bedford	92,925	111,825
New Britain	28,585	5,620
New Haven	674,855	291,754
New York:		
Manhattan	5,899,930	2,761,042
Bronx	2,657,934	1,286,311
Brooklyn	2,264,550	3,535,465
Queens	1,582,125	1,101,709
Richmond	151,379	100,404
Niagara Falls	15,450	73,875
Passaic	24,800	2,410
Paterson	57,217	65,378
Philadelphia	2,574,730	1,794,905
Pittsburgh	608,644	2,010,568
Rochester	382,607	372,957
Reading	102,275	95,750
Scranton	42,600	64,729
Springfield	692,795	292,765
Syracuse	160,383	75,915
Trenton	71,673	77,064
Troy	47,445	26,966
Utica	7,975	19,050
Waterbury	30,150	63,010
Wilkes-Barre	70,125	36,973
Worcester	104,220	104,820

In the cities of the middle states from which reports have been received the notable changes are in the nature of decreases as compared with February last year. Of the 34 cities reporting 12 show increases and 22 decreases, with a percetnage loss of 12.6. The important changes are to be found in the figures for Chicago, Cleveland, Detroit and Kansas City, Mo.

CITIES IN MIDDLE STATES

	1915.	1914.
Akron	110,260	198,530
Cedar Rapids	133,117	145,800
Canton	39,550	37,250
Chicago	4,701,400	5,097,900
Cincinnati	499,645	316,515
Cleveland	1,733,925	1,398,010
Columbus	153,350	225,915
Dayton	14,453	49,970

CITIES IN MIDDLE STATES (*Continued*)

	1915.	1914.
Des Moines	65,145	126,300
Detroit	1,307,215	3,020,850
Duluth	89,647	156,370
Evansville	85,435	159,256
Fort Wayne	80,120	103,300
Grand Rapids	104,301	82,095
Indianapolis	307,750	292,469
Kansas City, Mo.	896,330	1,053,950
Kansas City, Kans.	55,150	43,125
Lincoln	31,560	35,675
Minneapolis	811,495	498,005
Milwaukee	409,056	578,496
Omaha	84,120	221,175
Peoria	51,750	45,600
Saginaw	13,075	13,465
St. Louis	701,062	908,083
St. Paul	797,054	371,444
St. Joseph	18,751	29,715
Sioux City	36,150	28,875
Springfield	65,900	28,050
Superior	20,675	15,140
Toledo	454,607	606,400
Topeka	37,770	47,403
Youngstown	79,650	84,740

In the southern section of the country the changes are somewhat less striking, the 18 cities reporting showing a falling off, as compared with February last year, of 8.08 per cent. Baltimore is conspicuous by a heavy increase in activity as compared with a year ago, and in Atlanta and Louisville there is more new work projected than was the case last year.

CITIES IN SOUTHERN STATES

	1915.	1914
Atlanta	471,961	335,391
Baltimore	983,136	417,743
Beaumont	21,623	53,256
Birmingham	136,710	216,435
Chattanooga	33,110	108,925
Dallas	324,185	564,220
Huntington	48,625	30,747
Louisville	283,220	163,800
Memphis	101,735	275,455
Nashville	65,705	79,885
New Orleans	97,323	204,794
Norfolk	172,730	96,835
Richmond	259,184	270,567
San Antonio	113,595	577,950
Savannah	74,010	113,850
Tampa	58,055	109,820
Washington	890,838	884,036
Winston-Salem, N. C.	23,524	21,579

The opposite of the showing of the eastern section of the country is found in the reports from the extreme western states, where 19 cities reporting indicate a loss of 63.7 per cent. as contrasted with February, 1914. This is due almost wholly to the heavy shrinkage in operations in San Francisco, Los Angeles, Seattle and Portland. The falling off in San Francisco is not surprising in view of the tremendous activity which prevailed a year ago incident to the work in preparation for the Panama Pacific International Exposition.

CITIES IN EXTREME WESTERN STATES

	1915.	1914.
Berkeley	93,600	100,200
Butte	6,125	61,700
Colorado Springs	11,525	111,520
Denver	165,070	206,205
Fresno	77,128	56,624
Los Angeles	560,697	1,455,730
Oakland	328,934	429,192
Pasadena	36,531	83,035
Portland	311,740	605,530
Pueblo	5,700	45,200
Sacramento	123,307	200,691
San Diego	95,990	162,098
Salt Lake City	147,705	112,600
San Francisco	807,936	4,574,281
San Jose	27,418	42,278
Seattle	353,880	553,295
Spokane	21,725	24,125
Stockton	33,900	21,936
Tacoma	56,751	167,722

All things considered, the outlook is more encouraging than for some time past, and if even a goodly portion of the work now contemplated is put through, the year will show a very fair total.

Current News of Builders' Exchanges

Meetings of Various Organizations—Elections of Officers—New President of Cincinnati Exhange

Portland Exchange Occupies New Quarters

The members of The Builders' Exchange of Portland, Ore., took possession on Friday evening, February 19, of their new quarters in the Worcester Building. A most entertaining programme had been prepared, which included numerous talks on pertinent subjects by officials of the organization as well as by others invited for the occasion. The "house warming" if such it may be called, was a most enjoyable affair and the action of the Exchange in taking a long lease of its new quarters is regarded as showing its confidence in the return of better conditions in the building business.

Builders' Exchange at New Kensington, Pa.

Contractors and builders of the lower Allegheny Valley have just formed what is known as the New Kensington Builders Exchange with the following officers for the ensuing year:

President.....J. K. Watson
Vice-President.....George W. Douglas
Treasurer.....John D. Dixon
Secretary.....George V. Gardiner

There were also elected 15 members to constitute a board of directors of which George Keeler is chairman.

Testimonials to Officials of Pittsburg Exchange

At the regular weekly noonday luncheon of the Pittsburgh Builders' Exchange held on Thursday, March 4th, Wm. J. H. Boetcker, of the National Inside Association, made a very interesting and instructive address to 150 members present, after which R. K. Cochrane, former president of the Association, on behalf of the Exchange, presented to Capt. Thos J. Hamilton, former Treasurer, who retired Jan. 1st, 1915, a framed and engrossed copy of a resolution passed by the Board of Directors, which was as follows:

WHEREAS, There has come before this board the resignation of Thomas J. Hamilton as its treasurer, with an urgent request that the same be accepted, and

WHEREAS, In complying with this request we do so with extreme regret, yet feel that consideration of the reasons given demand assent; but in accepting this resignation we desire, on behalf of the Pittsburgh Builders' Exchange, and for ourselves, to place on record our appreciation of the long period of service and its exceptional value to this body; therefore be it

Resolved. That this board and the Pittsburgh Builders' Exchange inscrive on their minutes the following resolution:

IN accepting the resignation of Thomas J. Hamilton as our treasurer, we do so with a sense of lasting obligation to him for his invaluable services as our financial officer, our unpayable debt of gratitude for his advice and counsel on many trying occasions, his fidelity and loyalty to our organization during all the many years he has been our fiduciary officer and the accuracy with which he has always performed his manifold, trying and often difficult duties.

Resolved, That a copy of this preamble and resolution be inscribed and framed and presented to our retiring treasurer as a testimonial of our affection and regard for him as a man and as a memento for transmission to his descendants of his high and honorable character that will be pleasing and until the last generation testify his worth, his loyalty to every duty as citizen, as defender of his country—in which he has won admiration from his fellow soldiers during a time of peril to our common country—as a man of highest probity, faithfulness in the performance of manhood obligations, and as a fellow member of this organization.

Resolved, That it be ordered that the name of Thomas J. Hamilton be recorded on the membership roll of this organization as an honorary member for life.

Captain Hamilton served continuously as treasurer of the Association from 1886 to 1915 covering a period of twenty-nine years and this day was his 76th birthday.

He has lived a retired life for the past seven years and continued to serve in the capacity of Treasurer until a change of residence made it inconvenient for him to longer continue in office.

The greatest surprise was when J. Chas. Wilson in a few well chosen remarks, presented to R. K. Cochrane a beautiful mahogany chime clock, on behalf of the Exchange, in appreciation of his valuable services as president for the years 1912-1913-1914.

Both the recipients responded in a neat manner, expressing their thanks for the tokens of appreciation.

At the annual meeting, S. P. Trimble was elected president to succeed Mr. Cochrane and S. N. Murphy was elected to succeed Capt. T. J. Hamilton.

Annual Meeting of Cincinnati Exchange

The annual meeting and election of officers of the Builders' and Traders' Exchange, Cincinnati, Ohio, was held at headquarters in the Merchants Building, March 4. The election was a very spirited one, and interest in it was enhanced by the presence of a number of lady relatives and friends of the different candidates, who were electioneering for the different tickets in the field, of which there were three, all being headed by Wm. Miller, Jr., for president, and by George W. Baker for treasurer. Of course, both of these gentlemen were elected without a dissenting vote.

Pres. Wm. Miller, Jr., of the Cincinnati Exchange

There was a big fight for directors, the red ticket winning out with but one exception, this being the election of Albert Weist, who ran on the blue ticket. Joseph McDermott was chosen vice-president and Henry Niemes, secretary. The directors are as follows: C. Taylor Handman, J. O. Bagley, Walter McGarvey and A. G. Weist.

The arrangement for the election and social features were in charge of the retiring President, C. Taylor Handman, and Secretary Weingartner.

The new officers elected were duly installed at a meeting held at the Exchange headquarters on the afternoon of March 8.

Annual Meeting of Edmonton Builders' Exchange

At the recent annual meeting of The Builders' Exchange at Edmonton, Canada, a large percentage of the membership was present and the reports of the secretary and treasurer showed the organization to be in a flourishing condition. The officers elected for the ensuing year were:

President.....A. J. Brown
1st Vice-President.....H. Nash
2nd Vice-President.....C. W. Hillas
Secretary.....F. H. Drayton

Financial and executive committees were appointed and it was voted to hold monthly meetings hereafter on the first Tuesday evening of each month.

New Officers of Philadelphia Exchange

At a meeting of the Board of Directors of the Master Builders' Exchange at Philadelphia, Pa. held on February 9, the following officers for the ensuing year were chosen:

President.....George J. Watson
1*st Vice-President*.....Jacob L. Tyson
2*nd Vice-President*.....O. W. Ketcham
3*rd Vice-President*.....E. E. Hollenback
Treasurer.....Frank Reeves
Secretary.....Charles Elmer Smith

The Washington Builders' and Manufacturers' Exchange

What promises to become one of the most popular social features of the Builders' and Manufacturers' Exchange at Washington, D. C., is the one o'clock luncheon every Saturday at one of the downtown hotels which has recently been inaugurated. The attendance has shown an increase on each occasion and the luncheons are proving an excellent means of bringing the members together socially. The committee having in charge the selection of new quarters have several propositions under consideration and something definite is expected to develop shortly. The Spanish class inaugurated several months ago has now an enrollment of 30 and is making good progress under the leadership of S. J. Macfarren and A. B. Tugman.

Annual Meeting of Montreal Builders' Exchange

At the 17th annual meeting of the Builders' Exchange of Montreal, Canada, President T. Gilday stated in his report that notwithstanding the business depression and financial stringency consequent upon the war, the Exchange came through the year in a very creditable manner. He referred to the removal to the present commodious quarters in Victoria Square and of the results of the decision to do away with the Exhibit Hall and the disposal of the *Bulletin*. During the year several important amendments to the By-laws were passed defining different classifications of members and he pointed out that the action of the government in passing a statute increasing the duty on imported dressed stone which was petitioned for by the Montreal and other Exchanges is proving very beneficial to cut stone contractors. He also referred to the study which was being made of Quantity surveying. The election of officers resulted as follows:

President.....John Quinlan
1*st Vice-President*.....E. W. Sayer
2*nd Vice-President*.....J. B. Barbeau
Secretary-Treasurer.....D. K. Trotter

The new Board of Directors which included five who held office last year were as follows: John Allan, general contractor; R. F. Dykes, stone contractor; J. H. Hand, building contractor; W. M. Irving, brick and masonry; J. J. Roberts, carpentry and millwork; W. Bonnell, brick contractor; J. E. Walsh, contractor; R. S. Muir, mantel and tile; W. E. Potter, master painters and decorators; R. J. McCauley, master plumbers; Alex. Bremner, Jr., builders' supplies.

Annual Meeting of Saskatoon Builders' Exchange

At the annual meeting of The Builders' Exchange of Saskatoon, Sask., Canada, there was a large attendance, and deep interest was manifested in the proceedings. Secretary Maurice Prout rendered a report covering the work of the association during the past year pointing out, among other things, that "owing to the war and consequent financial stringency the building trade has been considerably curtailed in its operations, thereby causing the temporary withdrawal of some of the members. We still retain the majority, however, and are confidently looking forward to a day in the near future when our Exchange will be not only 'Bigger and Better' but the 'Biggest and Best' in Western Canada."

The election of officers for 1915 resulted in the following choice:

President.....James Preil
1*st Vice-President*.....A. W. Cassidy
2*nd Vice-President*.....Thomas E. Farley
Honorary Treasurer.....Andrew Rutherford
Secretary.....Maurice E. Prout

This is the fourth year in succession that Mr. Preil has been elected president of the Exchange. In the Board of Directors elected were represented general contractors, sanitary and heating engineers, electricians, sheet metal workers, dealers in builders' supplies, hardware, mill work, lumber and sand and gravel.

New Officers of Vancouver Exchange

At the recent annual meeting of Builders' Exchange at Vancouver, B. C., the following officers were elected for 1915:

President.....J. L. Skene
1*st Vice-Pres*.....J. G. Anderson
2*nd Vice-Pres*.....A. C. Brown
Secretary.....W. Hamilton-Lindsay

The president congratulated the members on the fact that although the times have been anything but favorable, the membership has increased and he expressed the hope that conditions in the building industry would show an improvement during the ensuing year.

The Builders' Exchange at Jackson, Miss.

Progress has been made in the organization of the Builders' Exchange at Jackson, Miss., brief reference to which appeared in these columns in January. The movement, which has been in contemplation by a few of the leading building contractors of the city for some time back, has taken tangible shape in the selection of W. J. McGee as provisional president, S. N. Cox as vice-president, and A. D. Paine as secretary, the latter being an architect. At the meeting when the temporary organization was perfected there were present representative building-contractors, mill men, lumber dealers, plumbers, architects, subcontractors, material men, roofers, painters, etc.

New Officers of Jacksonville Exchange

At the annual meeting of The Builders' Exchange of Jacksonville, Fla., held in the rooms of the organization on Saturday, February 6, the following officers were chosen to serve for the ensuing year:

President.....W. P. Richardson
First Vice-President.....O. P. Woodcock
Second Vice-President.....J. S. Bond
Secretary and Treasurer.....J. H. Kooker

The old Board of Directors was re-elected and the report submitted by the secretary showed the Exchange to be in a flourishing condition.

Officers of Toronto Builders' Exchange

At the recent meeting of members of The Builders' Exchange of Toronto, Canada, officers for the year were elected as follows:

President.....George Oakley, Jr.
First Vice-President.....S. R. Hughes
Second Vice-President.....G. W. Britnell
Secretary.....A. E. Flower
Treasurer.....John Aldridge

There were also directors elected representing various branches of the building trades.

The Exchange has recently inaugurated a series of luncheons at each of which some prominent speaker is to address the members on a timely topic. At the first luncheon nearly 150 were present and City Architect W. W. Pearse spoke on the changes which he considered desirable in the building by-law at present under revision.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Wallace's Flap and Shutter Guard

A safety guard for planers and constituting an important part of the equipment of the Wallace bench planer has just been put upon the market by J. D. Wallace, 527 West Van Buren street, Chicago, Ill. It is shown in its practical application in the engravings. Its name—flap and shutter guard—is descriptive of the

Wallace's Flap and Shutter Guard—Fig. 1—Showing the Device in Use

device, which consists of two independent parts, as may readily be seen from an inspection of Fig. 1. The flap has an aluminum casting swinging on top of the tables. It is solid cast, the stock having a concealed spring and covers the unused portion of the cutting knives. When special work, such as rabbeting is done, it can be swung off the table to the rear, as shown in Fig. 2. The shutter is a part of a steel tube which envelopes the cutter head. The lip of the shutter rests on top of the front table and it is pushed around under the rear table, snapping back over the knives when the cut is finished and the stock releases it. Fig. 1 shows the throat opening completely covered and Fig. 2 shows it about half open. The important feature of the opera-

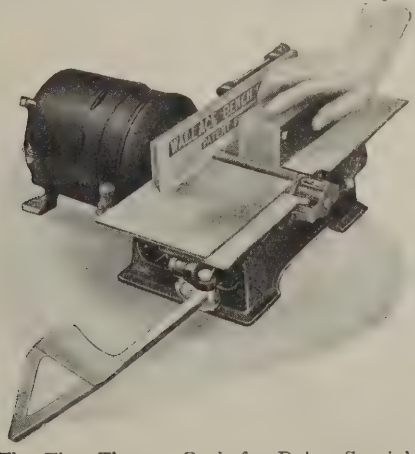


Fig. 2—The Flap Thrown Back for Doing Special Work

tion of the shutter is that any "kickback" of the stock being planed, causes the shutter to snap back over the opening as fast as the stock goes back. Nearly all planer accidents are caused by "kickbacks," and the shutter guards automatically renders such an accident impossible. The flap is included in the combination for the purpose of preventing careless and inexperienced operators getting their fingers into the unused part of the knives so that this addition makes the device absolutely "fool-proof."

Carborundum at the Panama Exposition

The Carborundum Company, Niagara Falls, N. Y., in designing its exhibit at the Panama-Pacific Exposition, which was opened at San Francisco with impressive ceremonies on February 20, adapted its product to the creation of a striking display. A central fountain, built of irregular masses of iridescent crude-carborundum crystals, rises to a hight of 10 ft. and over this a cascade of water plays. The flooring of the company's exhibit space is paved with carborundum and aloxite, and samples of the work for which these abrasives have been used, secured from all parts of the world, are displayed and appropriately described.

The Huther Dado Head

Some very interesting information for the carpenter and the builder regarding the Huther dado head is found in an attractively illustrated folder which is being distributed by Huther Brothers Saw Mfg. Company, 2500 University avenue, Rochester, N. Y. This dado head, which is claimed to cut perfect grooves of any width, with or across the grain, consists of two

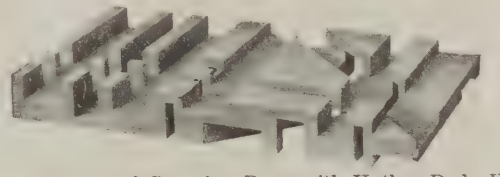


Fig. 3—Specimen of Grooving Done with Huther Dado Head

outside cutters and enough inside cutters to make the desired cut. The outside cutters are ⅛ in. thick and both being groovers may be used singly or as a pair to cut a ¼ in. groove. The inside cutters are made in thicknesses of 1/16 in., ⅛ in. and ¼ in. With each dado head the company sends out instructions for filing and fitting, and the point is made that it fits any saw mandrel or saw rig. The circular carries some illustrations in colors—one showing a stair stringer routed with a Huther dado head, while others show various kinds of grooves cut with the device, a sample of the work being indicated in Fig. 3 of the illustration.

Cabot's Old Virginia White

"Cabot's Old Virginia White in the Mississippi Valley" is the title of a daintily illustrated pamphlet that is being distributed by Samuel Cabot, Inc., Boston, Mass. The material referred to is a soft clean, white for shingles, siding and all other wood work, the claim being made that it has all the brilliancy of white wash, but none of its coarseness, rubbing off or other objectionable features. Reference is made to the fact that it is becoming fully as popular in the West as in the East, and the class of architecture upon which it is being used is well illustrated by the fine examples shown in the booklet. These are illustrated by means of direct reproductions from photographs of the finished buildings, and represent the work of architects in Illinois,

Indiana, Missouri and Wisconsin. A feature of the make-up of the booklet is found in the proofs of the half-tone engravings, together with their captions printed upon calendered paper which are pasted upon the brown colored paper leaves of which the booklet is composed. Accompanying the booklet is a smaller one of a size convenient to carry in the vest pocket and illustrating work of architects in New York State and also in the State of Massachusetts.

A Course of Instruction for Carpenters

A short course of instruction, which covers carpentry, geometry, projection, and architectural drawing, the steel square, joinery, stair building, and roofing, besides giving full instruction in the mechanics of carpentry, arithmetic, geometry, formulas, and mensuration, has just been issued by the International Correspondence Schools of Scranton, Pa. This course is of particular interest to carpenters and apprentices in the trade, who wish to increase their knowledge of the theory of their craft, and to have a firm foundation to advancement in position and wages. A prospectus of this short and excellent course, "The Carpenters Special Course," will be sent to any reader who may apply for it.

Van Guilder System of Hollow Wall Construction

A form of construction in which the walls are of such a nature as to provide satisfactory insulation from dampness, cold and heat, thereby rendering a dwelling

Van Guilden System of Hollow Wall Construction—Fig. 4—General View of Residence Built by this System

much cooler in summer and warmer in winter with a consequent saving in the cost of fuel, always appeals to the wide-awake builder as well as to the house owner. Combining these requisites with corresponding economy of construction has drawn to the Van Guilder Hollow Wall System a degree of attention that is constantly growing throughout the country. An excellent example of a dwelling erected in accordance with this system is shown herewith. The half tone, Fig. 1, gives an idea of the appearance of the completed structure, while Figs. 2 and 3 show the floor plan arrangement. The dimensions of this house are 28 x 40 ft. with a bay window extension 8 x 16 ft. The house is built of concrete, the double walls below the water table being 6 in. for the outer and 4 in. for the inner, with a 2½ in. air space between. In the superstructure the walls are each 4 in. thick. In securely tieing the two walls together across the air space $5.00 worth of No. 6 galvanized wire was used. The ties were placed 2 ft. apart horizontally and 9 in. apart vertically. Each wall was reinforced horizontally around the building every 9 in. in hight with No. 9 steel wire, while ⅝ in. iron rods were imbedded in the concrete over all the door and window openings. The cost of the reinforcing material used was $16.00. The outside walls were finished with stucco made of light colored sand, hydrated lime and white cement. The roof is covered with garnet vulcanite asphalt shingles, thus giving to the exterior of the building fire-resisting qualities. The residence is that of Peter Holt, of Ellsworth, Iowa, the house occupying a corner lot and facing south and west. We are told that for all the concrete work, including the foundation, superstructure, porches, cellar partitions, porch and cellar floors and cistern, there were used 181 cu. yds. of pit run gravel at $1.25 per cu. yd., and 167 barrels of cement at $1.40 per barrel. The entire cost of the concrete work of every kind except stucco is said to have been $900. The cost of the hollow walls was 16c per sq. ft., and the cost of the stucco for the outside walls was

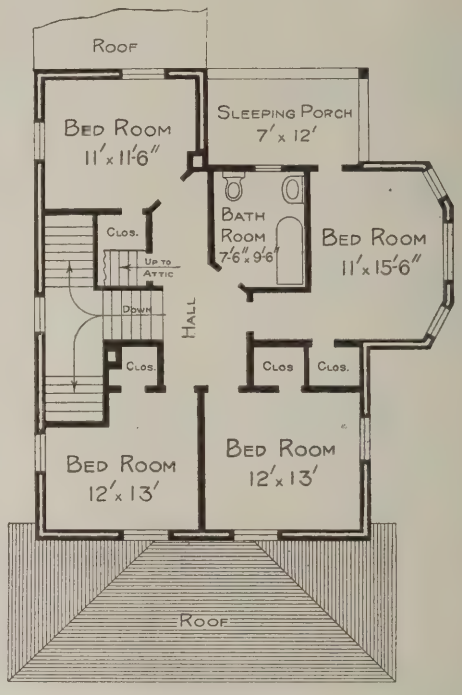


Fig. 5—Second Floor Plan

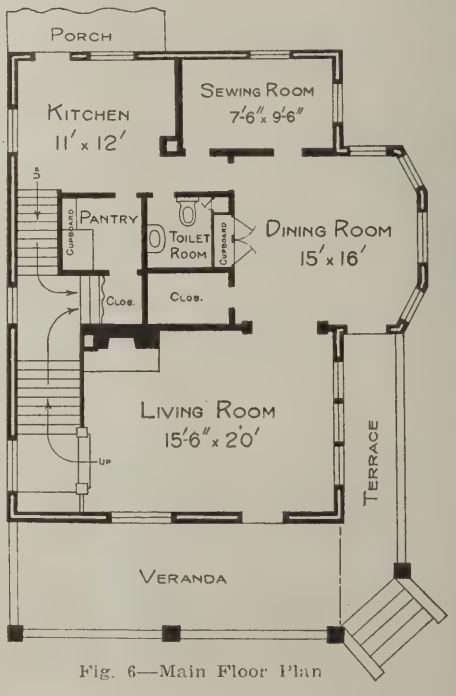
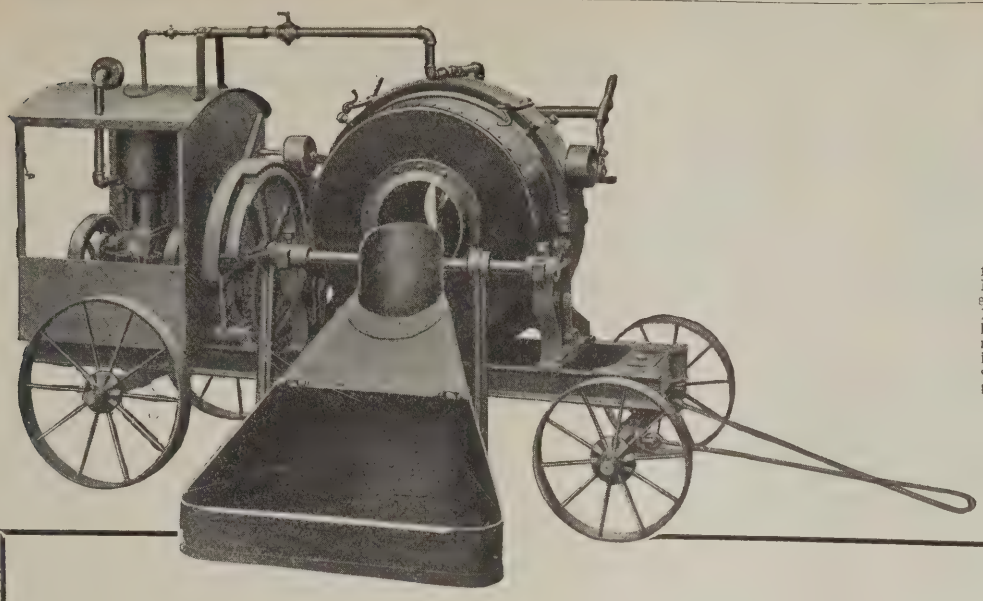


Fig. 6—Main Floor Plan

36c per sq. yd. or a total of $134. The total cost of the house is stated to have been $4,400.

The first story of the house is finished in oak, with the exception of the kitchen, which with the rooms on the second floor is in yellow pine. The double concrete walls were built with Van Guilder hollow wall machines made by the Van Guilder Hollow Wall Company, 712 Chamber of Commerce Building, Rochester, N. Y. The mixing was done by a Cottren machine made by the Knickerbocker Brothers Mfg. Company, Jackson, Mich.

(*Continued on page 78*)



$315.00

F. O. B. MILWAUKEE

Check over the equipment you get for your small investment. A Smith Mixerette mounted on steel truck and equipped with a 2 HP "FROST PROOF" gasoline engine with steel house. This price includes our famous geared power charger as shown in the cut. If batch hopper is desired instead of power charger, the price will be $246.00.

Two Dandy Concrete Outfits for the Building Contractor

A small sum of money invested in a reliable concrete mixer will enable every building contractor to handle concrete jobs economically. And the Smith Mixerette is just the machine that will turn the trick for you.

The Smith Mixerette is a light, portable and easily operated mixer with a big capacity for turning out well mixed concrete. It holds 5 cu. ft. of loose, dry material or 3 cu. ft. of mixed concrete—40-60 cu. yds. daily.

It is an all-steel mixer—just chuck full of money making features. The gear ring and driving pinion are enclosed in a dirt and dust proof casing inside of which the drum revolves. Look at the geared loader. No ropes, sheaves or overhead frame. It lifts quickly and evenly and without the twisting, jerking motion common to the pivot type loader. If desired a batch hopper can be substituted for the power loader. Such an equipment will cost only $246.00.

Now look at the hoist outfit. This rig is the only one made having the hoist mounted on the sills between the engine and mixer drum—the one place where there is no chance for the rope to cut or fray by rubbing against the drum flanges, engine house or gears. And it is sure some hoist. It holds enough ⅜-in. cable for a lift of 175 ft. It is operated by a powerful cone clutch and band brake. All levers are banked for one-man control. The substantial steel truck is equipped with standard wagon-tread axles and strong, heavy wheels—we can't tell it all here, we haven't the space, so write for a copy of our "Mixerette with Hoist" Folder No. 161-F and standard Smith Mixerette Folder No. 115-F. And don't forget to ask for the book "First Lessons in Concrete Work." Fill in the coupon.

THE T. L. SMITH CO.

3120-F Hadley Street Milwaukee, Wis.

1341-F Old Colony Building, Chicago

Send for your Free copy of the New 40-Page Book, "First Lessons in Concrete Work"

This contains valuable data and tables which will be of help to you in your work. Send for the book and either or both of our folders. Indicate which ones you want by marking a X in the little square. We'll send them on without any obligation on your part.

First Lessons ☐

Mixerette Folder No. 115-F ☐

Hoist Folder No. 161-F ☐

NAME .....

.....

Street No. .....

.....

City .....

State .....

$379.00

F. O. B. MILWAUKEE

This is the **big money maker** for the building contractor. It has the standard Mixerette drum. It has an extra long truck with **standard wagon tread axles** and strong, heavy wheels. A 3 HP FROST PROOF gasoline engine furnishes ample power to operate hoist and mixer simultaneously. This rig includes the hoist mounted on truck between engine and mixer drum. This equipment is furnished with batch hopper as shown for $379.00 or with the geared power charger for $448.00.

The contractor for the work was Olaus Hanson, of Ellsworth, Iowa, who, in collaboration with the owner, was also the architect of the building.

Myers Spray Pumps

There are many readers having occasion to use spray pumps for various purposes and are therefore likely to be interested in an attractive 64 page catalogue relating to goods of this kind which has just been issued from the press by F. E. Myer & Bro., Ashland, O. It is known as catalogue "No. S P 15" and within its covers are illustrated and briefly described bucket, barrel, hydraulic and power spray pumps, hose, nozzles, fittings, fixtures, repairs, etc. There are also illustrations showing in operation a few of Myers spray pumps, each picture clearly telling its own story. Not the least interesting feature of the catalogue is an article on Spraying, which with a list of spray formulæ and a spraying calendar are in line with the present spraying requirements and have been given the approval of agricultural experimental stations and others familiar with spraying methods. While the catalogue under review has been prepared for general distribution, primarily through dealers, the company will be very glad to send a copy of it to any reader of *The Building Age* who may make application for it.

The Toledo Indicating Level

One of the more recent candidates for popular favor in the way of a level for carpenters, builders, masons, plumbers, contractors, etc., is the tool which has been placed on the market by the Toledo Indicating Level Company, 1348 Nicholas Building, Toledo, Ohio. It is referred to as "The level that talks," and in Fig. 7

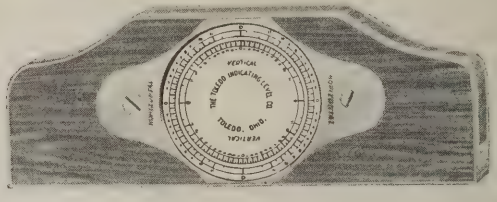
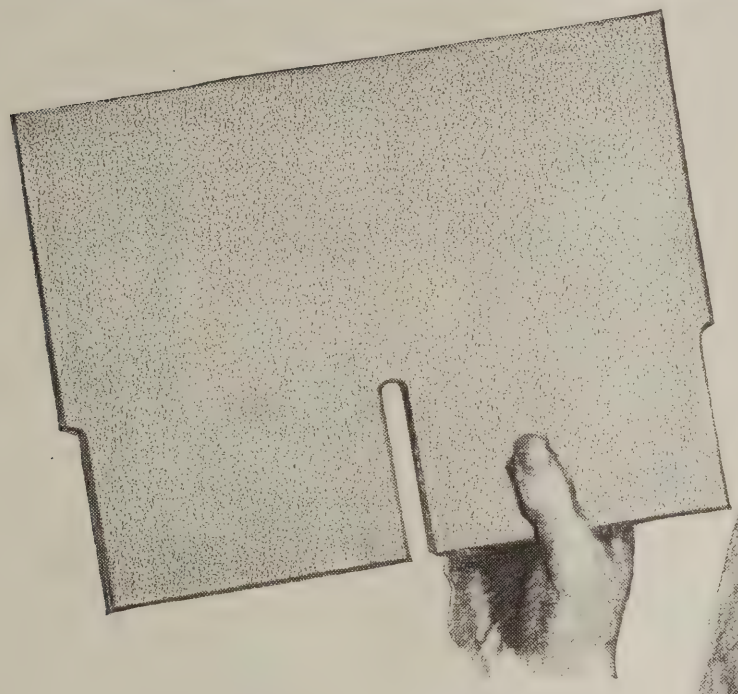


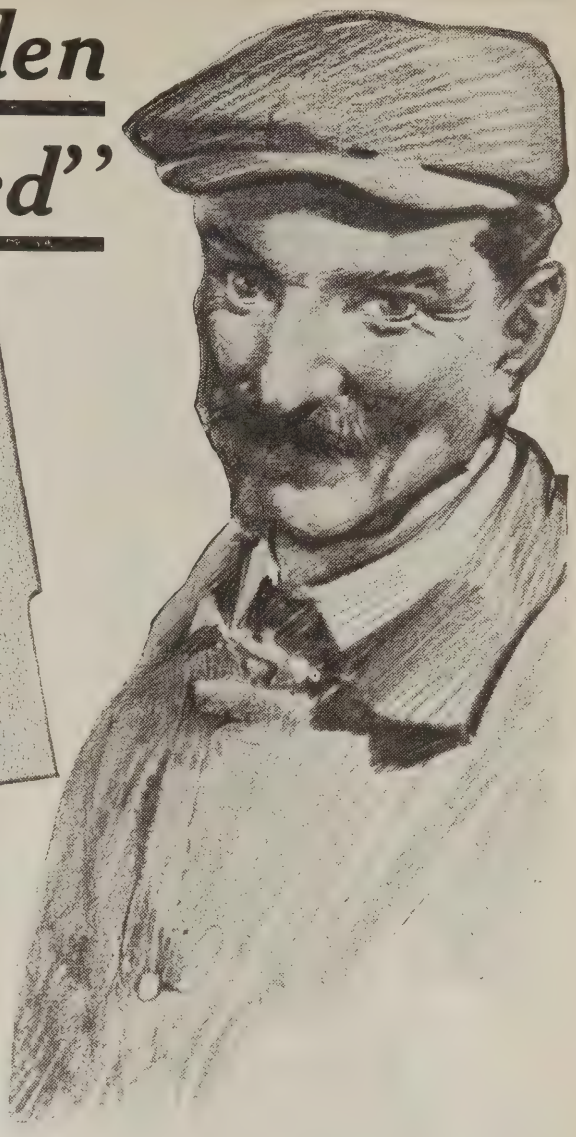
Fig. 7—The Toledo Indicating Level

of the illustrations we show the middle portion carrying the glass dial. The theory of this level is based upon the well-known physical fact that light liquid, whenever allowed to come to rest, always presents a surface parallel to the horizon. The level is constructed by the use of a very clear leaded-glass dial 3/16 in. thick, upon the front of which graduations and figures are etched and then traced with blue enamel so as to make them conspicuous against the bright red liquid, which half fills the hollow disk, the dial being so adjusted that the two zeros read exactly at a line with the liquid, the latter always maintaining a perfect level. The back of this dial bears a threaded wall which screws inside of a shallow nickel-plated fitting, the joint being made by the use of a thin gasket. When this unit is assembled it is inserted in a close-fitting bore inside of the level stock, where it is secured by a brass clamping plate and held by two screws as shown in the illustration. The graduations on this dial indicate the inches or fraction of an inch per foot that any kind of surface may be out of level or plumb, or on the other hand when such surface is exactly level or plumb. The 4-in. dial is graduated to quarter-inch readings, and we understand it is the intention of the company to later develop the principle as fine as 1/32 of an inch for the use of mechanics where *exact* readings are required. By the use of this level it is claimed that all guess-work is eliminated and that the time saved which is now spent in correcting work will more than pay the cost of a level in a few days. The level is made in a variety of sizes, the style of which we show a portion herewith being 12 in. in length and brass bound. Other styles are 24 in., 30 in. and 42 in. in length. An at-

(*Continued on page* 80)

"My Sale of *Wooden* Shingles *Increased*"





"When I first took on the NEPONSET Shingle I expected it would cut into my wooden shingle business. Instead, NEPONSET Shingles advertised *me* and *my business*, and *increased* my wooden shingle sales.

NEPONSET Shingles

PATENTED

are not ordinary composition shingles. They are built up *individually*. Made in pairs to reduce laying-costs.

"The greatest roofing development of the 20th century. Any carpenter would be foolish to overlook this new *yet time-tested* product."

The same materials are used in **Neponset** Shingles as in the well-known **PAROID** Roofing, also used in **Neponset** Proslate, the highest grade colored ready roofing ever made. **Neponset** Wall Board, **Neponset** Waterproof Building Paper and **Neponset** Floor Covering are other well-known **Neponset** products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me a sample of the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

tractive circular sent out by the company carries a full size picture of one of the 24 in. levels and clearly shows the various graduations upon the dial plate.

Use of Slate on Flat Surfaced Roofs

One of the developments of the slate industry is the rapidly growing use of this material on flat surfaced roofs. The waterproofing is applied just the same as on a built-up roof intended for covering with slag or gravel, but instead of these materials roofing slate of ordinary thickness is imbedded in the hot mixture to form the protective surface. We understand that the Bangor Roofing Slate Manufacturers' Association in collaboration with the Barrett Mfg. Company, has given the subject very careful attention and the results of their investigations with instructions and specifications will soon be ready for distribution in pamphlet form. The claim is made that "slate makes the ideal flat roof" for the reason that the slate surface is not subject to wear by the elements and makes a smooth, clean surface, which is in effect practically a slate pavement.

The "Dumpy" Level

The chief advantage of the Dumpy Level, recently placed on the market by the David White Company, 421 East Water street, Milwaukee, Wis., and illustrated in Fig. 8 is its great strength and rigidity. The adjustments of this instrument are also more permanent than that of the "Y"-level, although the

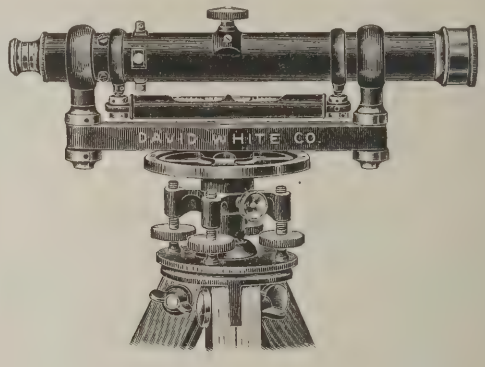


Fig. 8—General View of the "Dumpy" Level

"Y"-level, on account of its having more intricate adjustments, is capable of doing more accurate work. Yet the Dumpy Level, which is sufficiently accurate to meet the needs of the average building contractor, is becoming more of a favorite because of its ability to stand rough usage without injury to the instrument or its adjustments. The company further points out that the level here illustrated is but one of its many styles of instruments designed especially for the contractor and builder, all of which are shown in the new illustrated catalogue which will be sent free postpaid to all interested contractors.

Space Saving Fixtures for the Household

The Space Saving Appliance Company, 109 Lafayette street, New York City, is distributing among the trade an illustrated pamphlet relating to the space-saving fixtures which it manufactures. Prominent among these is the combination sink, drainboard and two-part wash tray which is said to require a floor space of only 24 x 48 in., and the space is used at all hours of the day whereas if separate fixtures were installed the floor space utilized by the ordinary wash trays would probably be used only once a week. When the sink and drainboard of the combination is in a raised position allowing the use of the tubs, it is possible to clean thoroughly the under side of the sink strainer and the standing waste pipe of the sink to the trap without using any other tools than a bottle wash. This waste pipe is separate and independent from the wash tray pipe and is permanently attached to the wash tubs in such a manner that it is not in the way when washing is being done. The combination which gives sink,

(*Continued on page* 82)

drainboard and bath tub does not require any additional floor space and is used largely in apartment houses as a servant's bath. This fixture is also used in tenements where no provisions have been made for bathing purposes, and upon its installation has rendered it possible for the owners to make the building more profitable as an investment. This combination is also very popular with architects who cater to the bungalow style of building. A large number of dwellings of this character in the various summer resorts throughout the East have been fitted with the company's combination bath and wash stand. This combination has a movable partition in the center which has a rubber tire around it that fits into a brass frame recessed to the inside of the tub. This frame has a groove 1/16 in. deep and ⅜ in. wide, into which fits the rubber tire. The movable steel bar with two compression screws in it fits into the upper part of the brass frame on either side of the tub. By turning down these compression screws the rubber tire is forced against the brass frame, thus making an absolutely water-tight division in the tub.

Accompanying the pamphlet referred to is a folder illustrating and describing the Madsen automatic water heater, the use of which eliminates the hot water storage tank.

Wheeling Galvanized Wall Ties

The growing tendency in many sections to construct buildings having exterior walls in which an air space is provided for purposes of insulation has created an

Fig. 9—Wheeling Galvanized Wall Ties—The "Standard"

increased demand for wall ties to bind the outer and inner walls together, or in the case of a brick veneer, to bind it to the frame work of the building. In order to meet this demand the Wheeling Corrugating Company, Wheeling, W. Va., is offering two kinds of galvanized wall ties, illustrations of which are presented herewith. One of these, known as the "Standard," made both straight and corrugated, is ⅞ in. in length. It is perforated at one end with two holes in the longitudinal plane of the tie, as indicated in Fig. 9. The "Veneer" wall tie shown in Fig. 10 is ⅞ x 5½ in. The upright part is flat while the base of the tie is corrugated. The point is made that by the use of wall ties

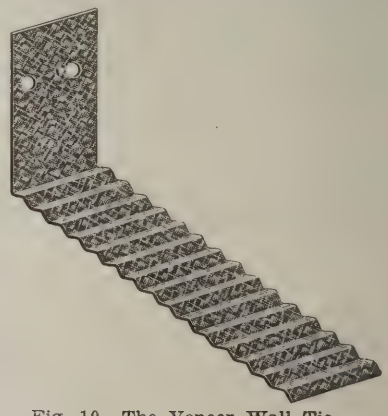


Fig. 10—The Veneer Wall Tie

the bricklayer is enabled to work faster as there is no necessity for clipping brick for bonds. The uniform corrugations in the ties give a large bonding surface and also an equal pull on the mortar at all points. The "Standard" ties are packed 100 to a carton, or 5000 to a wooden crate. The "Veneer" ties are packed 500 to a carton, or 5000 to a wooden crate.

Lansing Molds for Concrete Pipe

The cement industry has taken on such proportions at the present day that it is used in practically every conceivable form. One of the important applications

(*Continued on page* 84)

of the material is in the manufacture of cement pipe both for drainage and water supply. One of the great advantages of this business is the small capacity required to establish it upon a profitable basis. A few molds and a place to make the pipe are all the essentials that are required. The expenditure for molds is small and the business therefore offers great possibilities as an exclusive line or as an addition to a cement block or concrete plant. Molds for making concrete pipe are one of the products of the Lansing Company, Lansing, Mich., and we understand that its molds have been used for putting in hundreds of miles of pipe in Brooklyn, Milwaukee, Denver and in the cities of Mexico. They are also largely used by the United States Government in connection with irrigation projects in the West. In addition to the hand molds, the Lansing Company turns out power drain tile mediums for which many claims are made.

Beautiful Interiors

Under the above title there is being distributed among architects and builders a dainty *brochure* carrying numerous half-tone engravings of interiors showing the application of Ceil-Board for the finish of walls and ceilings. The material is made on scientific principles and is designed to eliminate the many faults of plaster while providing many advantages heretofore unknown in a building material of this nature. It is a combination of highly compressed pure fiber panels treated with moisture-proof sizing and held together with guaranteed water-proof cement of great tenacity. A complete panel is 3/16 in. thick and has a tensile strength so great that a 16 in. square will, it is claimed, sustain the weight of 725 lbs. The panels are furnished in standard widths of 32 and 48 in. in the gray and tan finishes, but in the 32 in. width only in the wood grain finishes. The point is made that Ceil-Board is an effective sound deadener, also an excellent insulating material, excluding the heat in summer and the cold blasts of winter, and at the same time its fire retarding qualities reduce the fire risk in buildings in connection with which it is used. Another point emphasized by the makers of the material, the Philip Carey Company, 1003 Wayne avenue, Lockland, Cincinnati, Ohio, is that Ceil-Board cannot crack or fall like plaster and is unaffected by shocks, jars or vibration. The board is also well adapted to any treatment used in the decoration of plaster or wood, can be painted with either oil, water colors or cold water paints and will also take wall paper if such a scheme of decoration is desired. The *brochure* in question gives much interesting and valuable information concerning this product and we understand that a copy of "Beautiful Interiors" will be sent to any architect, builder contractor or house owner who may desire it.

Simplex Concrete Piling

Under the above title there has recently been issued a very attractive treatise dealing with the placing of concrete piling in the ground in straight cylindrical shape to such depths and of such diameters as are required by the condition of soil and loading. The system illustrated and described is that of the Simplex Concrete Piling Company, Tacony, Philadelphia, Pa., and the matter is presented in such shape as to be of special interest and value to the architect and building contractor. Reference is made to the Standard Simplex pile, the Simplex molded pile, the Simplex shell pile, and the Simplex composite pile, the latter type being designed to cheaply meet soil conditions requiring great depth of penetration and where the permanent water line is considerably below the surface. Fully one-half of the book is given up to well executed half tone engravings of typical structures carried on Simplex piling, together with a selection of tests by loading, exposure and experience.

New Home of A. S. Aloe Company

The A. S. Aloe Company has just taken possession of its new "made-in-St. Louis" building at 513 Olive

(*Continued on page* 86)

street, St. Louis, Mo., which is said to be one of the finest and largest devoted exclusively to that particular line of trade. The new structure is of fireproof construction eight stories in hight and has a floor space of 33,600 sq. ft., all of which is utilized by the company for the purposes of its business.

The first floor is devoted to the optical department and the display of photographic goods. It has white tile floor, rich mahogany furnishings and soft, indirect lighting. On the second floor is an extensive display of surgical instruments, hospital and school room supplies, while the third floor is devoted exclusively to the mathematical supplies for the students, the draftsman and the engineer. Everything from the pencil and drawing paper to the finest calculating instrument is here shown. Another floor is devoted exclusively to the manufacture of surgical belts, supporters and orthopedic apparatus.

The general offices occupy one entire floor, while another is given up to an elaborate plant for the developing of photographic prints. The top floor, which was designed especially for the purpose, constitutes a daylight factory for the grinding of lenses in co-operation with the optical department on the first floor. The architects were Mauran, Russell & Crowell, the building contractors were James T. Stewart & Co., and the engineer was H. H. Humphrey, all of St. Louis. The lighting fixtures were designed by the St. Louis Brass Mfg. Company, and the store fixtures and interior decorations were installed under the personal direction of Hugo Heimann.

Money Making Concrete Mixers

Under the above title the Cement Tile Machinery Company, Waterloo, Iowa, is distributing an attractive 24-page catalogue bound in paper covers and illustrating and describing its varied line of "Winner" concrete mixers. The line embraces both large and small capacity machines with the latter in the lead, the company stating that nine out of every ten mixers sold today are machines ranging in capacity from 2 to 6 cu. ft. The company's model "A" and "B" are built only in 2 cu. ft. size, the model "B" having been designed especially to meet the demand of the small contractor who desires to maintain a reputation for quality work and at the same time do the work with the least possible expense. The machine can be operated with a very small crew and will turn out 2 cu. ft. per batch or from 15 to 30 cu. yds. per day. The claim is made that it will be found a profitable little machine for the small contractor who is doing a varied line of work. The other models shown in the catalogue are of 4 and 6 cu. ft. capacity. The model "E" is referred to as being of special interest to carpenter-contractors who have need for a hoist of some kind, and the machine in question has been filling this requirement in a very satisfactory manner. It allows the carpenter to go ahead and do his small concrete jobs without waiting for a concrete contractor. At the same time the hoist saves much time and labor in getting the material to

Fig. 11—Side View of Model "E" Winner Concrete Mixer

(*Continued on page* 88)

the building. In Fig. 11 of the illustrations we present a general view of the model "E" machine.

The Concrete Road

One of the most important topics of the present day is undoubtedly that of good roads, for the advantages to be derived from good roads in lowering the cost of living by making longer and quicker hauls possible are a gain both to the farmer and to the city resident. This timely topic is interestingly discussed in an attractively printed *brochure* of 38 pages prepared by Arthur C. Newberry and distributed with the compliments of the Sandusky Portland Cement Company, Sandusky, Ohio. Interesting particulars relative to the initial cost of concrete roads, their durability and resistance to wear, cost of maintenance, together with details of construction are to be found within the covers of the little work. Not the least important information is found in the specifications of the American Association of Cement Manufacturers for concrete roadways. Emanating from the source which it does the little book will be found of unusual interest and value, more especially to those having to do with the construction of concrete roads.

New Offices of Rising & Nelson Slate Company

The Rising & Nelson Slate Company at West Pawlet, Vt., has recently opened a branch office and slate yard at 2554 West Harrison street, Chicago, Ill., under the management of F. C. Myer. Here will be carried in stock a good supply of slate, the location of the yard being such as to render it very convenient for supplying the Chicago trade. The company has also recently opened offices in the Singer Building, New York City, under the management of Leigh Lundy and at 4 Post Office Square, Boston, Mass., in charge of George Kendall. The main office of the company is at West Pawlet, in the center of the colored slate quarries. We understand that production of all kinds of colored slate has been largely increased by the company during the past year, and that it is now operating the largest and deepest slate quarries in the state. It has lately issued a wholesale price list of roofing slate dating from the first of the present year.

TRADE NOTES

Mason & McNeil have opened offices for the practice of architecture in the Barrett Building, Jamestown, N. Y., and would like to receive manufacturers' samples and catalogues.

The Murphy Varnish Company, Newark, N. J., issues as a house organ an attractively printed 12-page *brochure* called "The Finishing Touch," and within its covers is found some very interesting matter relating to the products of this enterprising concern. Under the head line are the following words: "The setting up of knowledge where ignorance has prevailed is the best of all advertisements for a business founded on knowledge and conducted with knowledge." The feature of the copy of "The Finishing Touch" before us is a double-page living-room interior printed in colors and carrying the caption "Univarnish is the varnish that can be used for everything in and around your home for pianos, furniture, floors, boats, autos and railroad cars."

The latest issue of the "James Barn Magazine," which is published several times a year in the interest of successful dairying through modern barn equipment by the James Mfg. Company, Fort Atkinson, Wis., contains some very attractive illustrations of barns, which are accompanied by brief descriptive particulars. These barns are designed by the company in question and are equipped with its product. The pictures show not only exterior views but also a number of attractive interiors.

The manager of the Davenport Roofing Company, 321 Rock Island street, Davenport, Ia., regards the building outlook for 1915 as very bright and, in fact, much better than it has been for some years past. He states that his company has contracts for roofing four school

(*Continued on page 90*)

buildings in Cedar Rapids in addition to a great many other new structures in Davenport and vicinity.

D. J. Newson Contracting Company, 1155 Cleveland avenue, Niagara Falls, N. Y., would like to obtain copies of catalogues and samples of materials pertaining to building construction.

The National Metal Weatherstrip Company, of Ft. Worth, Tex., has been incorporated with a capital stock of $1000 by R. J. Pence, W. F. Fry and E. A. Jackson.

Tubular Heating & Ventilating Company, 232 Quarry street, Philadelphia, Pa., is distributing an attractive catalogue of 48 pages, illustrating and describing the Forbes warm air furnace which is especially adapted for use in low cellars. Special attention is drawn to the radiating manifold as applied to heating air and to the general simplicity of the construction and operation of the furnace. Scattered through the catalogue are half tone engravings of dwelling houses in connection with which the Forbes has been installed, and there are also basement views showing the heater and its runs of piping.

International Slate Company, Slatington, Pa., is sending out a pamphlet of a size convenient to carry in the pocket relating to slate roofing and blackboards. Directions are given telling how roofing slate is put on, also how to use several sizes of slate on one roof. Not the least interesting feature of the pamphlet is found in the rules for measuring slate roofs. A table gives the slate in any number of squares from 5 up to 60, while others show the exposure to the weather on the roof when slate is used of standard 3-in. lap; the distance for lath or between the nails in each row, and the quantity of nails necessary to lay a square. Following pictures of the company's punching machine are patterns showing how the slate can be cut.

The Majestic Company, 504 Erie street, Huntington, Ind., has just issued an attractive catalogue for 1915 relating to Majestic modern building specialties, such as furnaces, coal chutes, garbage receivers, etc. These are illustrated and described in attractive form, and their merits are set forth in a way to command the attention of the architect, the builder and the house-owner.

The Roberds Mfg. Company, 101 Railroad street, Marion, Ind., is distributing samples of Roberds ideal wallboard, a tough, fibrous material constructed of four layers of strong, special fibre stock and three layers of the company's own special asphalt compound, waterproofed and pressed into panels of uniform thickness. It is intended to be used instead of lath and plaster, and may be nailed directly to the studding. It is furnished in 32 and 48 in. widths and in any length from 5 ft. to 16 ft.

The Marbleoid Company of New York City, makers of fireproof flooring, has recently established a branch office at 122 South Michigan boulevard, Chicago, Ill., under the management of the Mid-West Supply Company.

Detroit Show Case Company, 483 West Fort street, Detroit, Mich., is distributing a very attractively illustrated catalogue relating to the "Petz" system of metal store-front construction. The matter presented is addressed to architects, builders and contractors, the point being made that the Petz corner post and transom bar does away with large, unsightly pillars and posts, is strong, takes up but small space, does not obstruct the light and gives use of every inch of window display. The inner core is reinforced with a heavy steel bar which extends the full length and is turned over at each end so that it can be easily and securely fastened to the frame work. The outer core is made of cypress with a heavy metal covering tightly drawn over and clinched at both sides by a special process. Accompanying the pamphlet is a large sheet of blue-print details.

Provident Slate Company, Slatington, Pa., is favoring its friends in the trade with a daintily printed pamphlet containing much interesting information regarding slate, its quarrying and its application. The pamphlet has been prepared in response to numerous requests for information along the lines indicated, as it is a well known fact that many architects, contractors and slate roofers have but little conception as to

(*Continued on page 92*)

the preparation of roofing slate for shipment to market, and also as to what veins or stratas produce the choicest unfading qualities. A feature of the company's business is the "guarantee" which is given with every shipment that the slate is absolutely uniform and unfading in color.

Universal Portland Cement Company, 208 South La-Salle street, Chicago, Ill., makes the announcement that Charles S. Fletcher has been appointed manager of the Sack Bureau, Oscar N. Lindahl has been appointed chief accountant and Gordon Wilson has resigned as assistant secretary to accept service with another concern.

The cover design of the March issue of "DooR-Ways," the house organ of the Richards-Wilcox Mfg. Company, Aurora, Ill., is decidedly suggestive of the month, and is printed in colors with pleasing effects. Within the covers considerable attention is given to San Francisco and the Panama-Pacific Exposition, with intermingling pages devoted to R. & W. door fixtures and hangers. The calendar for March, which accompanies it, is in keeping with those with which the company has periodically been favoring its friends.

Bertram A. Duncan, 113 Munroe street, Lynn, Mass., has opened an office for the practice of architecture, and is desirous of obtaining catalogues and samples from manufacturers of building materials, plumbing supplies and electrical appliances.

William H. Hart, president for 60 years of the Stanley Works, New Britain, Conn., has recently resigned to accept the chairmanship of the Board of Directors, a new office created by a change in the by-laws adopted at the stockholders' meeting.

"Some Shingles" is the title of an 8-page folder sent out by Bird & Son, East Walpole, Mass., and relating to "Neponset" shingles. The company points out that there is every indication that 1915 will see a revival of building, and accordingly it has prepared a big campaign on its most distinctive product—Neponset shingles. The latter, it may be stated, are built-up shingles, tapered like wooden ones, with the butt end of treble thickness. Accompanying the folder is a large colored poster intended for display purposes by dealers handling Neponset shingles. A portion of the panel represents a dwelling roofed with the material in question.

The Stark Rolling Mill Company, Canton, O., makes announcement of the appointment of the Dearborn Steel & Iron Company with offices in the Peoples Gas Building as its selling agents in Chicago, northern Illinois and Wisconsin. The Dearborn company is a new concern, and we understand that much time will be devoted by it to the sale of the well-known Toncan metal products of the Stark mill, and at the same time they will solicit orders for regular black, galvanized and blue annealed steel sheets and formed products.

Kolesch & Co., 138 Fulton street, New York City, has just sent out an illustrated folder consisting of extracts from its catalogue and price-list of drawing instruments, papers, etc. Special reference is made to the "sets" in which the drawing instruments can be obtained, and in connection with the illustrations are given numbers, sizes and costs. We understand that a copy of the illustrated folder will be sent to any reader who may be interested.

Jesse F. Kennedy has opened offices for the practice of architecture in Suite 512, Fayette National Bank Building, Lexington, Ky., and would like to receive samples and catalogues from manufacturers of building materials in various parts of the country.

The Detroit Flexotile Floor Company, Detroit, has been incorporated with $10,000 capital stock by George A. Erskine, John H. Collins and John J. Trevaskus, and others, to manufacture flexotile products.

Bangor Slate Mining Company, Bangor, Pa., presents some interesting facts about slate in a 12-page pamphlet which it has issued. The statement is made that its Bangor-Washington quarry was one of the first to be opened in the celebrated Bangor region and that it has been operated for the past 50 years. In addition to rules for measuring slate roofs and tables showing

(*Continued on page 94*)

the sizes of slate, etc., price lists are given together with brief reference to tools used in slate roofing.

Standard Mfg. Company, Shelby, Ohio, refers to the Standard checking spring hinge as combining all the advantages of the old style double action hinge with the all-important door check feature. It is an ingenious device so constructed that the door swings slowly, stopping at "dead center." The point is made that it is absolutely noiseless and that it is especially adapted for double acting doors between dining room and pantry or kitchen in residences, apartment houses, etc.

Milwaukee Corrugating Company, Milwaukee, Wis., and with branch office at Kansas City, Mo., is urging the merits of its "Milcor" metal building corners and batten barn strips which are of a nature to interest the architect, the builder and also the owner. The company is also calling attention to its "Titelock" metal shingles and to its varied line of other sheet metal specialties.

Weiser Mfg. Company, 325 West Thirty-eighth street, Los Angeles, Cal., has just issued from the press what is known as catalogue No. 11, relating to various lines of attractive builders' hardware in bronze and brass. The little book is profusely illustrated and the pictures are accompanied by brief descriptive text. The goods shown include locks, escutcheons, hinge straps, cabinet trim, door and window guards, push and kick plates, brass railings, etc.

Biesanz Stone Company, Winona, Minn., is distributing a circular descriptive of a new sand and gravel washing device which it has developed for use at its own gravel pits. The machine is simple in construction and is said to effect great economy in the washing of sand and gravel.

TABLE OF CONTENTS FOR MAY, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

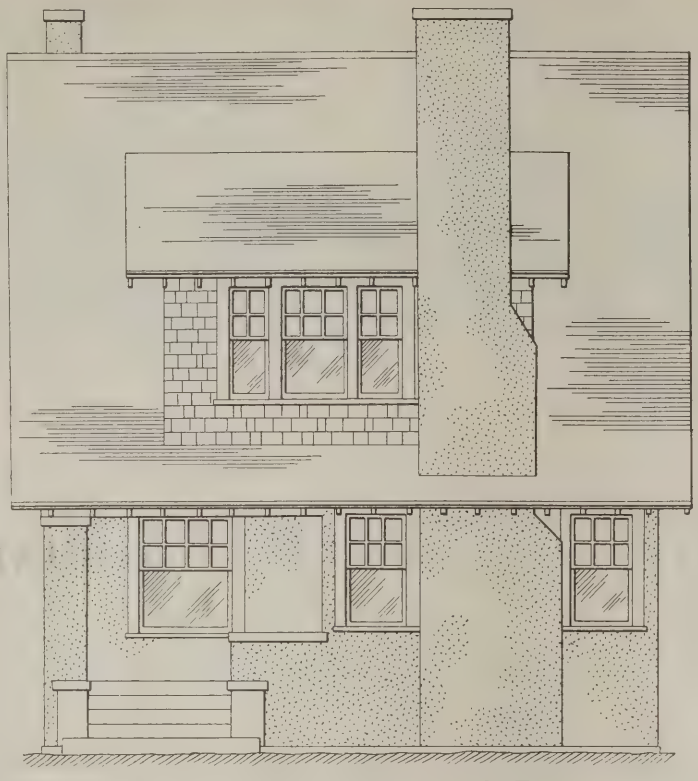
NEW YORK, MAY, 1915

A Suburban Home of Tile and Stucco

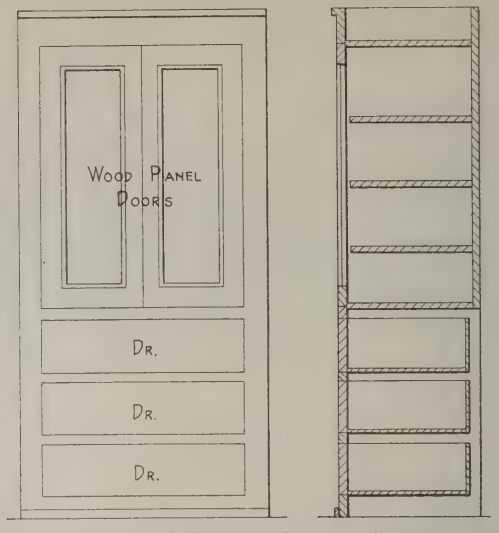
An Attractive Cottage in the Middle West Costing $3,500—The Living Room Chimney a Feature

THE art of specialization along certain lines of building construction is practised with considerable profit by many contractors and there are several reasons for its continued advocacy. It is generally recognized that this method of business procedure has the tendency to decrease overhead expenses on account of the contractor's expert knowledge of time and material values, while he is also able to introduce into the various constructive phases of the work certain time-saving kinks resulting to his own and his client's profit. The truth of this statement is emphasized rather forcefully in considering the subject of the article presented herewith. It is an attractive two-story suburban residence constructed of hollow tile. It is situated in Park Ridge, Ill., a small town on the

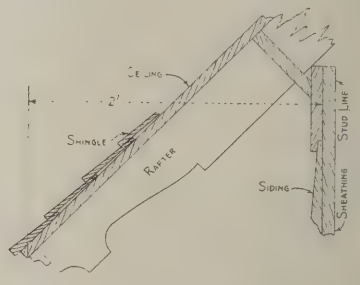
A Suburban Home of Tile and Stucco—Erected by A. Baxter at Park Ridge, Illinois



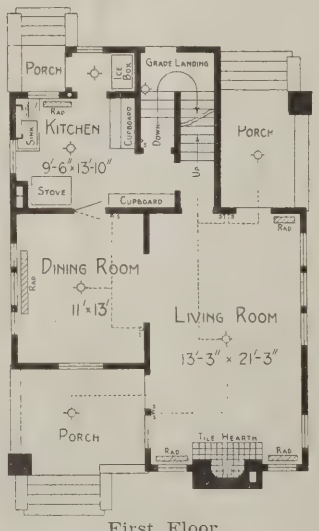
Front Elevation—Scale ⅛ In. to the Foot



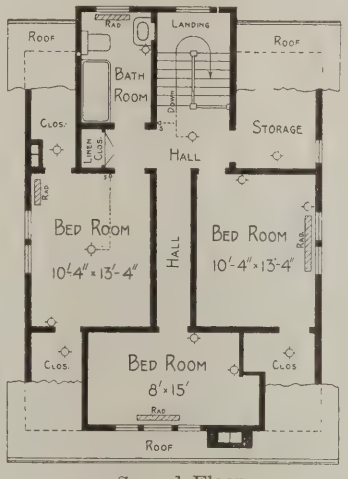
Elevation and Section of Linen Closet—Scale ⅜ In. to the Foot



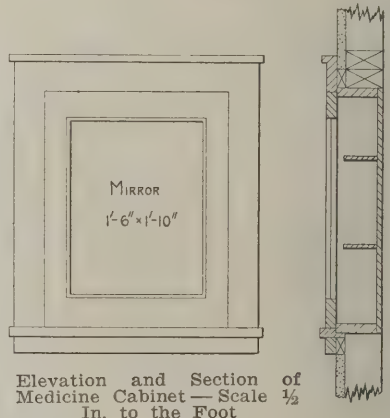
Detail of Rafter Ends—Scale ¾ In. to the Foot



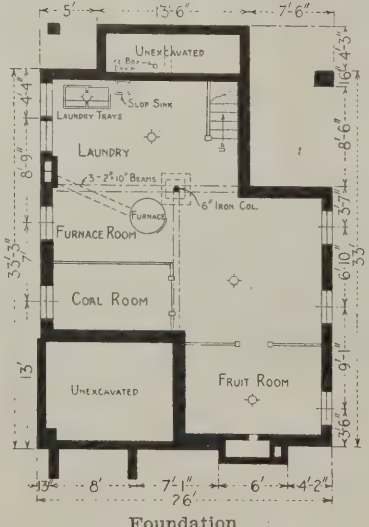
First Floor



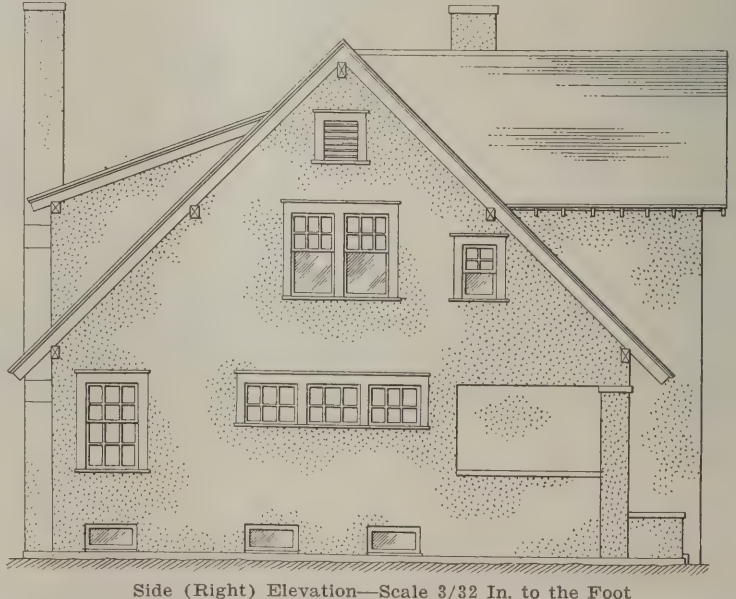
Second Floor



Elevation and Section of Medicine Cabinet — Scale ½ In. to the Foot



Foundation
Scale 1/16 In. to the Foot



Side (Right) Elevation—Scale 3/32 In. to the Foot

A Suburban Home of Tile and Stucco—Plans, Elevations and Miscellaneous Constructive Details

outskirts of the city of Chicago. It was constructed by a building contractor who specializes in this type of work, and it represents the class of modern home which may be erected for an investment not exceeding $3,500 in the Middle West.

The contractor specializes in this type of construction principally for the reason that he feels he has to offer his clients a most attractive proposition, especially for the man with a moderate income. He points out that he is able to provide a commodious structure with every modern convenience at a price comparing most favorably with frame construction, with the additional advantage of its fireproof qualities. Some additional arguments cover the low cost of maintenance, cheaper insurance rates, greater warmth in the colder months and greater comfort in the summer season.

A Suburban Home of Tile and Stucco—View in Living Room Looking Toward Open Fire Place

The simplicity of construction, coupled with the builder's own ingenuity, makes the cost low, without sacrificing any essentials of construction.

The subject forming the basis of this article is one of his contracts of recent completion. The accompanying illustrations and floor plans reveal a comfortable arrangement of rooms on the first and second floors, especially suitable for the convenience of an average family. The residence has a southern frontage, and every room throughout the house is well lighted as may be seen from the pictures of the exterior. This is especially true of the living room, where there are windows on the east and south sides, while the windows in the dining room on the west stream an abundance of light to all corners. The comfortable appearance of the living room is given a more homelike atmosphere by the inclusion of a brick fireplace and hearth.

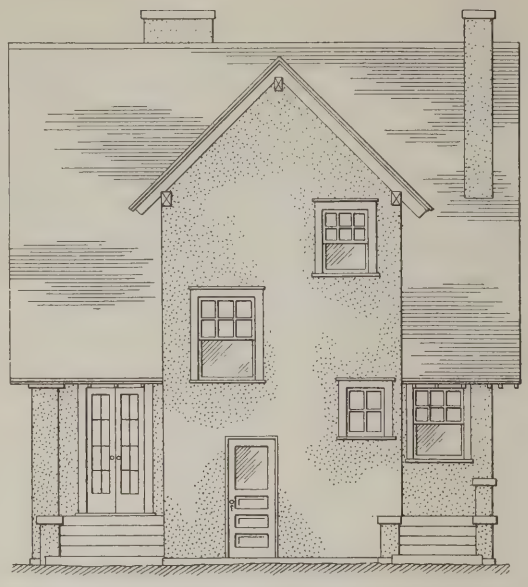
The living room measures 22 x 14 ft., and is reached from front and rear porches, as well as from the dining room. The latter has dimensions of 12 x 13 ft.; beyond it is a large kitchen, which has excellent lighting facilities on account of its location. The plan includes a large spice cabinet situated directly over the sink, while on the right hand side will be seen two large cupboards, provided with drawers. A small porch off the kitchen houses the ice box. In the hall off the kitchen are two flights of stairs—one leading to the basement and the other to the second uoor.

On the second floor are located three comfortable bedrooms, each provided with roomy closets. The hall also gives access to a general storage room, while on the opposite side is a large linen closet. The stairway from the first to the second floor is well lighted by a window at the landing. The bathroom measures 10 ft. long by 6 ft. wide, all fixtures being situated on the side at the left of the entrance—a most convenient arrangement.

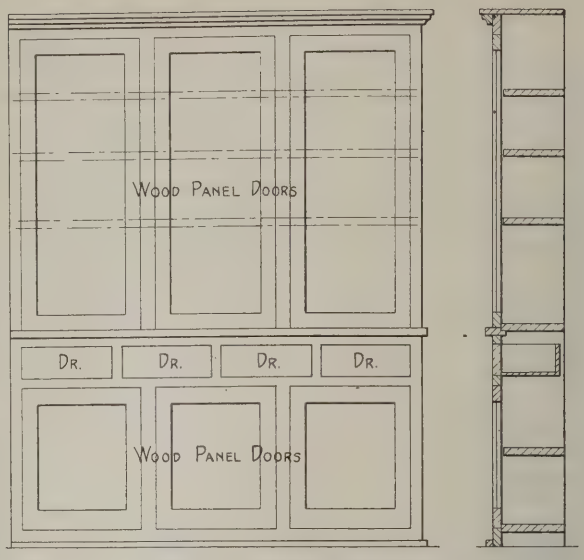
For the exterior walls and interior partitions hollow tile was used giving in the exterior walls a 6 in. double air-space and in the interior partitions a 2 in. air space.

For the foundations 6 in. vitrified tile was used. The footings are 12 in. wide by 6 to 8 in. deep.

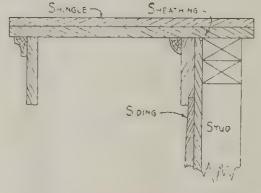
In setting the tile the cores were laid horizontally, and not vertically as specified by the manu-



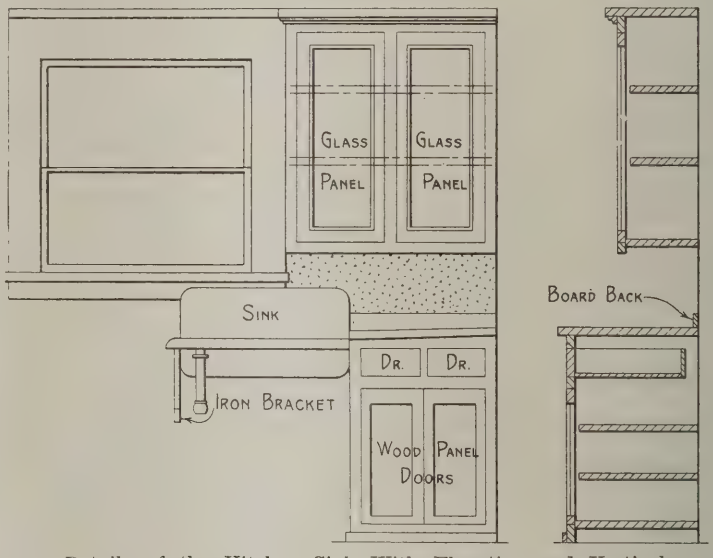
Rear Elevation Showing Grade Entrance and Two Porch Entrances—Scale 3/32 In. to the Foot



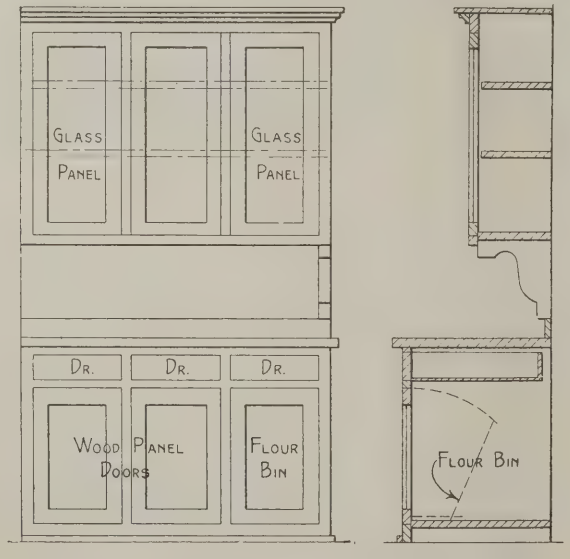
Elevation and Section of One of the Kitchen Cupboards —Scale ⅜ In. to the Foot



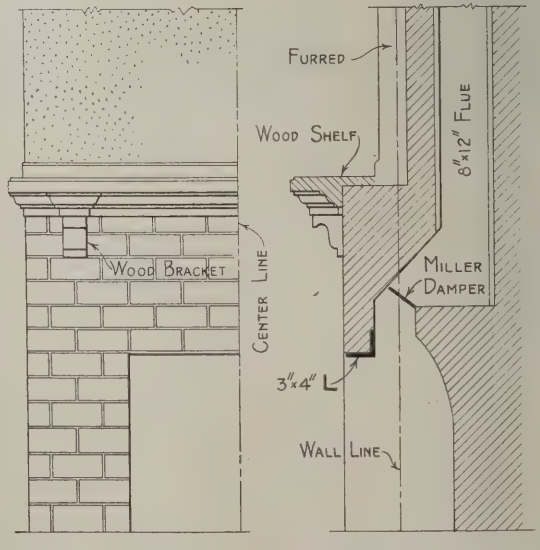
Detail of Barge Showing Construction—Scale ¾ In. to the Foot



Details of the Kitchen Sink With Elevation and Vertical Section of the Kitchen Cupboard—Scale ⅜ In. to the Foot



Details of the Second Kitchen Cupboard—Scale ⅜ In. to the Foot



Details of Open Fireplace and Mantel—Scale ⅜ In. to the Foot

A Suburban Home of Tile and Stucco—Elevation and Miscellaneous Constructive Details

facturers, it being the contention and experience of the contractor that the efficiency of the tile is increased by this method of construction. As against this contention, however, it may be stated that exhaustive tests by a well known firm of engineers have demonstrated beyond all question that a wall built of hollow tile laid on end in the usual way is nearly twice as strong as a wall built of tile laid on the side or with the cores running horizontally.

All mortar used in setting the blocks of tile was composed of one part of Portland cement and three parts clean coarse sand, with lime not exceeding 2 per cent. of the mixture. It was the practice of the builder to erect the tile to a hight of 5 to 6 ft. before mortaring the exposed joints. All pipes necessary in the plumbiing and vent lines were erected before the setting of the tile, but in the case of the risers for the hot water system of heating, the piping was carried on the inner side of the exterior walls, and visible on the inside of the house.

The tile was set continuously from the bottom up to the window frames in the basement. After the setting of the frames, the wall was continued up to first floor joists, the latter being 2 x 10 in. and resting in a cement pocket. At the point where the sills occur a 2 x 4 in. strip was imbedded in a cement pocket and the sills set in place.

After the tile had reached its highest point, the top was covered with a 2 in. cement finish, into which double plates were pressed and allowed to set. The gable rafters are 2 x 6 in. placed 24 in. on centers, and spiked at 4 to 6 in. intervals to the wall plates.

The roof is framed as shown in the detail drawing. The ridges are 1 x 8 in., and all necessary collar beams are put in. Projecting eaves have roof boards of $\frac{7}{8}$ x $3\frac{1}{4}$ in. clear yellow pine laid face down. On the gable ends half the boards run in on the roof 4 ft., breaking the joints with common roof boards. The roof is sheathed with yellow pine boards, and covered with undipped shingles of white cedar exposed $4\frac{1}{2}$ in. to the weather.

All galvanized iron work is of No. 26 gage. The down spouts are of 4 in. corrugated material. The guttering is supported at close intervals with strong iron straps. All joints in galvanized iron work are well riveted and soldered.

The exterior walls are plastered two-coat work. The first coat was composed of equal parts cement and lime, with a proper proportion of sand, and was deeply scratched. The second coat was made up of equal parts of cement and sand, with but little lime. The final dash coat of stucco was the prepared white waterproofed compound manufactured by the Garden City Sand Co., of Chicago, Ill.

The cellar extends under the entire building and has a concrete floor. First a 4 in. bed of cinders was laid down and then on top of this was applied $3\frac{1}{2}$ in. of concrete, composed of one part Portland cement, three parts coarse sand, and five parts of $\frac{3}{4}$ in. crushed stone. A top coat $\frac{1}{2}$ in. thick composed of one part Portland cement and two parts of clean sharp sand and pitched to the drain completed

A Suburban Home of Tile and Stucco—The Living Room Looking Toward the Rear Porch—Dining Room Is Seen at Left and Door in Background Leads to the Main Stairs and Kitchen

the work. The outside steps and porches are also of concrete, given a smooth finish.

For all rough carpentry work yellow pine was used. The rooms in first and second stories have a rough flooring of 1 in. dressed yellow pine, over which in the rooms in the first story a layer of building paper was placed. On the second floor a deadening felt weighing one pound to the yard was laid, with all joints well lapped. Over the paper and deadening felt were laid the finish floors of first quality red oak.

The Interior Trim

The stairs to the second floor are of oak, with 7/8-in. risers and 1 1/8-in. treads. The basement stairs are of yellow pine.

All doors are of oak, the front one being 2 1/4 in. thick, and those for the interior 1 3/4 in. All door openings have a 2 x 4 buck set in cement, to which the jamb is nailed to receive the doors.

The pantry cupboards are put in according to the detail drawings reproduced herewith. They are of yellow pine, with removable shelves.

The basement is provided in the northwest corner with a two-part laundry tray. The fixtures for the kitchen sink and the bathroom equipment on the second floor have been arranged to facilitate the waste and supply piping arrangement. On the rear porch the ice box has been provided with a drain.

The kitchen has an enameled iron sink, with large drain board. In the bathroom on the second floor the equipment consists of a 5-ft. bath tub, and modern types of lavatory and closet. A built-in medicine cabinet is provided directly above the wash bowl.

Throughout the house hot water is provided by means of a No. 3A "Humphrey" automatic gas water heater, manufactured by the Humphrey Co., Kalamazoo, Mich.

In the kitchen is a "Jewel" gas range, of a type made by the Detroit Stove Works, Detroit, Mich.

The System of Heating

The building is heated by hot water, the boiler used being a No. 221 T, manufactured by the Richardson & Boynton Co., New York and Chicago. Risers are taken from two supply mains and radiators are distributed to advantage, as shown on the floor plans. Where the risers pass through the rooms they are given a coat of bronze paint so that they may harmonize with the surrounding decorations. The room is made warmer by the additional radiation from the exposed pipes, while their finish in no way detracts from the interior decorations.

The house is piped for gas and wired for electricity. In the living and dining rooms a cluster of four lights is provided, while other rooms throughout the house have single brackets distributed to advantage.

The ceilings on the first floor are 8 ft. 6 in. in the clear, and 8 ft. on the second floor. The plastering of the walls and ceilings is two coat work. The scratch coat is composed of well burned lime, clean sharp lake sand, and one-half bushel of hair to each barrel of lime. The second coat has the same materials excepting the hair, well troweled and floated. The walls are tinted. The bathroom has its wall finished in imitation tile and has a wood floor. The door and the medicine cabinet are white enameled.

All painting is three-coat work. The interior oak finish, with the exception of the floors, has one coat of Johnson's wood dye, one coat of underlac, and one coat of Johnson's prepared wax, all made by S. C. Johnson & Co., Racine, Wis. The oak floors throughout were thoroughly filled and given one coat of shellac and two coats of wax. The cupboards and case have two coats of linseed oil, painted or stained to blend with the finish of the room.

Estimate of Cost

The contractor has furnished the following figures, which are of unusual interest in this connection, showing as they do the actual cost of different parts of the work of construction:

Excavating	$ 60.00
Masonry	1,500.00
Tile, plaster and cement	230.00
Rough carpentry	250.00
Labor	250.00
Millwork	400.00
Plumbing	260.00
Heating	300.00
Decorating	250.00
Total	$3,500.00

The building was erected by A. Baxter, of Park Ridge, Ill., and the work was done under his personal supervision.

Painting Old Brick Walls

In the case of a large brick building, the walls of which had never before been painted, the mortar had fallen out of the joints in many places and it was to be pointed up by a bricklayer. The walls were to be finished flat and a correspondent in a recent issue of the *Painters Magazine* asks how he can best stop the suction in the bricks and how he should treat the newly painted portion of the surface to prevent the lime in the mortar from eating through and discoloring the work. In reply the authority in question says:

To avoid all risks of the lime in the mortar used in pointing the joints, it would be best to have the bricklayer do his pointing so that the mortar would not be on a level with the face of the bricks, but from one-sixteenth to three-thirty-seconds of an inch below. In that case you could putty up the joints, after applying your first or priming coat, thus stopping the suction in both bricks and joints. On hard pressed brick fronts, where the joints are not very open, pointing with mortar or cement is not resorted to, but the joints are filled in with colored putty after the first coat, and sometimes after the second coat, of paint.

As to advising you how to stop suction in the bricks, it must be considered whether the brick in question is of the hard or soft variety, because in the latter case one more coat of paint is required than for hard brick. If you paint in imitation of red brick and the wall is composed of ordinary (not hard pressed) brick, use good Venetian red in oil, thinning with raw linseed oil and very little good drier, making a paint of medium consistency, which brush well into the surface. Then putty up

as suggested with linseed oil and whiting putty, colored with dry Venetian red or mineral brown. The putty must not contain any cheap oils or it is liable to sweat out and make trouble. For the second coat, make the paint from Venetian red and yellow ochre or metallic brown in oil, according to the depth of shade desired for the final coat, adding about one-fourth as much of keg lead as you have of color and thin to brushing consistency with raw linseed oil three parts and turpentine one part, adding very little japan. Do not use turpentine substitute, if you wish to avoid trouble. Let this coat dry good and hard and see to it that there are no shiners, if you wish to make a good flat finish.

For this flat coat, unless you purchase flat brick color in paste form, to be thinned with turpentine, mix Venetian red and yellow ochre, or red and metallic brown, ground to stiff paste form, until you have the desired shade; then, for every twenty pounds of color in oil add five pounds fine dry whiting and thin for use with one-third best brown japan and two-thirds pure turpentine. If the color is to be buff, the first or priming coat should be keg lead, tinted with yellow ochre and Venetian red, thinned with raw linseed oil and small portion drier. The putty may be colored with yellow ochre. For second and third coat follow same rule as in the case of the red color.

A Suburban Home of Tile and Stucco—The Rear and Side Elevations Showing Grade Entrance As Well As Porch Entrances to Kitchen and Living Room

Quantity System of Estimating in St. Louis

Much has been said in these columns in regard to the Quantity System of Estimating and the campaign which has been waged for some time past by G. Alexander Wright and others in an effort to render the merits of the system more clearly understood by American architects and building-contractors. The results of this campaign are being seen in the practical adoption of the system in different sections of the country. The latest development is the announcement that St. Louis is about giving the system a trial, the city having passed an ordinance authorizing the mayor, with the approval of the City Council, to appoint Quantity Surveyors. The number we understand is not limited, but appointees must be skilled in building construction and estimating and must give bonds in the sum of $10,000.

Patrons of Quantity Surveyors who sustain loss by reason of their negligence, incompetence or misconduct can sue on the bond any time in 5 years. The appointments hold for 4 years. The charges authorized are the fees agreed upon between surveyor and clients until a list of fees can be prepared by the Engineers' Club, the St. Louis Chapter of the American Institute of Architects and the Building Industries Association.

Fig. 1—General View of the Building Before the Roof Raising Operations Had Been Commenced

How a Large Truss Roof Was Raised

A Piece of Work Which Presented Some Interesting Problems for the Builder and How He Solved Them

By James F. Hobart

THE raising of a large truss roof of wooden construction is a piece of work which the contracting builder is occasionally called upon to execute, and the one here described involves some problems which are of more than passing notice. The building is shown in Fig. 1 as it appeared before roof raising operations were commenced. It was about 60 x 174 ft. in plan and 13 ft. in the clear from concrete floor to truss beams. It will be noted that the walls are of pilaster construction with corbelled-out cornice and that the curtain walls do not stand upon a water table, but are recessed from the ground up. There were 11 spaces or bents in the walls, and the roof was hipped

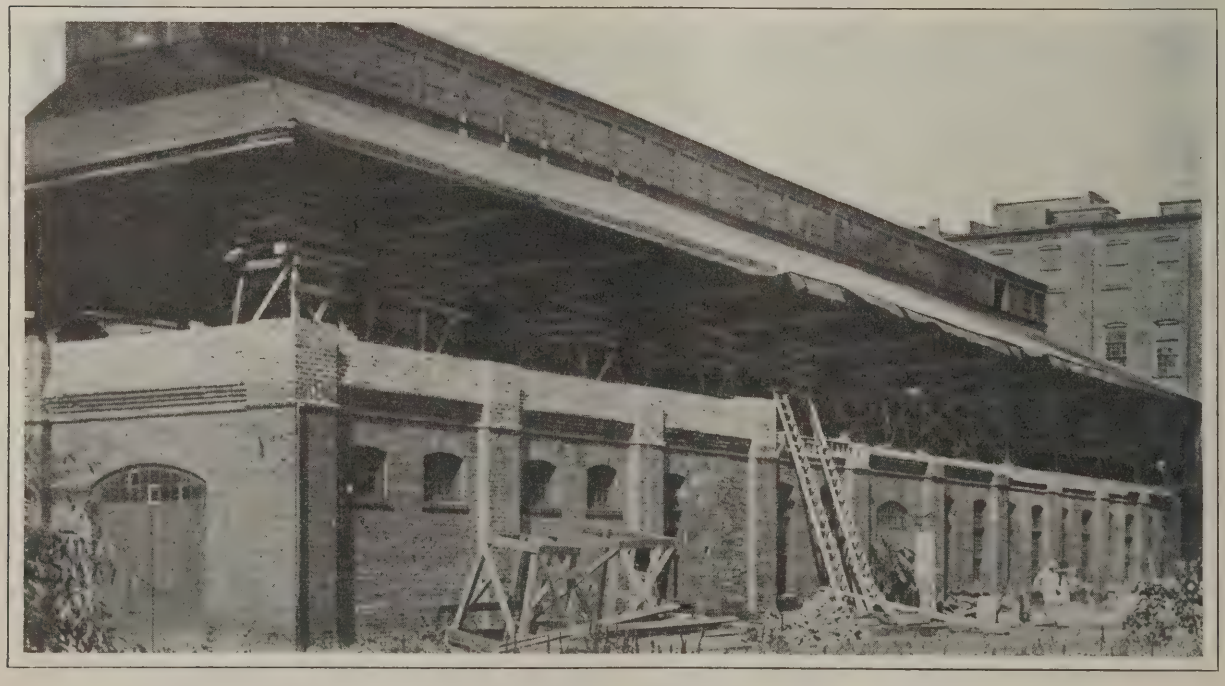


Fig. 2—Appearance of the Building After the Roof Had Been Raised to a Hight of 13 Feet

at the end farthest from the main building four stories in hight, from which the building to be raised projected as a sort of wing. The roof is built with a continuous lantern for lighting purposes and this source of light was to be utilized in the story which was to be added to the building.

How a Large Truss Roof Was Raised—Fig. 3—A Beam Problem for the Contractor

In Fig. 2 the building is seen after the roof had been raised 13 ft. and was ready for the new side walls, a portion of which are already built. The picture also shows the manner in which the original corbell cornice was handled, the new walls starting even with the outer edge of the corbell and breaking back to the original line of wall, thence running vertically to the new cornice. This construction was designed to serve another purpose whereby the joists for the new floors were permitted to have a much greater bearing in the wall than would have been possible save for the projecting double corbell which covered the beams of the building.

The picture, Fig. 3, shows one of the many problems which confronted the contractor doing the work. At the point where the building or wing to be raised, joined the main structure there was a wide 18 ft. bent left without doors or curtain walls for the passage of railroad cars, the shipping and receiving rooms of the factory being in the main building adjacent to that of the one where the roof was raised. The picture also shows the serious flashing proposition to be met after the roof had been raised to the required hight. It will be seen that not only does the main portion of the raised roof pass uncomfortably close to windows, but the roof meanders in and out behind pilasters and across them in a most disconcerting manner. One morning just as the roof was encroaching upon the window space shown at the right in Fig. 3, an insurance inspector of buildings suddenly appeared and promptly stopped the raising operations until the said window was bricked up to his satisfaction, in order, he said, that possible fire might not be carried from one floor of the main building to another by the encroachment of the raising roof over both window openings. Hence the bricking in of the upper window forthwith.

The solution of the "beam trouble" as it may be termed by the placing across the 18 ft. span of a double steel beam is indicated in Fig. 4. The outer member consisted of an I-beam of requisite depth to carry the load and an angle of the same depth, bolted inside the beam and separated by distance pieces. The inner member—the channel with unequal legs—received and carried the ends of the 12 in. floor joists which were put in to carry the floor of the added story. The outer member of the I-beam carried the face of the new wall which was started upon the lower flange of the beam and carefully carried up until it could be tied by a row of headers to the rest of the wall. The picture shows the manner of placing the new floor joists which were spaced 12 in. on centers and separately tied to the side wall by wall bolts or clips of the size and dimensions required by the city ordinances.

Some trouble was experienced in getting the masons to build solid under the new floor joists. These members were put in place approximately resting upon the old brick work, or in most instances upon portions of new bricking which were necessary to fill or restore the portions of wall occupied by or torn off with the rafters which formerly rested upon this wall.

At any rate the old wall was levelled up roughly, the floor joists put in place and the new floor laid. After the floor had been spiked to the joists the latter were levelled as found necessary by raising the low joists with jacks or by prying them up as was most convenient, then wedges were placed where required under the joist ends on the inside edge of the walls. Instructions were given to the masons to pack thoroughly and fully under each and every joist end before the side walls were started between and over the joists.

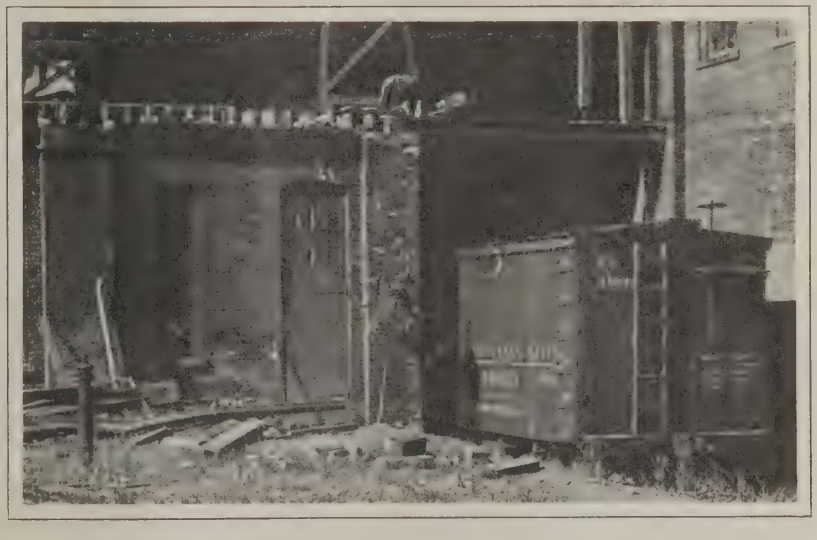


Fig. 4—Showing How the Beam Problem Above Indicated Was Solved

In Fig. 5 is afforded an idea of the manner in which the roof was "loaded" on hoisting screws, those along the side walls being supported upon square trestles. The mid-screws were carried under hollow built-up posts inside of which the screws traveled through a nut placed against the end of

the post. The contractor was questioned quite a bit as to the reason why he used the two intermediate rows of post instead of permitting the outside or wall screws to carry the entire load. For some time he was unable to give a satisfactory reason for the central rows of screws. He probably overlooked the fact that the entire roof weight would be carried by the jacks at the walls and used the central posts to distribute the load so that the roof would not "hog." This was evidently "one on the contractor" and accordingly he finally volunteered the statement that the central posts and screws were used to distribute the load on the screws, which he feared would not carry the roof load without doubling up, by means of the central timbers and screws. When he was asked why he simply did not double the screws, placing two on each trestle and thereby saving time and expense of the central posts and of men to turn the screws there, he said—Well he did not say very much of anything for he has not yet found an answer to that query and has to stand quite a bit of "joshing" as to whether or not he usually raises ridge poles with the roofs or prefers to jack them up separately.

How a Large Truss Roof Was Raised—Fig. 5—Manner of "Loading" the Roof on the Screws

Some of the trestles used for supporting the screws during the raising operation are shown in Fig. 6. It will be seen that each trestle is made in two sections, one fitting on top of the other and fastened together by means of strips of board "tacked" one to each corner of the trestle. These trestles were made of 4 x 4 in. stuff, well braced and cleated, and will stand up under about all the load that the screws will handle even when the screws are doubled. Each screw was carried upon "cob-house" blocking on top of the trestle and the first or lower timbers of each blocking was placed fair over the trestle timbers so as to carry the load direct to them and not to place the load upon the connecting cleats of the trestles. When the hight of building requires it a third section of trestle may be placed on top of the second shown in the picture. These trestles, while very convenient and weighing much less than an equivalent hight of "cob-house" blocking, were also very much stiffer than the blocking; were not so apt to topple over and could be placed and removed much quicker than the old-time blocking.

It may be submitted that the building contractor would require a tremendous storage capacity for housing 50 or 100 of these trestles, but even that is not so, for in storage the trestles "nest" closely, thus really occupying comparatively little space. It is, however, necessary that when erecting these trestles great care be taken to place each leg or foot fair upon a good bearing. There being four rigid points of bearing to each trestle is about the only point against it, for it is hard to make four points bear evenly. Could these trestles be made triangular instead of square they would prove much stiffer in use, and the labor in placing them squarely and firmly would be reduced to a minimum. On the other hand, the triangular trestle does not adapt itself kindly to the work and builders will doubtless rub along with square trestles for a while yet.

In Fig. 7 there is shown a portion of the elaborate sprinkler system in the roof and the manner in which the new central posts and stringers were put into position as soon as the roof had been raised far enough to permit—that is, about 2 ft. At the extreme right in the picture a central post is shown with its bolster in place on top, these posts resting upon concrete piers built for them and which were

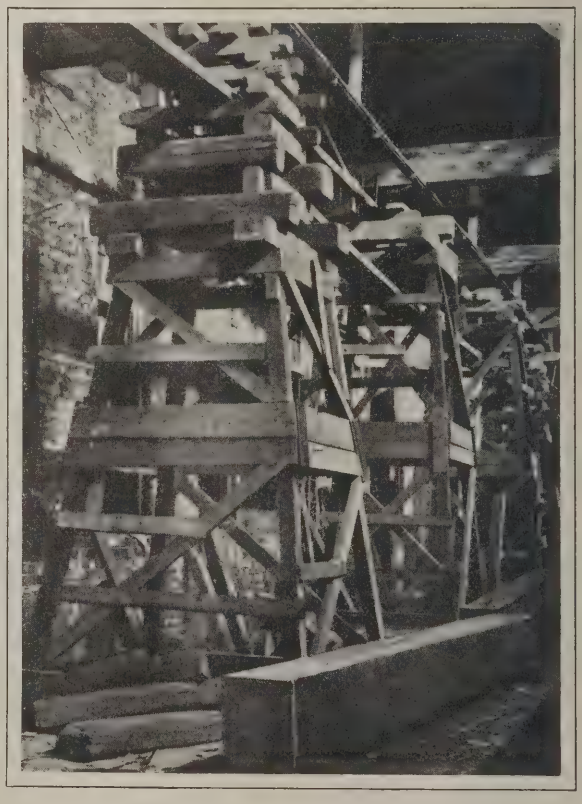


Fig. 6—Some of the Jack-Supporting Trestles

set up one by one by means of a rope tackle attached to the rafter above each post location. The posts were up-ended by means of this light tackle, put into position, plumbed and braced; then the bolster was sent up by the hoist and after putting it into

How a Large Truss Roof Was Raised—Fig. 7—Showing Portion of Pipe System in Roof, the Erecting Posts, Etc.

position the section of stringer was sent up by two of the light hoists already mentioned. After the beam was in place the rearmost hoist was taken down and erected again at the next truss beam ahead and the operations repeated.

A great deal of trouble was caused by the old wall bolsters which in almost every instance were found to be more or less decayed and about half of them were entirely rotted away. Some of the beam ends were also decayed where they were built into wall. It was necessary to replace the bolsters on most of the truss-foot bearings, and to do this the bolts through the joint between the beam and rafter portions of each truss as well as both ends thereof had to be removed. The holding of the two members in place during the removing and replacing of the bolts and bolster was accomplished by hanging a stout chain, doubled and hooked together endless around the rafter, just back of and above the bolts to be removed. A bit of scantling was spiked to the rafter to prevent slipping of the chain, then wedges were driven from opposite sides lengthwise with and below the beam, thus stretching the chain very tightly and putting enough strain upon the rafter and beam to permit of the bolts being removed and replaced without the timbers fetching out of place. In this matter the bolsters at each truss were changed one by one and the work was done while the building was being carried upward by the screws.

The method of turning the screws so as to raise the roof uniformly was quite simple. The screws were of two varieties, one lot having three threads to the inch and the other four threads, therefore, at a given signal, each man started turning the several screws which had been allotted to him for attention, going from one screw to another until he had given each screw a turn. All of the four-threads-to-the-inch screws were given a complete turn each time while all of the three-threads-to-the-inch screws were given three-fourths of a turn each when the signal was sounded.

When each of the men who did the screw turning had visited each screw in turn, all waited for another signal from the foreman's whistle before making another round among the screws, in this manner the entire roof was carried up uniformly without noticeable sag in any portion of it and with no injury whatever to the numerous pipe lines or glazed window sash in the building.

When it is considered that the sprinkler piping is all installed with a slight but very uniform grade from the outermost sprinkler head, back to the main stand or supply pipe and that no water must ever be trapped in any of the numerous branch pipes, and that the roof was raised so nicely that not a pipe had to be relocated, it must be realized that the engineering of the job was pretty good and that the many blockings were well placed and well built on solid foundations.

Just as soon as the roof had been raised sufficiently to permit, the new floor beams were placed in position and subsequent raising operations were carried on from the new floor.

On one side of the entire building—on the side not shown in Figs. 1 and 2 was a shed of "lean-to" construction, the roof of which joined the building to be raised immediately under the eaves of the latter. As the shed in question was crammed to the rafters with storage of paper in rolls and in bales, it became a matter of vital importance to prevent rain from wetting the stored stock during the raising of the roof of the adjacent building, the con-

Fig. 8—Manner of Water Proofing Over Contents of Building

struction of the walls thereof and the patching of the shed roof into the new walls. As soon as the roof started away from the walls, pieces of 2-ply roofing felt were thrust under the lower course of the slates and permitted to hang down 4 or 5 ft.

These pieces of felt were carried up with the roof and dragged over the shed roof, resting less and less upon it as the main roof went upward. But the pieces of felt were made long enough to cover the gap between roofs up to the point where the new floor could be built in. The floor being completed, the felt strips were detached from the old roof and fastened to the new floor as shown in Fig. 8. Strips of board were laid along on top of the roofing felt to hold it in place against wind and walking and as the wall grew upward the felt strips were placed on top of the new wall at night and loaded securely. As soon as the wall progressed far enough above the shed roof, permanent flashings were put in and further precautions to prevent leakage upon stored stock became unnecessary.

Proper Method of Mixing Concrete

The Density of the Concrete Due to the Order of Placing the Materials in the Mixer

IT is no doubt almost an accepted principle among contractors that the order of placing concrete material in a mixer is of no importance. Occasionally a specification is written and more rarely followed under which it is required that the component parts of the concrete be placed in the mixer in some prescribed order, but the general practice is to throw in the cement, aggregate and water in any convenient order, or, in case a measuring hopper is employed, all at once. In hand-mixing, of course, the old practice of first mixing the dry sand and cement still prevails, but that is because when all the materials are thrown on the board together and doused with water, it is difficult to get men to turn over the mass of wet concrete long enough to insure a well-mixed mortar, says a writer in *Concrete Age*. The stronger and more efficient machine is thought to remove this difficulty.

Cause of Density of Concrete

Some pressure tests on concrete pipe were recently made by a company attributing the density of the concrete obtained, first, to its richness—a 1:1½:2½ mix being used—and, second, to the method of mixing with especial attention paid to the order of placing the materials in the mixer.

According to the method used the mixer is first charged with the proper amount of water (established by experience and observation), and into that the cement is dumped; the mixer is then turned until a well-mixed grout results. Into this is then dumped the stone and after this has been turned sufficiently to insure the coating of all the stone particles the sand is put in and the turning continued until the sand particles are well covered and have apparently filled all the voids in the cement-coated stone.

It may be that the users of this method are correct in their assumption that the order of placing is responsible for the exceptionally dense concrete which they achieve, but to others it seems that the effectiveness of the method is due not so much to the order of placing of the materials as to the length of time taken between placing of the separate components, which added together make the total length of time of mixing somewhat longer than in the normal mixing of concrete.

This naturally leads to the query, "Is enough attention paid to the length of time of mixing in machine-mixed concrete?" Are not most contractors too hasty in getting the batch out of the mixer? A piece of western construction is reported in which it is stated that 2,150 cubic yards of concrete were mixed in an eight-hour day in four one-yard mixers. This is somewhat more than a mix a minute per machine. Regardless of type of machine used would not a two-minute period give a concrete enough better to warrant the use of more machines with their additional cost of purchase and operation?

As construction is now generally carried on the time of mixing is governed entirely by the observing eye of an inspector or superintendent. When to him the various parts that go to make up the concrete seem to have reached a proper intermingling the batch is dumped. If it is a fact that after a certain amount of mixing, easily determined by the expert eye, the component parts of the concrete become so thoroughly intermixed that no perceptible increase in quality of the concrete will result from further mixing, this method of ocular inspection is correct enough, but if it is probable that an increase, even slight, in future strength may result from mixing the concrete beyond the time when it seems to be thoroughly mixed, then in the scientific development of concrete construction such time should be ascertained.

Proper Time of Mixing

We believe that some tests have been carried on to investigate the proper time of mixing concrete, but these tests have not been so conclusive nor have they had such wide publicity as to be of much value. There is a field here for future investigation, which some testing laboratories should soon take up. Undoubtedly most of the concrete which is made is mixed in too short a period. If by adding to that period we can increase the density of the concrete and thus improve its water-resisting qualities or prolong its future life, we are certainly justified in the additional expense of extra mixing. It may be difficult to estimate precisely the effect of this additional mixing, but unless there is absolute certainty that it does no good it would be at least a good insurance. The difficulty, of course, is not in determining whether additional mixing is desirable, but in ascertaining some method by which the exact time of increased mixing may be rationally determined, and that is the field of the testing engineer.

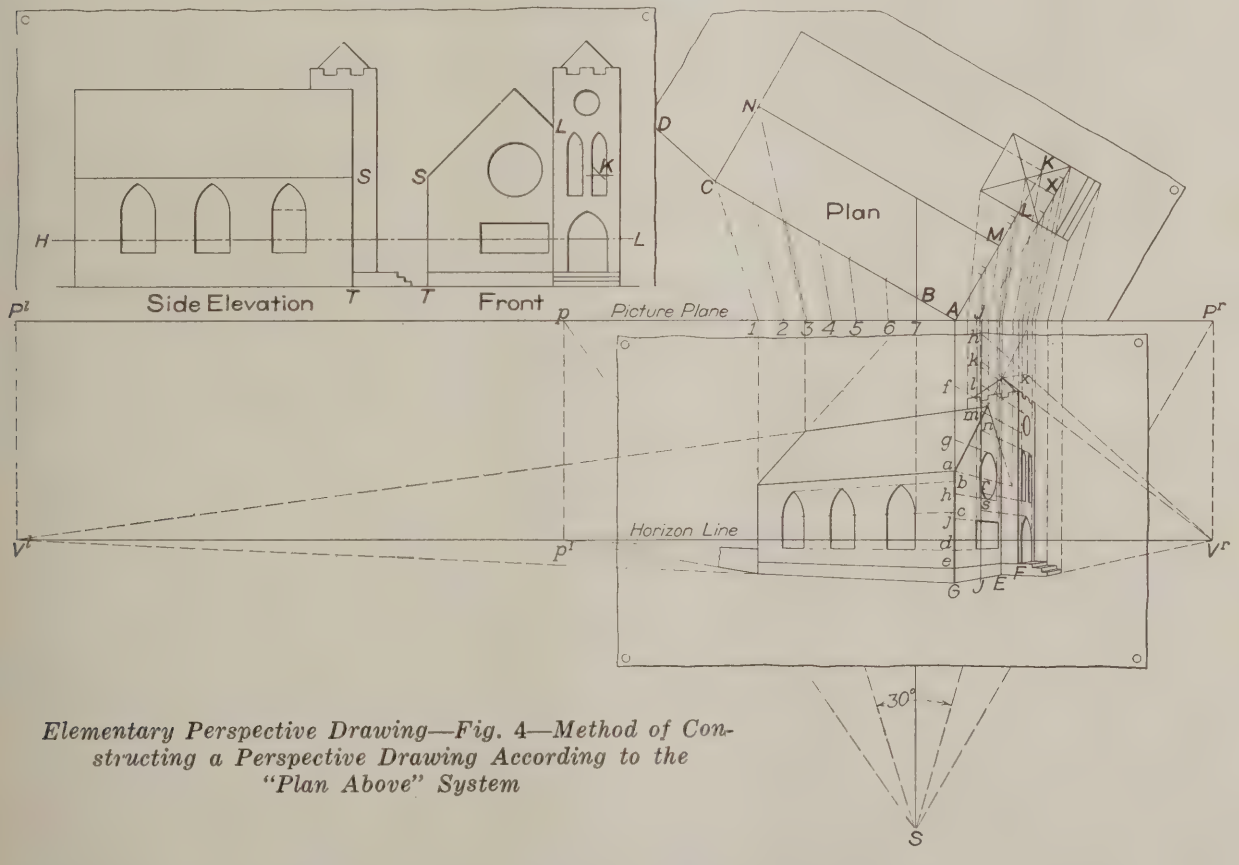
Elementary Perspective Drawing—II

Constructing the Perspective View—Detailed Description of Method of Obtaining the Vanishing Points

By George W. Kittredge*

THIS is all accomplished upon the drawing board, as fully illustrated in Fig. 4, by first drawing a line from left to right across the paper to represent the picture plane, as shown by P^l and P^r. It will be found most convenient to have the plan of the subject to be represented upon a separate sheet of paper so that it may be turned so as to present any desired side or angle to the view as shown, bringing the near angle of the plan to touch the picture plane as at *A*. By thus bringing one angle of the building into the plane of the view, all the hights of its several parts may be set off and a line representing this angle in the perspective view, as will be hereinafter described, using in this operation, of course, the scale to which the plan is drawn, as, for instance, ¼ or ½ in. to the foot. Should it be desired to produce a smaller view, the plan may be set farther back of the line P^l P^r, as previously explained, when the line of one end or side of the plan may be extended to intersect the picture plane for a line of hights, as shown at *A* of Fig. 3.

Since it is desirable to have the point of sight as nearly opposite the center of the picture as possible, we may select the point *B* of Fig. 4, the jamb of one of the windows, as being approximately near the center of the plan in its chosen position, and from *B* draw *B S* at right angles to P^l P^r, upon which we may locate the point of sight *S* at any desired distance away, as, for instance, in this case 88 ft., as measured by the scale of the plan, which we may assume to be 1/32 in. to the foot. It should be located far enough away so that the angle of vision shall include not more than 30 or 35 degrees. Following the lesson learned in the observation on the railroad tracks in Fig. 2, if the observer should stand at *S* of Fig. 4 and turn his face so as to look in a direction parallel to one of the sides of the building, the vanishing point of that side would appear, as before, at a point on the screen exactly in front of him. Therefore draw lines from *S* parallel



Elementary Perspective Drawing—Fig. 4—Method of Constructing a Perspective Drawing According to the "Plan Above" System

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

to the two sides of the building, continuing them to intersect the picture plane, as shown at P^l and P^r. These points will then represent the distances to the left and right of the axial line at which the vanishing points for the two sides of the building must be located when the perspective view is being constructed. Should the design of the building be such that its plan shows other sides, which are oblique to the principal front or side or to the plane of the view, as in the case of a bay window or an octagon tower, the same method of locating their vanishing points will hold good. Thus the position of the vanishing point for the wall or fence, see *C D*, extending obliquely from the left of the plan in Fig. 4, will be found by drawing a line from *S* parallel to *C D* to intersect the line P^l P^r, as shown at *p*.

Finding Points on the Picture Plane

Now since light moves in straight lines from all points of the object, the position upon the picture plane of the several points may be found by drawing straight lines from all points of the plan toward *S* till they intersect P^l P^r, as shown. This operation is termed "viewing" the points. A plan for use in perspective drawing must contain more than the usual floor plan; it must contain the roof lines, and show the location of all features which would appear in the sides which are to be represented. We must keep in mind that what has been done up to this point constitutes a plan or top view of everything concerned, including the course of the light in passing through P^l P^r, which represents the screen or picture plane standing on edge.

Constructing the Perspective View

The perspective view can now be constructed upon a separate sheet of paper, which, for convenience, may be placed in the space between the picture plane and the point of sight *S*, as shown in Fig. 4. Before the hights of any of the points can be determined it becomes necessary to fix the hight of the point of sight, or, what is the same thing, the hight of the horizon line. This should be done by drawing a line, *H L*, to represent the horizon across the elevations, as shown at the left in the upper part of the figure, where it is shown as passing through the springing line of the arch in front entrance. The least apparent distortion in the representation of all parts of a subject will be obtained by fixing the horizon line at about half its hight. The effect of hight of tall objects is, however, increased by allowing the greater part to appear above the horizon line, and realism is added to the view if the point of sight is taken at such a point as the object could or would naturally be seen or photographed from if it were completed. The horizon line of the perspective view may now be drawn across the sheet just placed in position, and extended to the right and left sufficiently to receive lines dropped vertically down from P^l and P^r, as shown by V^l and V^r, which are the vanishing points for the two sides of the building that are to appear in the view. A line dropped from *p* will also locate at *p'*, the vanishing point of the oblique fence. In some works on perspective it is explained that a ground line should first be drawn from which to measure the hights of the object. This is entirely unnecessary, since the horizon line becomes a base from which to measure the hight of all points, the hight of any point being its distance above or below the horizon.

Since the point *A* of the plan is in the picture plane, a vertical line, *A G*, may now be drawn, upon which the hights of the several points of the building are to be set off to scale as wanted. Therefore, beginning with the left side of the building, obtain from the elevation the hights of the several points, as the eaves, the top and sill of the windows, the springing line of the arches, the top of the foundation and the grade line, measuring each distance from the horizon line, and set them off on the line *A G*, as shown respectively by *a, b, d, c, e* and *G*. Lines drawn from each of the points thus obtained toward V^l will represent horizontal lines in the view. The lines drawn from *a, e* and *G* form the boundary lines of wall surface, which is terminated by a line dropped from point 1 on the picture plane representing *C* of the plan, all as shown. Light lines from points *b, c* and *d* may now be drawn toward V^l, between which to construct the window. The position of the jambs is obtained by dropping lines from points 2 to 7 on P^l P^r, drawing them only from line *c* to line *d* in the view. The points of the window heads will, of course, be on the line from *b*, but their true position thereon will be found by first bisecting the window spaces on the plan, as shown, then by "viewing" these points, as explained above, and finally dropping them onto line *b*. This part of the operation is omitted in the drawing to avoid confusion of lines.

Proceeding now to the right side or front of the building, the hights of the several points are obtained from the front elevation and transferred to *A G* as before, as shown by *f, g, h, j* and *d*, from which points lines are now drawn toward V^r. Although many lines are shown on this part of the plan, the points on the front wall of the plan showing the width of the rectangular window, will be easily seen, from which "view" lines are carried to P^l and P^r, whence they are dropped into the view between lines *j* and *d*, while the points showing the width of the circular window find their way into the view between lines *g* and *h*, forming a square in perspective in which the curved outline of the window is inscribed, as shown.

Putting a Circle into Perspective

Although somewhat imperfectly shown in the illustration, this is the proper method of putting a circle into perspective. A square can always be circumscribed about a circle, and since a square can always be put into perspective without difficulty, the true position of a circle in perspective, whether it be used wholly or in part, in a vertical or a horizontal plane, can always be determined by this means. To apply this method to the parts of circles forming the arches of the windows and door, the several arcs should first be extended to form at least half circles, when the lines of the circumscribing parallelograms, could easily be located in the view, as in the case of the round window above described, after which the parts not required in the view could be erased.

With reference to the lines of the front gable, the position of its apex is found by viewing the point *M* of the plan and dropping the same into the line from *f* on *A G*. From the intersection thus ob-

tained the near line of the gable is drawn to *a*, and the line of the ridge is drawn toward V^l, to be terminated by viewing the point *N* of the plan, all as shown. The farther line of the gable may be found, if desired, by viewing the point *L* of the plan and setting off its hight obtained from the front elevation on *A G*, and proceeding as usual, but a simple way is to view the imaginary point *K* of the plan, which is, of course, found on a level with point *a* in the perspective, as shown by *S K* of the front elevation.

Observation will show that if the lines of the inclined roof or gable lines at the front and rear ends of the roof be continued upward, as partially shown, they will meet at a point exactly above V^r, whose hight will, of course, depend upon the inclination of the roof. This point would be very useful in the case of a roof containing dormers, skylights or other details, since all lines running parallel to the gable lines must vanish at this elevated vanishing point.

Coming now to the front wall of the tower of our subject, we have a choice of two methods of determining the hights of the various details shown. These hights may be set off as before upon the line *A G*, and carried first toward V^r to the line from *E*, showing the angle between the front wall of the main building and the side wall of the tower, then, since the side of the tower is parallel to the side *A C* of the building, they may be carried in a direction from V^l to the line from *F* forming the forward external angle of the tower, and finally toward V^r again across the front to meet the proper lines dropped from P^l P^r. This method has been followed in the case of the top line of the foundation, because that line is continuous and is therefore required in the view. A simpler method, however, of determining the said hights is to continue the front line of the tower in the plan to intersect P^l P^r, as shown at *J*. From *J* we may draw *JJ* in the plane of the view, upon which the several hights in question can be set off, measuring from the horizon line as before, all as shown by *k, l, m, n, r* and *s*. From these points lines are now carried toward V^r to intersect lines from P^l P^r as before described.

One more point, the apex of the tower roof, demands attention because it does not lie in any of the planes of the building. Its position in the perspective view has been obtained by viewing it in the usual way, but its hight can best be obtained by means of a point placed opposite it in some plane which intersects the picture plane. Therefore, from the apex in plan draw a line at right angles to the front wall of the tower, intersecting it at *X*, which point must now be viewed and brought down into the view as shown, and intersected with a line from *h* on *J J*, which is its hight as given in the front elevation. From the resulting intersection, *x*, a line is now drawn toward V^l to meet the view line from *X*, first mentioned.

The foregoing comprises the general features of what is familiarly termed the "plan above" system of perspective. It is easily understood, because its operations are performed, as it were, naturally rather than technically, and one who works carefully and thoughtfully stands little chance of falling into error.

(*To be continued*)

Decorative Value of Tile Flooring

Machine-Made Tile—Opportunity for Its Use—Influences That Affect the Design of the Floor

TILE floors have a practical value; they also have great decorative value, and it is with the latter that we are at present concerned. Owing to the peculiar limitations of the material and the methods of manufacture, tiles are necessarily small units. To cover a large surface with these units, obviously requires numerous joints. Therefore, the joints, as well as the tiles, should be given importance in the design. From a designer's point of view, the limitations of a material are its greatest asset, each material requiring its own peculiar treatment.

Not many years ago, all the tiles that were available for floors were of the machine-made variety, so perfect in workmanship that they could be laid in a floor with joints of a hair's breadth. These tiles were made in a variety of shapes and colors, but it was useless to lay out a pattern in one color, because the pattern of the joints could not be discovered without close inspection. If pattern was to count, it was necessary to use color, and the effect was generally hard, dry, and uninteresting. Conditions have since changed, says A. B. Le Boutillier in the *Contract Record*, and we have come to realize the value of the joints. It is seldom necessary to lay a floor of plain tiles with joints less than one-quarter of an inch in width. Whether these joints are left the natural color of cement, or are colored, they will always count in the design, and the slight unevenness of the tiles themselves will give a texture that is not as hard and uninteresting as the floors of mechanical perfection.

The character of the building and the location of furniture and rugs affect the design of the floor. If the floor is in an important room of a monumental building and is free from large pieces of furniture, it may well be treated so as to be in accord with the architectural treatment of the walls, but if there is to be much furniture and many rugs on the floor it is better treated as a whole. This is a point that is often lost sight of in railway waiting rooms and restaurants.

Church floors afford as great an opportunity for tile work as the windows do for stained glass.

Much could be said on this subject alone, but it is sufficient here to make the following observation: The nave aisles should be simple, the choir somewhat more elaborate, and the sanctuary very rich in pattern, symbols and color. In short, the elaboration increases as the altar is approached.

It is not necessary to use large tiles in a large room to get scale, as the tiles can be arranged so that the unit is composed of several small tiles, and the scale of the pattern increased or reduced.

It is not essential that all the tiles laid in a floor come from one factory. Herein has the tile setter great advantage, especially in colored tiles. In the matter of shapes and designs, clay is so easily moulded that there is almost no limit to the variety that the smallest factory can produce. It is in the matter of glazes and quality that makers differ.

There are many patterns that have been common property ever since the beginning of tile making, and are to be found, with slight variations, in many tile manufacturers' lists. New designs can be readily produced and old ones revived; the process is simply a model in clay or wax, from which a plaster mould is made, then the clay pressed in by hand, removed from the mould, dried and baked; a simple primitive process, to which tiles owe much of their charm. The difficulties are in composition of the clay and glazes; these, of course, it is assumed, have been overcome by the manufacturer.

The ideal method of designing a floor is to arrange a general scheme and then lay out the details on the job, changing and rearranging details as occasion arises. This, of course, requires an artist as a workman—and there are such—or constant supervision. This is not always possible, but when it is done, the result is spontaneous, and free from the mechanical look that might come from a hard and fast plan laid out on the drawing board.

By the use of color in pattern, and pattern in individual tiles, there is almost no limit to the richness and elaboration possible for tile floors, but on the other hand, it is also possible to make an interesting floor of plain tiles in one color by taking advantage of the joints.

Concrete and Steel Bond Tests

What is probably one of the most exhaustive studies of the amount and distribution of the bond stress between concrete and steel is contained in Bulletin No. 71, just issued by the Engineering Experiment Station of the University of Illinois, at Urbana. It bears the title "Tests of Bond Between Concrete and Steel," by Duff A. Abrams, and presents the results of tests of about 1500 pull-out specimens and 110 large reinforced concrete beams. The tests covered a wide range of ages, mixes, size of bar, length of imbedment, condition of storage, method of applying the load, etc. Both plain and deformed steel bars were used.

Bond resistance may be divided into two principal elements, adhesive resistance and sliding resistance. In all of the tests measurements were made to determine the relation of slip of bar through the concrete to the bond resistance at different stages of the tests. A considerable bond resistance is developed before a measurable slip is produced. It was found that after slipping begins there is a well-defined relation between the amount of slip of bar and the bond resistance for small slips. For plain bars slip begins at about 60 per cent. of the maximum bond resistance; with further slip the bond resistance increases rapidly until a slip of about 0.01 in. is reached, which represents the maximum bond resistance. The amount of slip corresponding to a given percentage of the maximum bond resistance is remarkably constant for a wide range of ages, mixes, conditions of storage, etc. Slip of bar begins at a bond stress equal to about one-sixth the compressive strength of cubes made from the same concrete. The maximum bond resistance is equal to about one-fourth the cube compressive strength.

For deformed bars the relation of slip of bar to the bond resistance was not materially different from that of plain bars in the early stages of the test; in the later stages of the test the bond resistance varied widely with the type of bar and was found to depend on the area and slope of the bearing surfaces the projections of the bar.

Twisted square bars were found to be inferior to plain round bars on the basis of bond resistance per unit of area of the surface of the bar.

The usual method of computing the bond stress in a reinforced concrete beam does not take account of all the phenomena of bond action. Slip was first observed in the middle region of the span at loads producing a tensile stress in the reinforcement of about 6000 lb. per sq. in. As the load was increased slip of bar progressed through the outer thirds toward the ends of the beam. In the beams reinforced with plain bars end slip began at about 67 per cent. of the maximum load; for the beams with certain types of reformed bars the value was 51 per cent. In the tests of reinforced concrete beams it was found that a very small amount of end slip represented critical conditions of bond stress.

Copies of this bulletin may be obtained gratis upon application to C. R. Richards, acting director of the engineering experiment station, Urbana, Ill.

Building Construction Employers Association

The recently formed organization of contracting builders in the city of Pittsburgh, known as the Building Construction Employers Association, and with headquarters in the rooms of the Pittsburgh Builders' Exchange in the Fulton Building, has elected officers as fololws:

President ..... James L. Stuart
First Vice-President ..... C. B. Kennedy
Second Vice-President ..... John Schreiner
Third Vice-President ..... Frank I. Stulen
Fourth Vice-President ..... Samuel Holmes
Secretary ..... E. M. Tate
Treasurer ..... S. N. Murphy

The above, with John L. Mullen, G. R. Downing and W. B. Loufman, Jr., constitute Executive Board.

The annual cut of British Columbia timber is approximately two billion feet. There are 420 mills and 790 logging camps in the province, employing about 60,000 men.

The Quantity System of Estimating

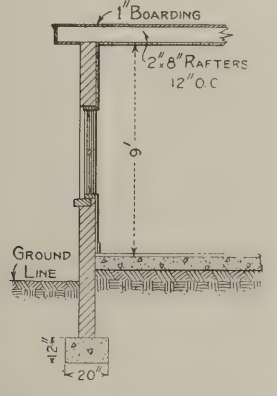
An American Method Compared with the London System —Some Details of Special Value to Architect and Builder

By Albert G. Duke

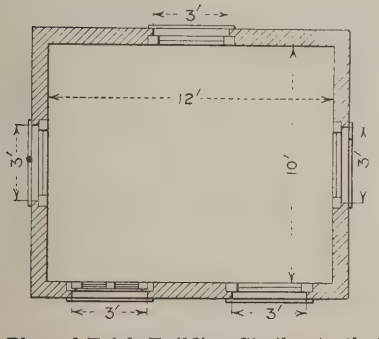
In the issue of *The Building Age* for December last, a simple example of the London system of quantity surveying was given, as a recommendation to American contractors.

It would seem to any contractor on this side of the water that the system requires too much preliminary work, especially in these days when the building contractor is left so little time to prepare an estimate; and the fine detail that is involved is not required or worth the time spent upon it.

We have no recognized method of "taking off" quantities in this country, and until the profession is established, it must be left to each contractor to develop his own method.



Section of Foundation and Main Wall of Building as Represented by the Outline Plan Given Below



Plan of Brick Building Similar to that Shown in the December Issue

It is the writer's intention to explain and show briefly a method of taking off quantities and estimating, using the same illustration for measurements as given on Page 36 of the December issue, so that the advantage of the method now advocated may be seen by comparing the two systems.

This system of "taking off" has been used by the Aberthaw Construction Company, Boston, Mass., with which I am associated, for the past seven years and has proved entirely satisfactory in every way, being equally applicable to large and small works of any character.

The reader will notice at a glance that the chief labor-saving item is the fact that all the work appears on one set of sheets, whereas the London system requires three sets of records, viz., the "Dimensions," the "Abstract" and the "Bill."

In the Aberthaw method, it is important to notice the systematic order of setting down the dimensions and that each column is used for a specific purpose, so that when it is necessary to refer to the dimensions later, or variations are to be made, the items can be easily identified.

The first column on the left is for the description and location of the work, also for any notes useful for further reference.

Form 58 Estimate No. Sheet No. 1

Estimate for One Room Brick Building

February 12th 1915

Concrete in Foundations	2	(14½+10)	1⅓	1		81	= 3 cyds	6.00	18
6" Concrete paving with 1" granolithic finish		12	10			120	= 120 sq ft	15	18
Brickwork in Cement Mortar	2	(13⅓+10)	⅔	14		436	436 − 46 Ddt = 390 = 390 cu ft	50	195
Windows	4	3	⅔	4	Ddt 32				
Door		3	⅔	7	Ddt 14				
Clear site and grade for paving									5
Dig trench, wheel & deposit	2	(13⅓+10)	3	5		700	= 26 cu yds	1.25	33
Backfill		46	2	4		368	= 14 cu yds	.50	7
Mason work									
8"x5" Stone window sills	4	4 ft					16 ft	1.00	16
10"x6" Stone threshold to door		4 ft					4 ft	1.50	6
Carpenter work									
Boxed frames 3"x4" double hung sash & glazing with clear sheet glass							4	5.00	20
Labor setting & jointing							4	2.00	8
Trim.							4	2.00	8
2 Doors & frame 3'6"x7'6" (4 panel) and trim Labor setting and hanging.							1	15.00	15
							1	5.00	5
Hardware to windows and door									10
1"x6" Baseboard	2	(10+12)			ft 182	bf	44 ft	20	9
Rafters 8"x2" Plates & sundries	13	14				242 − 150 = 392 sq	400 bf	45.00 M	18
1" Tongued & Grooved Roof boarding		16	14			224	2½ squares	4.50	10
Trim to Eaves	2	(16+14)					60 ft	.20	12
Plastering									
Walls & Ceil work	2	(10+12)	9			396	396 − 69 Ddt = 327 = 36⅓ sq yds	1.00	36
Windows	4	3	4		Ddt 48				
Door		3	7		Ddt 21				
Lath & plaster to underside of ceiling		12	10			120	13⅓ sq yds	1.25	17
									466

Facsimile of Estimate "Form" as Suggested by Mr. Duke

The Quantity System of Estimating—Some of the Various Details

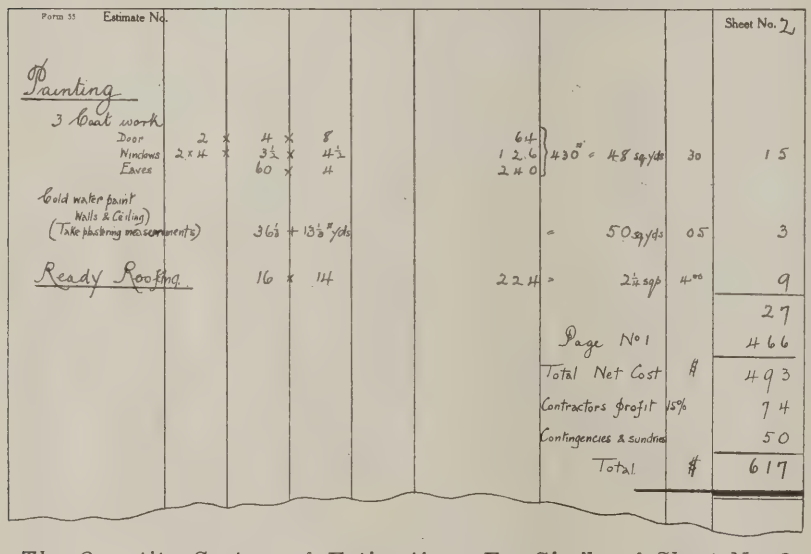
The third is for length, fourth for breadth, the fifth is for hight, while the second is used for setting down the number of floors, footings or other items by which the measurements should be multiplied. As the figures are connected by multiplication signs, the clerk who extends them has a simple arithmetical expression to extend, with very little chance for any misunderstanding. The remaining columns are for extensions, unit prices and total money, respectively.

The right use of these columns is very important, and if it is faithfully followed out it will be perfectly easy for any person to refer and identify a dimension at any time after it has been made.

One man should scale the whole of the building, another extend the dimensions, and the same one who scales should check the extensions after he has taken off all dimensions.

This makes two distinct operations and leaves the estimator's mind clear for scaling.

Each trade or operation is taken in turn, taking every item throughout the building before proceeding with the next operation. Assuming a brick building, the estimator would commence with the brickwork foundations and continue until all


Form 55 Estimate No. Sheet No. 2

Painting

3 Coat work

Door 2 × 4 × 8 = 64

Windows 2×4 × 3½ × 4½ = 126 } 430 = 48 sq yds 30 15

Eaves 60 × 4 = 240

Cold water paint Walls & Ceiling (Take plastering measurements) 36⅔ + 13⅓ yds = 50 sq yds 05 3

Ready Roofing 16 × 14 = 224 = 2½ sqs 4.00 9

27

Page No 1 466

Total Net Cost # 493

Contractors profit 15% 74

Contingencies & sundries 50

Total # 617

The Quantity System of Estimating—Fac-Simile of Sheet No. 2

work taken care of by the bricklayer is taken, before commencing with any other trade.

The same applies to the earthwork—clearing site, digging, backfill, any pumping, sheeting, etc., would be entered under this heading. All trades to be treated in the same way.

It is essential, in order to avoid omissions or errors, to follow a regular order of "taking off" the work, and the main items should always be taken first. For instance, assuming a certain contractor's chief work is brickwork, it would be as well always on every estimate to commence with this item, then follow with concrete, excavation, drains, windows, carpentry, doors, roofing, painting, glazing, miscellaneous iron work, etc., etc.

In general, the work should be "taken off" in the same order as the job is constructed.

The method of booking a dimension, cubic, superficial or number should be followed, according to the prevailing method of pricing or purchasing material.

So that readers may make a comparison, this example has been taken off for a building similar to that shown in the December issue of this paper.

The letters "Ddt" after a dimension denote that the item is to be deducted, the extension being put a little to the left, so that it may readily be seen.

It will be noticed that fractions are used for parts of a foot because the dimension is easily understood and there is not the chance of mistaking the position of a decimal point that so frequently occurs when decimals are used.

All quantities should be taken off first and then unit prices set down in the column provided. No extensions to be made until this has been done.

It would be a great waste of time to take off the excavation as minutely as is done by the London system, and it is not advisable to use the peculiar English unit of the rod for brickwork.

Licensing Architects in North Carolina

One of the important measures adopted at the recent session of the General Assembly of North Carolina is a law providing for the registration of architects. Persons who have made architecture their sole or principal business before the enactment of the law those registered in other states as architects, and members of the American Institute of Architects may be registered without examination, but all other persons must pass a satisfactory examination before the State Architectural Examining Board which is created by the new law. Applications for examination must be in writing and accompanied by a fee of $25. Examinations will be held at the annual July meetings of the board.

It is made an offense, punishable by a fine of $50, for an unregistered person to hold himself out to the public as an architect. The act does not, however, forbid an unregistered person from making and selling plans, unless he holds himself out to be an architect.

Certificates of registration are to be filed with the clerks of courts in the county where the holder is engaged in business. He must stamp all his drawings and plans, "Registered Architect of North Carolina."

The state board will consist of five members to be appointed by the Governor. To insure competent membership, the act requires that each appointee shall have practiced architecture for at least ten years.

In regard to the building outlook for 1915 a contractor in Youngstown, O., states that he has on hand and under way more work than he has handled in 18 months, while according to a local paper the architects of the city are much pleased with the outlook for business in their line.

It is stated on good authority that only one modern sawmill is operated in the territory of Hawaii.

Portable Schoolhouses in Chicago

New Type of Frame Building with Sheet Metal Covering—Capacity for Seating 48 Pupils

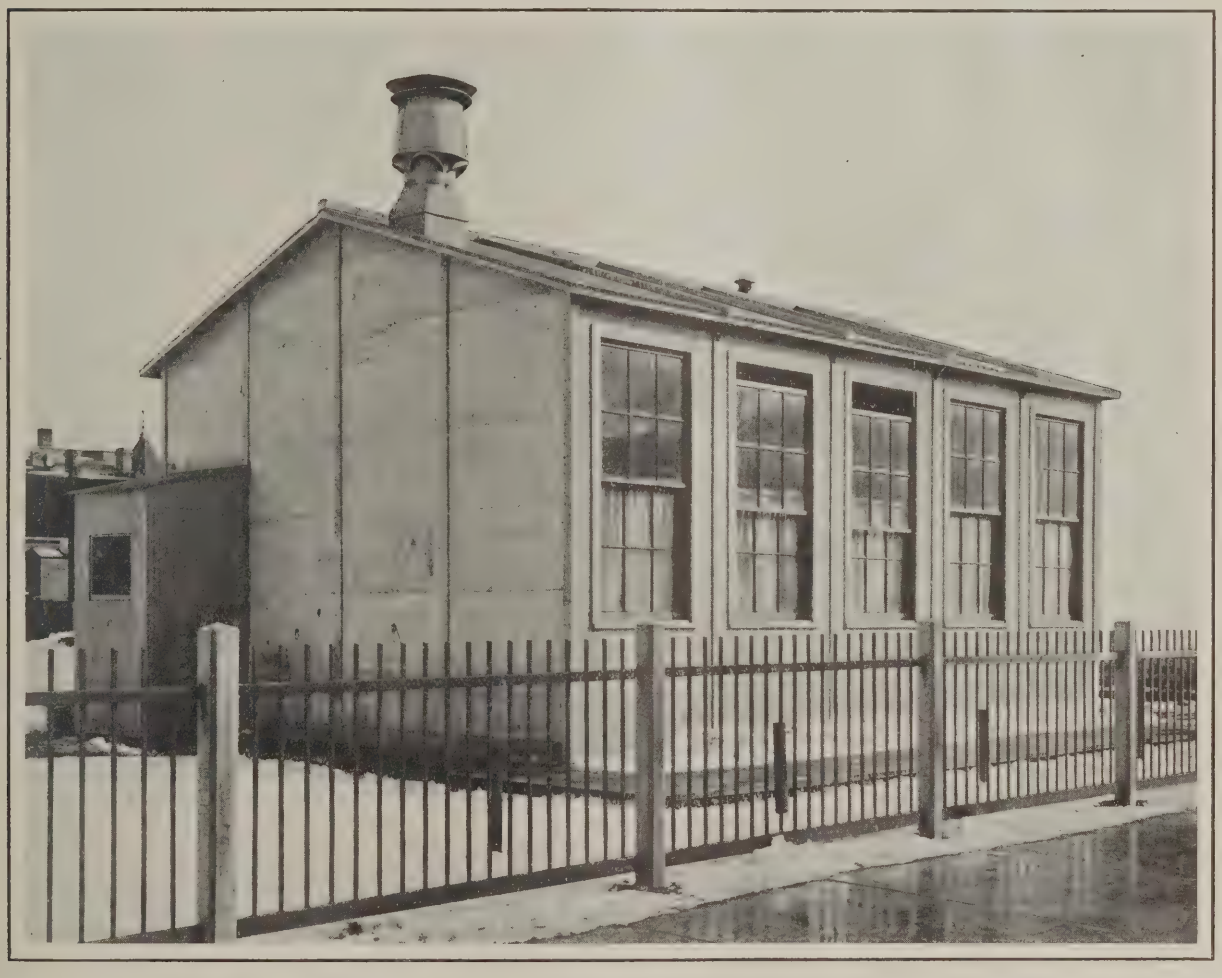
A NEW type of portable schoolhouse of frame construction with a covering of galvanized sheet metal has been designed by the Chicago Board of Education for use in various parts of the city. These one-room structures are erected in sections, so that they may be taken down when desired in a very short time. The simplicity of construction is such that they may be erected in approximately one day, and a record was established last winter when 90 of the buildings were erected in 110 days. The work was not let to a general contractor, but was undertaken by the Repair Department of the Board of Education, principally on account of the fact that the bids received were in the neighborhood of fifty per cent in excess of the amount estimated by the board authorities.

The accompanying plans and illustrations will give an excellent conception of the details involved and of the interior and exterior treatment, while in what follows mention is made of the heating and ventilating facilities. It is well to note the cooperation that prevailed between the architectural and structural departments. In the plans provided the following details were clearly shown: Side and front elevation of building and elevation of framing; sections through the side walls and window jamb; details of the joints over trusses and of ridges; end elevation of framing and details of gable.

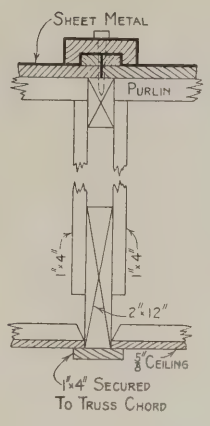
The schoolhouses are 30 ft. long, 22 ft. wide, and the hight of the ceilings about 14 ft. from the finished floor. From the finished floor line to grade is usually 18 in., and from grade to the bottom of the corner and intermediate posts 4 ft. This is the usual depth allowed, but under conditions where the ground is in a bad shape the construction work is left to the discretion of the supervising foreman.

The buildings are constructed with sufficient cubic capacity to comfortably house 48 children.

From the accompanying exterior illustration it will be seen that the long side of the building has been furnished with five large windows. These con-

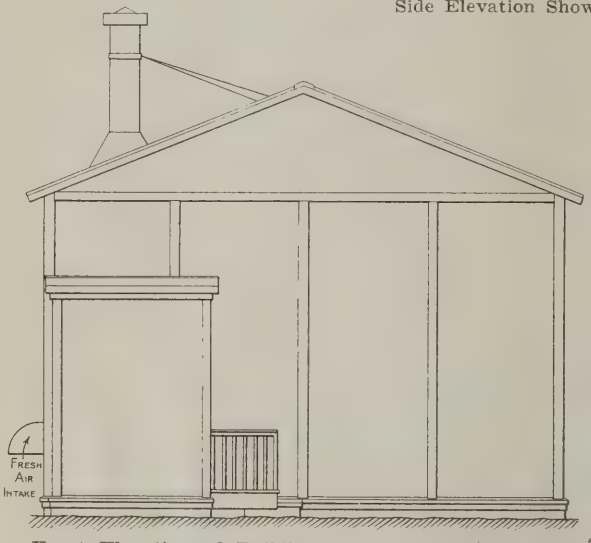


Portable Schoolhouses in Chicago—General View of One of the Buildings

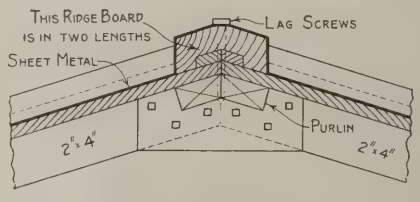


Details of Joints over Trusses—Scale ¾ In. to the Foot

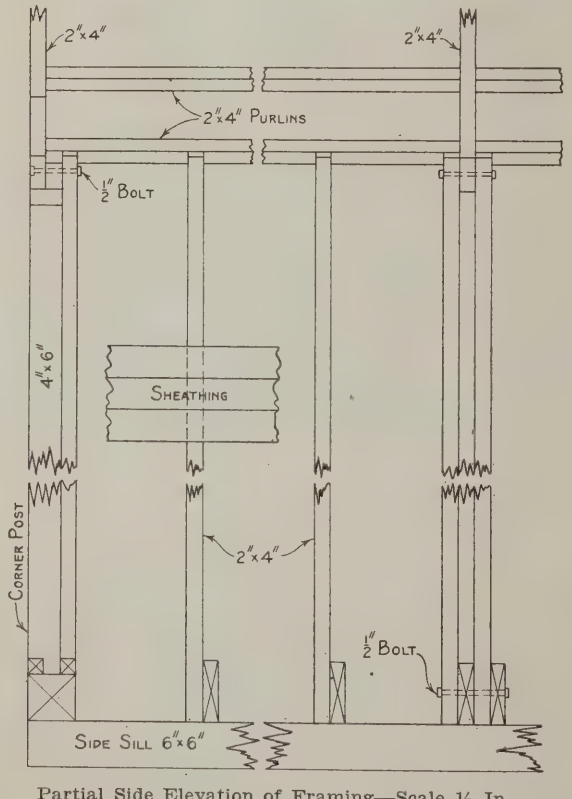
Side Elevation Showing Large Window Area—Scale ⅛ In. to the Foot



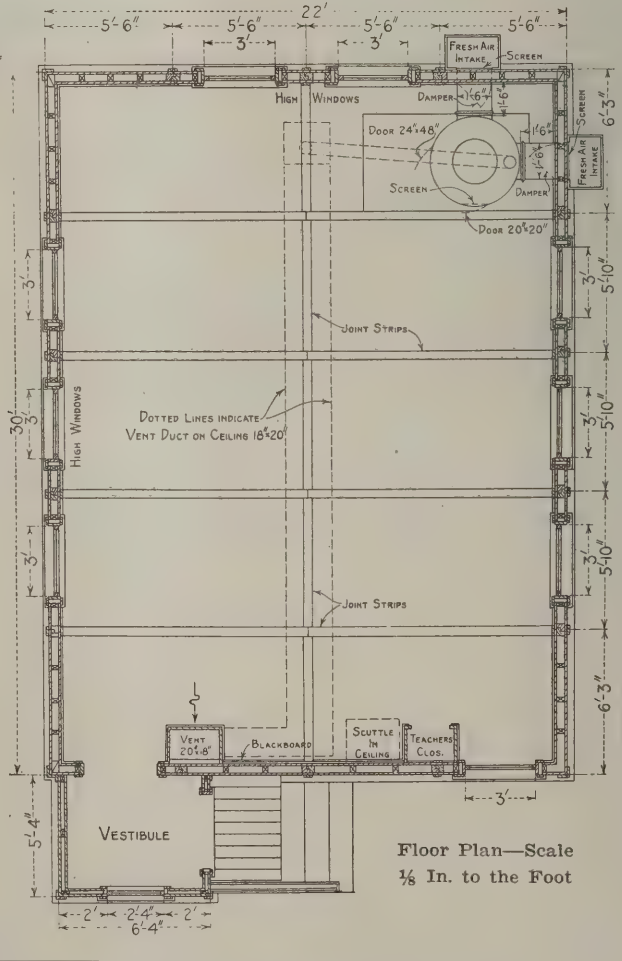
Front Elevation of Building—Scale ⅛ In. to the Foot



Detail of Ridge of Roof—Scale ¾ In. to the Foot



Partial Side Elevation of Framing—Scale ½ In. to the Foot

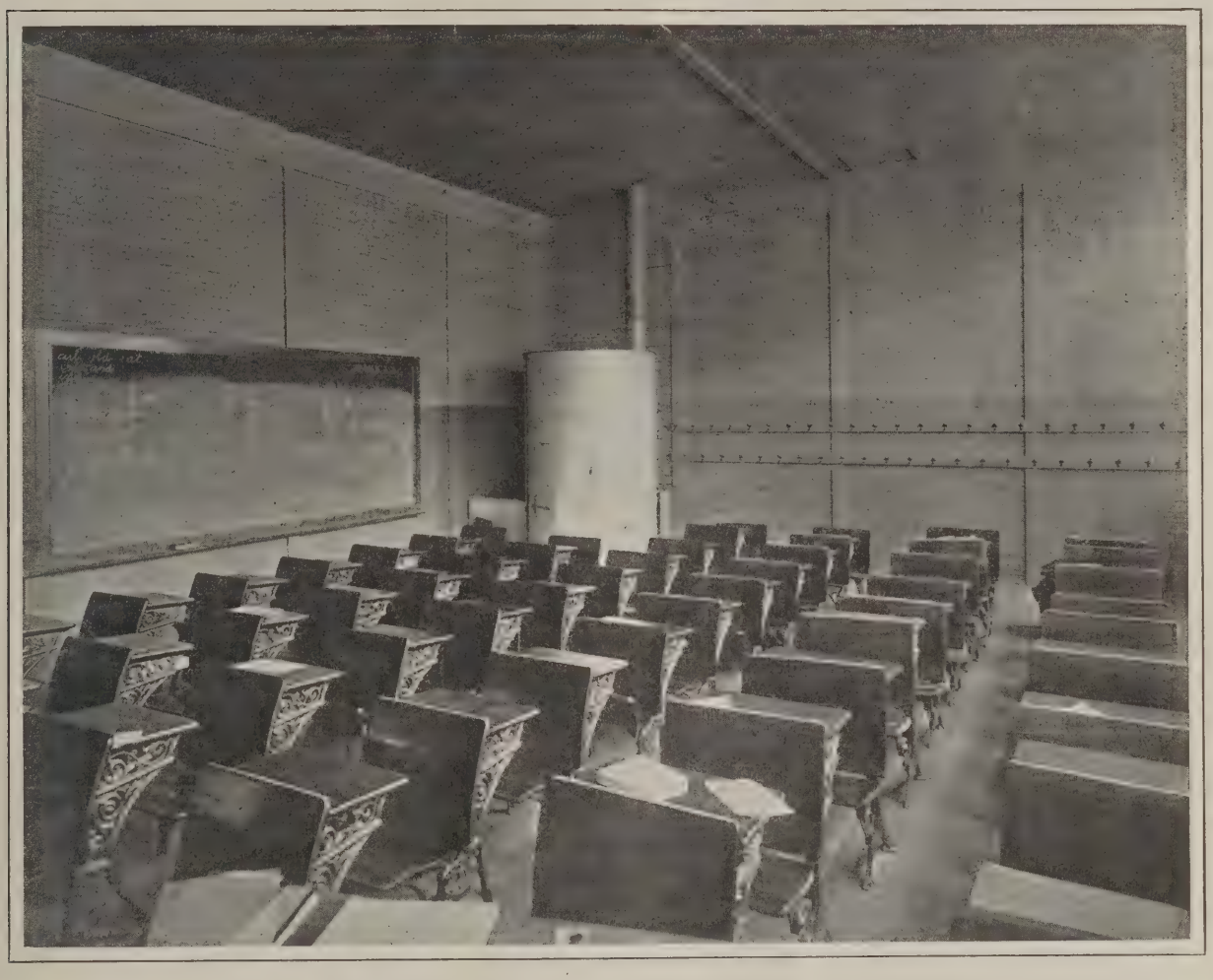


Floor Plan—Scale ⅛ In. to the Foot

Portable Schoolhouses in Chicago—Plan, Elevations and Various Constructive Details

stitute the entire natural lighting. No artificial lighting is provided. Each section has 8 ft. x 3 ft. 6 in. of glass surface, composed of 14 x 22 in. panes of glass. On the interior of the opposite long side the space is occupied by a large blackboard. Access to the schoolhouse is made through an enclosed porch at the back of the structure, measuring 5 x 4 ft., and about 10 ft. high. Hooks on the interior of the short side wall provide space for the children to hang their clothes. On the side opposite the entrance is the heating apparatus.

The building is heated by a No. 22 "Vale" stove, enclosed in a galvanized iron drum about 4 ft. in diameter and 8 ft. high. Two fresh air ducts 18 x 18 in. provide an excellent circulation of fresh air



Portable Schoolhouses in Chicago—Interior of Class Room Looking Toward the Rear Corner

around the stove, and the foul air from the building is carried through a 24 x 36 in. outlet at the opposite end of the ceiling, connecting with a roof ventilator as shown on the exterior illustration.

The building is erected in sections, five being provided on the side and four on the end. In construction the ends are put up after the floor has been laid. The sectional joints are covered with 1 x 4 strips, which are in turn protected by a galvanized iron covering. These are kept in position with screws. From the drawings it will be noticed that screws have been used rather profusely in order to facilitate dismembering the schoolhouse.

The layout of the foundation is composed of 6 x 6's cut 30 ft. for the length and the same size material cut 22 ft. for the width. Three of the former and two of the latter are used. The rough flooring consists of 1 x 6 in. common boards nailed firmly. When this work has been done the sides are raised. In the construction work the bolts used at the bottom are $\frac{5}{8}$ in., 8 in. long, and at the top $\frac{5}{8}$ in. 6 in. long. In nailing ordinary 8d and 20d nails are used.

The studs are 13 ft. $3\frac{1}{2}$ in. long, and are held at the bottom by being firmly bolted at the joists. End studs measure 2 x 2 in. A tongue sets back of the 2 x 2's to hold the end of the section, and the layout of the 2 x 4 plates nail the studs in place.

Little space is left between the sections. The distance between the sections on the roof and sides is 6 ft. The sheathing used is 1 x 6 in. dressed common lumber. When this has been accomplished the trusses are set in place. Purlins used in this connection are 2 x 4 in.

In the general layout the openings are left with a 54 in. pocket. The frieze board forms a cap for the windows and is fastened with screws so that when the frieze work is moved the trusses are accessible for disconnection. At the side sections a pocket is also left at the bottom to allow accessibility to the bolts. Pockets are provided on the outside also.

The sills measure 6 x 6 in. The roof truss is 2 x 12 in., and the rafters 2 x 6 in. The brace truss runs at right angles to the rafters and carries the roof boards and sections. When in place the roof sets on a 2 x 6 on end, and the sections on a 2 x 2 in. ripped diagonal. One-half of the 2 x 2 is nailed to

a 1 x 5, forming a roof strip covering the connecting sections. To some extent the frieze work carries the sections on ends.

The trusses are carried by pieces of 2 x 4's, spiked to one stud. The next stud is held in place by being bolted top and bottom, and the bolting of the sections and the 2 x 4's carries the trusses. When this section bolt is released the truss may be lifted right out.

When the roof is sheathed a good wool felting is applied. On top of this is tacked and soldered at the joints sections of No. 26 gage galvanized iron. These sheets are made to fit the sections exactly. On the sides of the building the sheathing is also covered with the same grade felt, but the galvanized iron covering is nailed, and not soldered as on the roof. The metal covering is also made to fit the sills and casings, so that the entire woodwork may be protected from the weather. The porch giving access to the schoolhouse is the only woodwork that is left uncovered.

The floor boards are nailed and left so that when it is necessary to take the building down they may be sawn in sections. On top of the rough flooring a wool felt is placed, and a top flooring of maple is applied. This is put on in sections to conform with the rough flooring underneath.

The interior walls are covered with 5/8 x 4 in. beaded hard pine, and the finished ceilings are of the same material, measuring 3/8 x 4 in.

The buildings have been found very comfortable and warm, and the Board will continue to erect them providing their satisfaction continues. The total labor cost has been estimated for the carpentry work, at $59, while the total cost of a structure is in the neighborhood of $1,000.

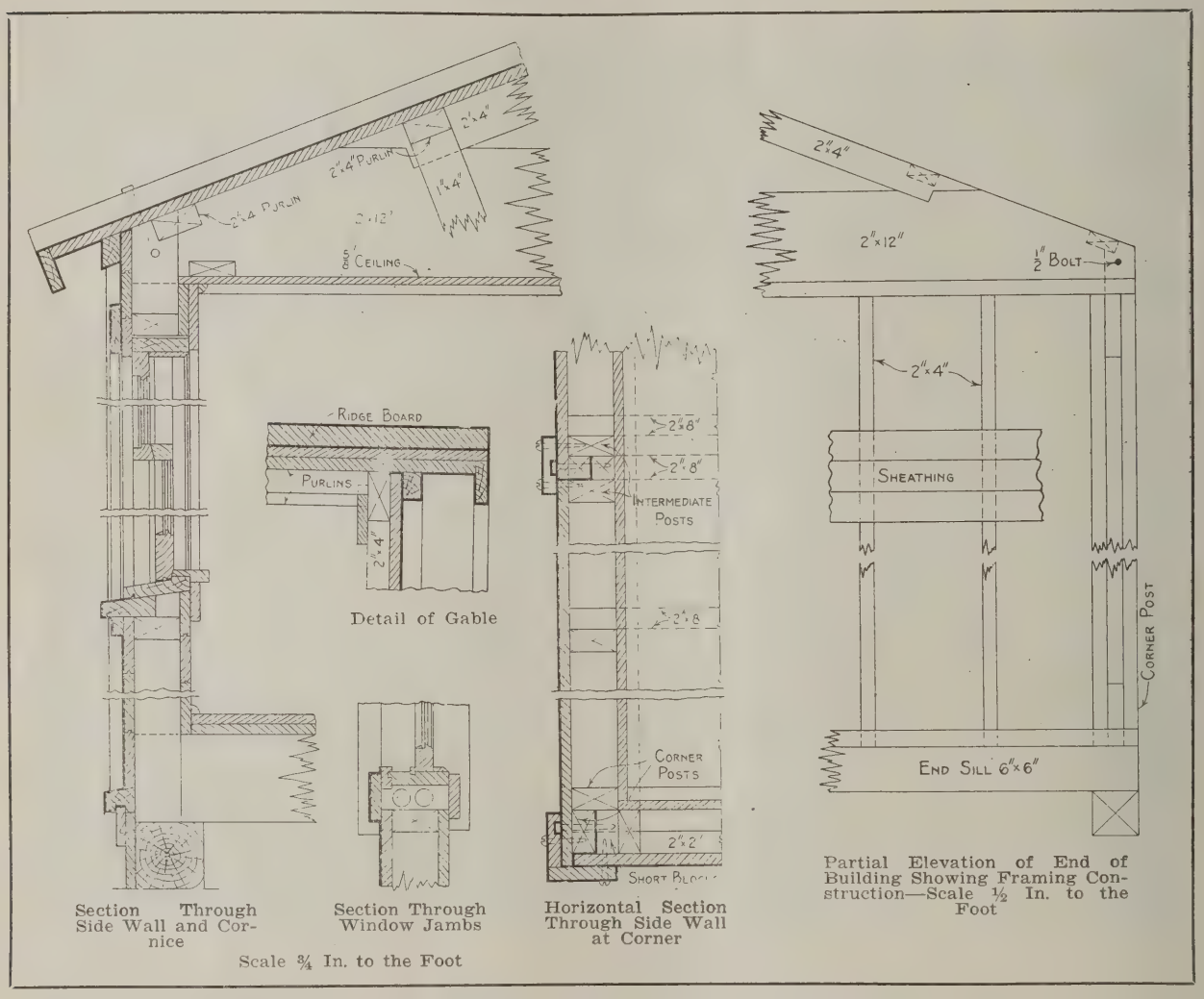
Definition of Cedar Wood

What is called "cedar" is not at all the cedars used by Solomon in the building of his temple at Jerusalem, nor is it the famed wood preferred by the Egyptian woodworkers.

Of the Solomon cedars there exist only about 300 trees, says *Wood Craft*, which are carefully fenced in and guarded, and which serve merely as a place of pilgrimage and for tourists.

Common so-called cedar is far from the scented, brownish-red real cedar, and has only the name in common with that tree. The Himalayan cedar growing at hights of 4,000 ft. to 20,000 ft. above sea level is the nearest relative to the cedar of Lebanon, and is used a great deal in English shops.

Similar to this cedar is the West Indian or Spanish cedar which is used for cigar boxes. As this supply is getting scarce, substitutes have been found in the African Bosipi and the wild muscat tree, as also the American juniper tree, which, however, is also becoming rare. Japanese cedar wood is light, soft and durable.



Portable Schoolhouses in Chicago—Various Constructive Details

Removing Stains from Stonework

Main Source of the Trouble—How It Can Be Avoided—Best Method of Treatment

IN the first place, it cannot be insisted upon too strongly that no stone now accepted as a standard in the market contains within itself the elements of staining or discoloration. It may change its color somewhat in weathering, but this will be in the way of a mellowing of tone, and will give no unsightly blotches. This is proved by the natural exposure of the rock in the quarry. Where there is staining in the walls of a building, it can safely be set down to faults in the setting, or to some cause extraneous to the stone itself.

The most prolific source of trouble, says a writer in *Stone*, is, of course, the cement that is used in setting the stone. Ordinary Portland cement will badly stain almost any stone. Various so-called non-staining cements" are widely heralded, but it is the universal experience of stonemen that little dependence can be placed on these.

In the old days, before cement was so widely used, architects rarely had to complain of staining. There are thousands of buildings that have stood for half a century or more that show only the kindly mellowing of time, save for the effect of smoke and dust incidental to city life.

How Trouble May Be Avoided

Architects will specify very particularly that stone be set in cement mortar and think that they guard against all trouble if they require the back and sides of the stone to be coated with waterproof paint. Undoubtedly a good paint is much protection, but the difficulty is to coat the beds and joints of each stone clear to the face. A narrow strip left unpainted will permit the carrying of the discoloring moisture from the cement to the face of the stone by capillarity.

All of this trouble could be avoided if the architects would only insist that the stone be set entirely in lime mortar, made in the following proportions: One part lime and three parts sand. The lime to be thoroughly slaked and the sand well tempered; all mortar to lie in the pile at last twenty-four hours before using; all sand to be clean, coarse, and free from loam. If the most delicate stone is set in mortar as above, and the back of the stone plastered with the same mortar, it positively will not stain.

There is another way in which stone may be stained—by the drippings from concrete floors or roofs. In such cases the discoloring moisture runs down the face of the stone, and no painting of the back or beds can afford any protection. The utmost care in superintending the construction is the only safeguard from this disfigurement.

Cement stains cannot be eradicated by any wash or other treatment. Fortunately, they are apt to bleach out in time under the influence of the sun and the weather. The architect and the owner alike are naturally greatly exercised when cement stains appear, and try to seek some immediate remedy. It is impossible to use wire brushes without leaving recommended may injure the stone and certainly will not prove efficacious. The only thing to do is to have patience and wait for the natural bleaching, which may take weeks or even months.

Do Not Wash the Stone With Acid

The stone setter, anxious to leave a building in spick and span condition, may suggest that it be washed down with muriatic acid. This should never be permitted. The acid may take out some of the stains for the moment, but it burns the surface and eventually will discolor even those portions that escaped the original staining.

There was a time when scrubbing with wire brushes was permitted, but this has generally been discarded, since its bad effects have been recognized. It is impossible to use wire brushes without leaving a coating of iron on the surface of the stone, and this is bound to leave a worse stain than it corrects.

The sand blast is sometimes employed, but generally for old buildings that have become discolored from smoke and soot. This method should always be discouraged. The sand strikes the stone with a tremendous impact. It destroys the "skin" which forms on the surface of the stone by deposition of mineral ingredients on the evaporation of the interstitial water. It also stuns the grains or crystals of the stone and tends to hasten the weathering.

The very best treatment of stone to remove smoke, soot, dirt, mortar, etc., is a simple washing. A recipe that is recommended by stonemen of the widest experience is as follows: Prepare a wash of soft water and about one and a half bars of common laundry soap. Boil until the soap has been thoroughly dissolved. Add a fine, clean, gritty sand (white preferred) and mix to about the consistency of putty. While mixing add about five tablespoonfuls of ammonia per bucket of water. With this preparation scrub the surface with a stiff scrubbing brush. Wash down with a stream of water from a hose, and then go over it again with scrubbing brush.

Stains From Metal Work

While any building may need a cleaning, a great deal of the staining could be avoided if more care were taken. While speaking of the evil effects from cement and the dripping of dirty water, there are other things to be guarded against. The rust from improperly protected iron or steel and the verdigris from copper or bronze sheathing have disfigured many a fine structure. The writer knows of one very costly building where the oil-saturated exhaust steam from hoisting engines was dicharged directly against the façade. What wonder if this is permanently stained? Doubtless the architect is speculating as to the cause of the discoloration, and is inclined to blame the stone.

Hollow Tile House with Shingle Roof

A Suburban Home in Which the Outstanding Feature of the Interior Arrangement Is the Living Room

WE have taken as the basis of our colored supplemental plate this month a hollow tile house with shingle roof and embodying an interior arrangement well calculated to interest the builder and the prospective house owner. The striking feature of the first floor plan is the living room, which extends the full depth of the house and constitutes what might be regarded as an "extension" of the main body of the building. It measures 14½ x 24 ft. in size, has at one end a large open fireplace, paneled side walls, and exposed roof rafters. French casements connect this room with the private terrace immediately at the rear.

Features of the Kitchen

A feature of the kitchen is a built-in dining nook where the family can enjoy its meals with comfort in the kitchen and at the same time save the housewife a great deal of work and numberless steps. Communication between the kitchen and the living room is established through a commodious pantry lighted by a window which gives out upon the terrace already referred to. The kitchen equipment includes sink with drain-board, placed directly under a window where it receives ample light, a range, work table, and closet or cupboard for the kitchen utensils. The location of the kitchen is such as to give ready access to the stairs leading to the cellar where are located the laundry, the furnace and various storage rooms.

From the hall opening out of the living room communication is also established with a sleeping room, the bath room and den or study, which can also be used as an office or it may be converted into another bed room, according to family requirements. Both rooms are lighted by French casements which open on to the front porch.

In the attic are two sleeping rooms with a commodious storage closet, which, in case of necessity, can readily be converted into a bath room should the owner so desire.

Hollow Tile Walls

According to the specifications of the architect the exterior walls of the house are to be constructed of hollow tile blocks with faces scored with special dovetail scoring so as to offer a good surface for the stucco finish. The blocks used in the construction of the exterior walls are to be laid with the hollow cores running vertically in the wall so as to develop their full strength. In any case where it is necessary to construct the interior partitions of hollow tile the blocks may be laid on the side if such a scheme is desired.

The mortar used for laying the blocks shall consist of a standard cement and sand in the proportion of one part of cement to three parts sand. The amount of lime well slacked which may be used in the mortar is not to exceed 10 per cent. of the mass by volume.

The Foundation Walls

The foundation walls, extending from the top of the 10 in. concrete footings to the under side of the first floor beams, are to be built of 12 x 12 x 12 in. tile blocks. At the corners 6 x 12 x 12 in. blocks are to be used so as to secure a running bond in the wall. The exterior surface of the foundation walls from the footings to a point above the grade line are to be given a heavy coat of waterproof cement. Where columns or piers supporting heavy loads rest on the foundation wall they are to be filled with concrete from the footings to the top of the wall so as to eliminate any possibility of failure due to compression.

The exterior walls above the water table are to be of 8 x 12 x 12 in. blocks. These are to be covered with a stucco finish consisting of two-coat work and the tile is to be thoroughly wet before applying the first coat of stucco.

All hung windows are to have special jamb blocks with rabetted openings to receive the window frame box. All lintels over openings are to be constructed with special lintel blocks, reinforced with steel bars and concrete or steel L's may be used.

The porch columns and piers are to be of hollow tile. All sills are to be formed of hollow tile sill blocks, care being taken to fill all joints so as to prevent moisture from working through them.

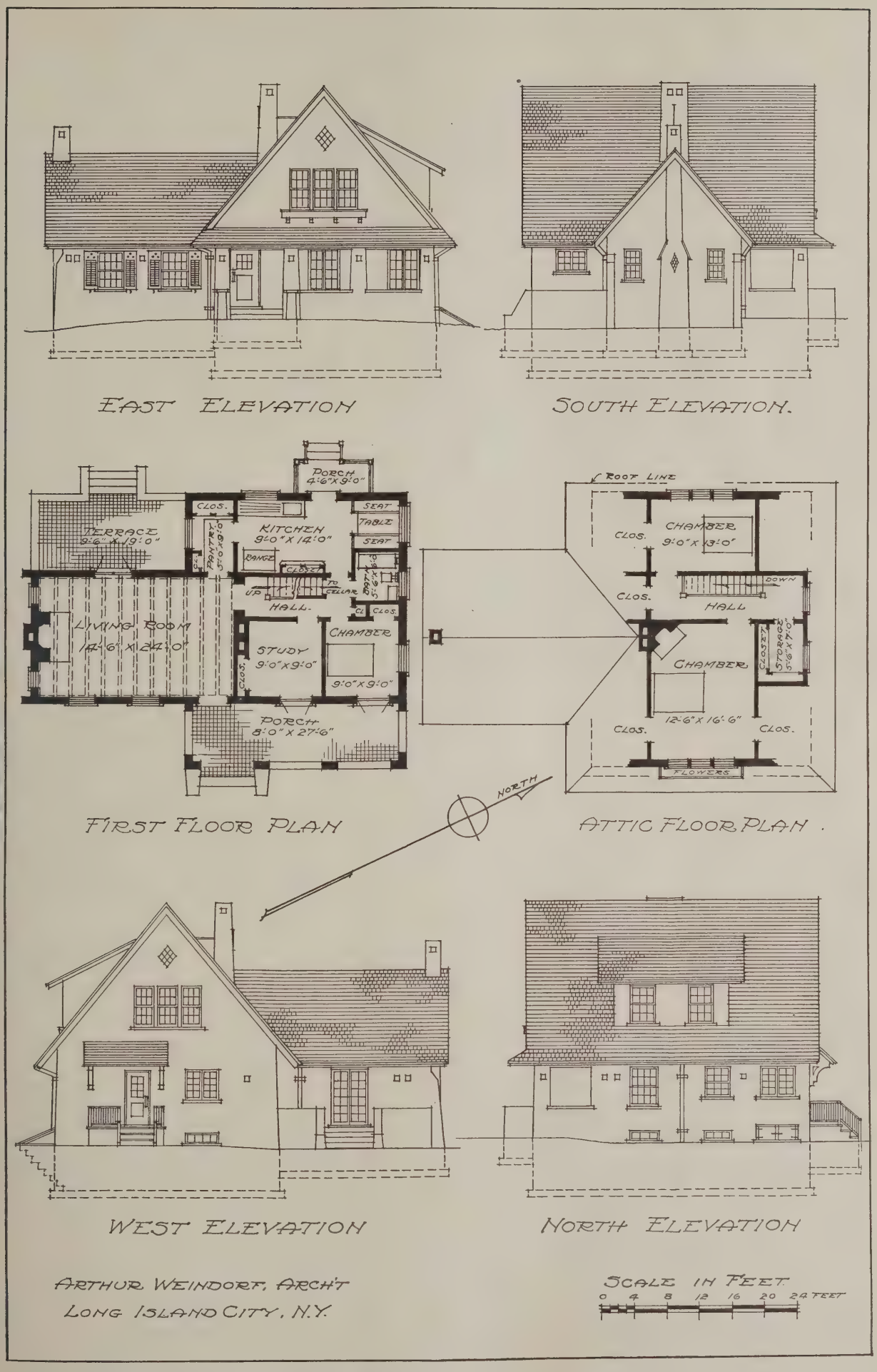
Terra cotta slabs 1 in. thick are to be set under all floor beams to serve as bearing plates for them. Imbedded at intervals of 5 ft. in the wall under the roof plate are to be ¾ in. bolts 30 in. long with nut and washer and projecting 6 in. above the top of the wall to serve as an anchorage for the plate. Cement grout is to be filled in around the bolts before placing the roof plates. On the tile course directly below the bolts should be placed 1 in. tile slabs.

All concrete used should be of a mixture consisting of one part cement, two of sand and four of broken stone or gravel.

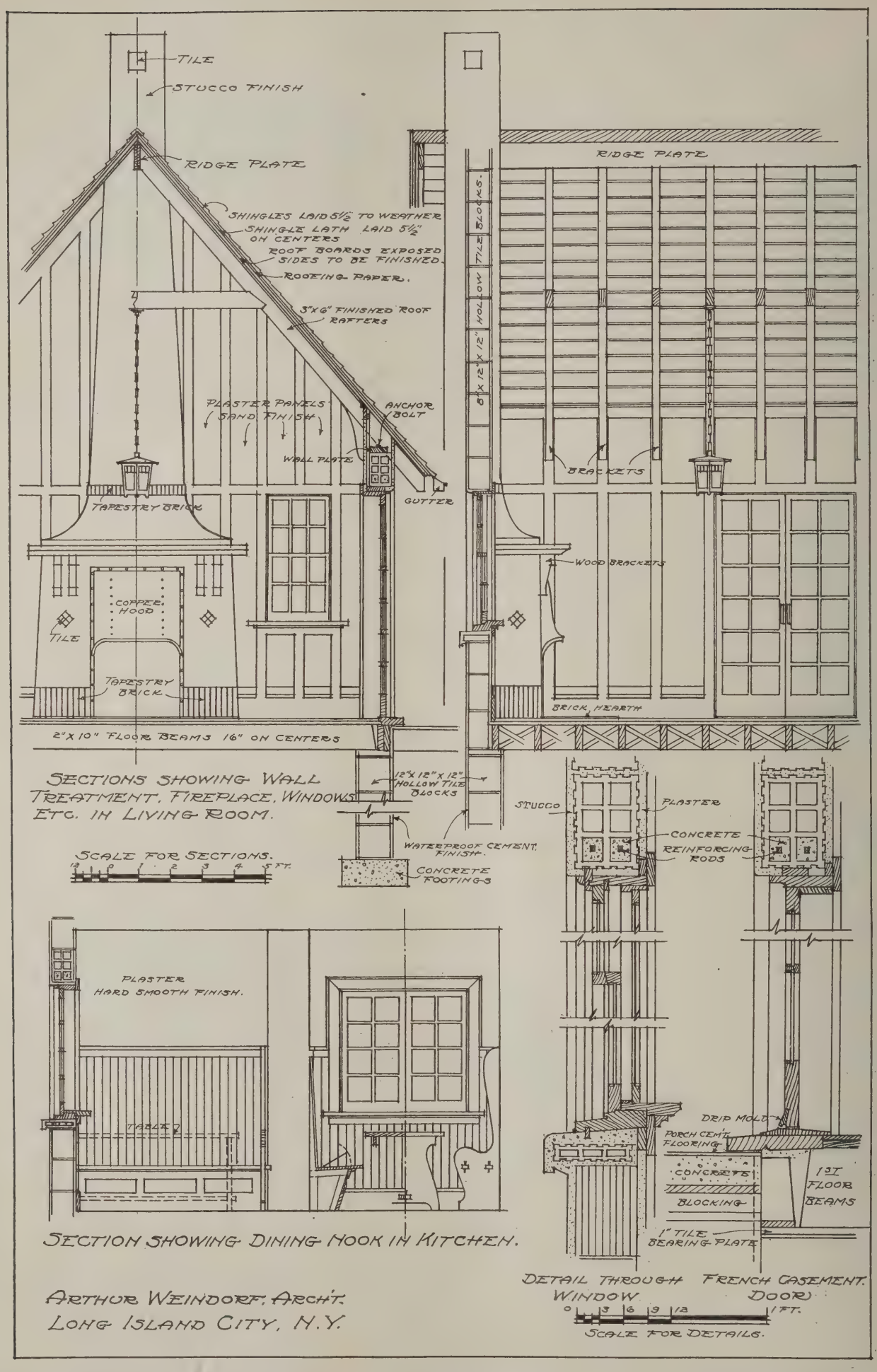
Finish of the Walls

Plastering on the interior of the building is to be applied directly to the hollow tile walls. The living room is to have a sand finish and all other rooms a hard smooth finish. All walls are to be tinted with a flat waterproof tint. The bath room floor will consist of 1 in. square tiles and the side walls will be covered to a hight of 3 ft. with 3 x 6 in. white tile, starting from a sanitary base and finish with a bed moulding.

The framing timbers are to be of spruce and the wood work of all the rooms is to be of cypress. The first tier of beams is to be 2 x 10 in. and the second



Plans and Elevations of Hollow Tile House Forming Basis of Our Colored Supplemental Plate



Miscellaneous Constructive Details of Hollow Tile House Shown on Colored Supplemental Plate

tier 2 x 8 in., all set 16 in. on centers. Interior partitions are to be built up of 2 x 4 in. studs set 16 in. on centers and the studs around door openings are to be doubled. All bearing partitions are to be bridged and have 4 x 4 in. plates top and bottom. Each tier of beams is to have cross bridging spaced 6 ft. apart.

The first floor is to be double and the second floor to be single, all of North Carolina pine.

The inside trim is to be brought to a smooth finish and filled with a good wood filler and then finished natural. The floors are to be varnished.

The hardware is to be of bronze plated finish, to be selected by the owner.

The plumbing fixtures in the bath room consist of wash basin, bath tub and water closet, all to be of porcelain enameled.

The house is to be heated by furnace, which shall be of sufficient size to give a comfortable temperature of 70 deg. within when it is zero outside. Electricity and gas are provided for all rooms, the arrangement calling for combination fixtures to match the hardware in finish.

All exterior work is to have three coats of paint, consisting of white lead and linseed oil.

Estimate of Labor and Material

According to the estimate of the architect the cost is based on a cubic content of 31,500 cu. ft. at a unit price of 22c per cu. ft. and is distributed as follows:

Excavating and grading	$125.00
Masonry work, including concrete and cement work, hollow tile exterior walls, brick chimneys, fireplace, etc.	2,975.00
Exterior stucco work	325.00
Interior plastering	265.00
Carpentry work, including lumber bill, mill work, labor, etc.	2,000.00
Hardware (finish)	100.00
Metal work	130.00
Painting, staining and tinting	250.00
Heating (steam)	320.00
Plumbing and gas fitting	300.00
Electric wiring and combination lighting fixtures	140.00
	$6,930.00

The house here illustrated and described was designed by Arthur Weindorf, Long Island City, N. Y., who states that the above figures include the contractor's 10 per cent. profit. These figures of cost will vary in different sections of the country depending upon style of finish, rates of wages and local prices of materials.

Subcontractor's Right to Lien

The Legislature of a state is without power to enact a law which purports to give a subcontractor a mechanic's lien in the face of a provision in the general contract to the effect that no lien shall attach on account of the work done, and a subcontractor must take notice of such provision. These two important principles were lately laid down by the Illinois Supreme Court in the case of Rittenhouse & Embree Co. vs. Warren Construction Co., 106 Northeastern Reporter 467. Accordingly, the court holds that so far as the Illinois Lien Law has this effect it is invalid and unconstitutional. The opinion, in part, reads:

"The foundation of the right to a mechanic's lien is a valid contract with the owner of the lot or tract of land to be improved, or with his duly authorized agent, for the construction of an improvement thereon and the furnishing of material and labor pursuant to the provisions of such contract, for while it is true that the lien is not created by the contract of the parties, but is created by the statute, still a contract is essential to the creation of any valid lien under the statute. * * * The statute which gives a right to a mechanic's lien was not intended to abridge or curtail the right of contract between the parties, and where the contract between the original parties waives the right to a mechanic's lien, or is of such character that no right to a lien can accrue thereunder, the provisions of the Mechanic's Lien Law, in so far as they attempt to give a subcontractor a right to a lien in spite of such agreement between the original parties, are unconstitutional and void."

In the above-cited case a contractor agreed to construct for an owner "free from all claims, liens, charges, etc., all of the rough carpentry work required in the construction" of an office building, and it is held that a subcontractor was bound to take notice of this provision.

Architectural Acoustics

In order to determine the acoustic properties of a building it is no longer necessary to wait until the auditorium is finished and then endeavor to ascertain whether it is good or ill, says Dr. Wallace C. Sabine, Dean of Graduate School of Applied Science of Harvard University, in an article which appeared in the Journal of the Franklin Institute. While the factors of the acoustic problems in an auditorium at all complicated, are themselves complicated, nevertheless they are capable of exact solution or at least of a solution as accurate as are the architect's plans in actual construction. This conclusion is given as the result of experiments extending over a period of ten years and begun in some of the buildings at Harvard.

The question of reverberation of sound was first studied. The principal point there is the absorption of the sound, that is, its transformation into another form of energy. It was found that cushions placed in the seats materially diminished the reverberation and further experiments in absorption showed that the audience itself and heavy hangings three or four inches from the wall were the best absorbers of sound. It was discovered that wood sheathing was a better absorber than plaster, glass or brick.

While materials are the principal feature in reverberation, faults in which can consequently be corrected with comparative ease in an auditorium already built, the shape of the room itself is the best factor in interference—the conflict in sound waves reflected from projecting surfaces, which sometimes continue a sound unduly, sometimes make an echo and sometimes either directly conflict or directly augment each other so as to double or annihilate a sound. Hence the so-called "loud regions" or "deaf regions" in an auditorium. From the experiments, experts in acoustics can now determine by an inspection of the plans of an auditorium whether or not it will be possible to hear well in it, and if not just what should be done to improve it.

THE PALACE OF THE LEGION OF HONOR AT THE PANAMA-PACIFIC INTERNATIONAL EXPOSITION IN SAN FRANCISCO

State Buildings at Panama Exposition

Attractive Structures Which Have Been Erected by Various States as the Headquarters of Their Representatives

ONE of the features of interest for the architect and contracting builder visiting the Panama-Pacific Exposition at San Francisco is found in the various state buildings and pavilions of the foreign nations. One of the latter, the Palace of the Legion of Honor, which is the French National Pavilion, is illustrated in the panel view at the top of this page. The pavilion is an exact reproduction of the famous Palace of the Legion of Honor in Paris, and by special arrangement, the formal opening of the pavilion was deferred so that Vice-President Marshall would be the first person to step within it when he paid his official respects to the pavilions of the foreign nations at the Exposition on March 26.

France established an Exposition record in the construction of this pavilion. The plans were drawn in three days after the French Government had spent $2000 in one cablegram forwarding the general specifications. After this, three shifts of workmen were employed and the $100,000 pavilion came into being like a magic palace. The building occupies a conspicuous site on slightly rising ground, facing north toward San Francisco Bay. It is one of the first of the national pavilions to greet the visitor passing along the beautiful Avenue of the Nations. To the left in the panel picture are the pavilions and gardens of Japan.

Some of the State Buildings

On the facing page are shown some of the state buildings of our own country, No. 1 being the Massachusetts Building. The famous Bull Finch Front state house has served as the model and, in keeping with its part in American history, many interesting historical exhibits are on view. The building is one of the largest of the state buildings and the great gold dome can be seen towering above its stately neighbors.

The Philippine Building, No. 2, is typical of our far eastern possessions. Throughout the building native style is seen and exhibits from every section of the Islands are shown. Native furniture is one of the distinctive features of this building, while native men and women are in attendance to explain the various exhibits.

The Arkansas Building, shown in picture No. 3, is exceptional in its design and is built on bungalow lines for visiting residents of Arkansas. There are spacious lounging and reception rooms decorated with taste and in keeping with the general plan of the structure.

The New York State Building

The New York State Building is shown in No. 4. This is one of the largest, the structure being four stories in hight and costing $200,000. The architecture is Graeco-Roman in style and is finished in Travertine to conform with the exhibits. The building is over 200 ft. in length and 100 ft. wide. Somewhat extended reference was made to the building in these columns some months ago.

Missouri Building, colonial in its style of architecture and one of the most attractive in the Exposition grounds, is shown in No. 5. The reception room—one of the features of the building—is 80 ft. long, 42 ft. wide and 35 ft. high. A number of dining rooms, kitchens, bed and bath rooms have been installed for use of the Missouri officials during their visit at the Exposition.

Pennsylvania Building shown in No. 6 is an exact reproduction of the historical Independence Hall and will serve as the home for the famous Liberty Bell. The bell is to be kept in a specially constructed steel vault and will be under guard at all times. Many historical relics are also on exhibition.

Virginia Building, shown in No. 7, is a faithful reproduction of Washington's home in Mt. Vernon. Many of the rooms contain pieces of General Washington's own furniture, these having been loaned by Miss Nannie Randolph Heath. A number of new pieces of furniture have been modeled after the old, and there are also many historical relics housed in the building, which faces San Francisco Bay. Adjoining the Virginia Building are those of New Jersey and Pennsylvania.

The Oregon Building is a unique feature among the state buildings at the Exposition. It is shown in No. 8 and is built of Oregon pine and fir and is a reproduction of the famous Greek Parthenon in Athens. It is 111 ft. by 211 ft., and one of the features of the building is a moving picture theatre.

Some of the Various "State" Buildings at the Panama-Pacific Exposition in San Francisco, California

Another is the dining room on the second floor in charge of the Oregon State Agriculture School. There is also an interesting fish and game exhibit. The flag pole adjoining the building is over 200 ft. in hight and an American flag 48 ft. in width flies from it from sunrise to sunset.

Hawaii Building, shown in No. 9, contains many interesting exhibits from the various islands of the Hawaiian group. One of the most important is the fish exhibit and it is interesting to state that the fish of Hawaii are distinctive in color and size. The building is directly opposite the California state home and contains many artistic groups of statuary which have been designed especially for it.

The Utah Building, containing some of the most important exhibits of the state, adjoins the Canadian building and is shown in No. 10 of the facing group. Utah's state flower, the Sego Lily, is used frequently in the interior decorations. Many celebrated works of art and statuary are shown throughout the building. The exhibits include mining, live stock and agriculture.

Commencement Exercises of New York Trade School

The thirty-fourth annual Commencement Exercises of the New York Trade School were held in the Assembly Hall on the evening of March 31 in the presence of some 800 friends and guests. The hall was tastefully decorated with the national colors, and among the guests on the platform were the president of the school, R. Fulton Cutting, Chauncey M. Depew, who delivered the commencement address; F. Augustus Schermerhorn, Francis C. Huntington, and Walter L. Suydam, trustees of the school; Frank Reynolds, John Byrns, Andrew H. Brown and George Creasy, representing the Master Plumbers' Association; William H. Oliver and Carl H. Dabelstein of the Master Painters and Decorators' Association, and Charles W. Hoffman, James R. McAfee, John S. Hyers, S. A. Goldschmidt and Amos H. Radcliffe.

The exercises began with an overture and then President Cutting addressed the students, congratulating the graduating class on the successful completion of the course of study and gave them an earnest talk on the principles that tend toward success in life, dwelling particularly on integrity in all things. The address of the evening was delivered by Mr. Depew, who was unusually happy in his remarks and his eloquence speedily won the favor of the students and assembled guests. The subject of his address was "efficiency" and he pointed out that the demand of to-day was not only for workers who knew their business, but who also efficiently applied their skill and knowledge. He illustrated his remarks with several examples that came through his experience as an employer, and he pointed out that sober, industrious habits were conducive to happiness and a contented life.

John Byrns of the Master Plumbers' Association presented the gold medal annually donated by his association for high standing in workmanship and trade knowledge, the winner being Edward H. Bair of Blairstown, N. J., and student Frank J. Brennan of Mt. Carmel, Pa., received honorable mention in connection with the award.

S. A. Goldschmidt, president of the Columbia Chemical Works, next presented the Honor Rolls to those who were entitled to them by reason of their high standing in their studies. The honor student in the Carpentry Department was Thomas D. Williams of Audenried, Pa., and the honor students in the Department of Sheet Metal Work were Harry S. Bowen of Seattle, Wash., and Edwin H. Gundlach of Sandusky, Ohio.

The certificates of graduation were presented by Amos H. Radcliffe and John S. Hyers, both of whom are graduates of the New York Trade School and successful business men.

There were 54 graduates in the Plumbing Department; 5 in the Steam Fitting Department; 12 in the classes in Sheet Metal Work and 7 in the Carpentry Department.

The exercises were brought to a conclusion by the singing of "America," after which the students conducted their friends through the shops where interesting examples of the work of the various classes were displayed.

Buildings in Greater New York

According to a recent compilation there are 375,037 buildings of various kinds in New York City, the Borough of Manhattan having 84,849, the Bronx 35,163, Brooklyn 172,380, Queens 62,525 and Richmond 20,120. In the Borough of Manhattan there are 813 office buildings as against 145 in Brooklyn, 69 in the Bronx, 95 in Queens and 47 in Richmond.

The greatest number of one and two-family dwellings is found in Brooklyn, these being 62,080 and 49,505 respectively. It also has the most tenements with elevators, the number being 45,956. The Borough of Manhattan has 2,155 elevator apartment houses and hotels as compared with 209 in Brooklyn, 231 in Queens, 70 in the Bronx and 82 in the Borough of Richmond.

Building Inspectors' Conference

After the annual meeting of the National Fire Protection Association, soon to be held, a conference of building commissioners and inspectors will occur in the Hotel Astor, New York City, on May 14. The conference is called by a committee consisting of building department officials in many of the larger cities of the country. Questions to be discussed at the conference include the technical details of the building inspectors' work and the educational methods which can be used to secure a better popular understanding of the requirements of good building.

Owing to the remarkable increase in the demand for space at the Cement Show, the management has found it necessary to secure the First Infantry Armory in Chicago in addition to the Coliseum and Annex for the 1916 show. This necessitates a change in the dates set for the ninth annual exhibition which will open at 2 p. m. on Saturday, the 12th of February, and close at 11 p. m. on Saturday, the 19th of February, 1916.

Dating from April 5 a minimum wage of union carpenters in Carbondale, Pa., will be $3.40 a day, the men to work 8 hours as heretofore.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

THE complicated formulas for deflection are made to appear as follows, after certain substitutions and transformations of factors:

$$D = \frac{30\ f\ L^2}{E\ h}$$

in which D = deflection in inches.
f = allowable maximum fiber stress in bending.
L = length in feet.
E = modulus of elasticity.
h = hight of beam in inches.

Assuming common values:

For steel, $f =$ 16,000 lb. per square inch, $D = \frac{L^2}{60\ h}$.

For wood, $f =$ 1,300 lb. per square inch, $D = \frac{L^2}{41\ h}$.

For wood, $f =$ 1,000 lb. per square inch, $D = \frac{L^2}{44\ h}$.

For wood, $f =$ 800 lb. per square inch, $D = \frac{L^2}{46\ h}$.

Aids to Computation

In addition to the handbooks of the steel companies and the Manual of Standard Wood Construction, designers use diagrams and slide rules to lighten their work on simple problems. The following are suggested in this connection:

The Wager timber scale for computing the strength of wooden beams, $1.

The Merritt beam scale for computing the strength of steel beams, $1.

Des Moines Bridge & Iron Company's calculator for steel beams, channels, angles and tees, 25 cents.

The two first mentioned are made of heavy paper and the third is of celluloid. The writer has used them daily in his work for some years.

The most complete rule for this work is one designed by the eminent structural engineer, Benjamin Winslow. It enables one to design with any material, with any fiber stress, any span, any spacing, any system of loading, etc. The rule is made of German silver and costs $10. The size is 3½ in. x 10½ in. x 1/16 in. Taking the place as it does of all pocketbooks, tables and diagrams, the writer feels that to omit recommending it to structural draftsmen and designers would be a neglect on his part of a plain duty.

Slide rules of the Mannheim type are used to-day by all engineers, but a recent improvement is known as the Phillips slide rule, the makers of which employed the writer to prepare a manual of instruction. This rule enables one to multiply three factors at one setting and the arrangement of the graduations wonderfully increases the value of the slide rule for all purposes. This new rule sells for $5.

Example.—Determine the size of a wooden beam using a maximum fiber stress of 1,000 lb. per square inch to carry a uniformly distributed load of 6,000 lb. on a span of 14 ft.

Answer.—Assume the beam to weigh 20 lb. per linear foot = 14 x 20 = 280 lb. The total load = 6,280 lb.

$$M = \frac{6280 \times 14 \times 12}{8} = 1.5 \times 6280 \times 14 = 131{,}880 \text{ in.-lb.}$$

Assume a depth of 12 in., which will give a beam 11.5 in. the usual depth of a commercial size 12-in. beam.

$$M_r = \frac{fbh^2}{6} = 167\ bh^2 = 131{,}880 \text{ in.-lb.}$$

$$b = \frac{M_r}{167\ h^2} = \frac{131880}{167 \times 11.5^2} = 5.9 \text{ in.}$$

This calls for a commercial size beam 7 in. x 12 in., the actual size of which will probably be about 6.5 in. x 11.5 in. The weight per linear foot, assuming wood to weigh 35 lb. per cubic foot, will be

$$\frac{6.5 \times 11.5 \times 35}{144} = 18.2 \text{ lb.}$$

This is so close to the weight assumed that we will let it stand. (This weight was obtained by dividing the area of the cross-section of the beam by 144, the number of inches in a square foot. The result is the cubic foot per linear foot and multiplying this by the

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 50 of the April issue.

weight per cubic foot the weight per linear foot is obtained.)

Investigate for shear.

$$W = \frac{4bhs}{3} = \frac{4 \times 6.5 \times 11.5 \times 100}{3} = 9967 \text{ lb.}$$

The load of 6280 lb. is therefore safe.

The deflection is to be kept below 1/360 of the span $= \frac{12 \times 14}{360} = 0.466$ in.

$$D = \frac{L^2}{44\ h} = \frac{14 \times 14}{44 \times 11.5} = 0.38 \text{ in.}$$

Find the span on which the safe bending load is equal to the safe shearing load.

$$L = \frac{8\ M}{12\ W} = \frac{143500}{1.5 \times 9967} = 9.67 \text{ ft.}$$

This beam cannot be safely loaded with more than 9967 lb. on any span of less than 9 ft. 8 in. no matter what the safe load in bending may be. (The bending moment used here is the actual bending moment of the beam which had to be selected to carry the load, that is, $M = 167 \times 6.5 \times 11.5^2 = 143500$ in.-lb. This is the resisting moment, the actual bending moment as we have seen being 131880 in.-lb. It is cheaper to use a commercial beam with a resisting moment larger than the bending moment than to trim the beam down to the theoretically exact size. This happens with rolled steel beams also. When a built-up plate girder or a latticed girder (truss) is used the difference between the bending moment and resisting moment can be cut to a smaller amount. Reinforced concrete is a material which permits of closer designing than rolled shapes, hence the differences in design shown by equally competent designers tackling the same problem when using reinforced concrete.)

A formula to find the limiting span when bending and shear are considered is developed as follows for wood: M in inch-pound.

$$L = \frac{8\ M}{12\ W} = \frac{M}{\frac{1.5 \times 4bhs}{3}} = \frac{3\ M}{6\ bhs} = \frac{M}{2bhs}$$

Find the deflection on the limiting span.

The allowable deflection $= \frac{9.67 \times 12}{360} = 0.323$ in.

The actual deflection $= \frac{L^2}{44\ h} = \frac{9.67 \times 9.67}{44 \times 11.5} =$ 0.184 in.

Find the allowable safe uniformly distributed load the beam will carry on a span of 20 ft.

$$W = \frac{8\ M}{12\ L} = \frac{143500}{1.5 \times 20} = 4785 \text{ lb.}$$

Allowable deflection $= \frac{12 \times 20}{360} = 0.667$ in.

Actual deflection $= \frac{20 \times 20}{44 \times 11.5} = 0.79$ in.

The deflection is too great if the lower side of the beam is to be plastered, or the beam is to carry a plastered ceiling.

Note.—When a wooden beam has a depth in inches less than two-thirds the span in feet the deflection is apt to cause plaster to crack. Try a beam 14 in. deep, the actual depth being 13.5 in.

$$b = \frac{M_r}{167\ h^2} = \frac{143500}{167 \times 13.5^2} = 4.71 \text{ in.}$$

Try a commercial 6 in. x 14 in. = 5.5 in. x 13.5 in.

$M_r = 167 \times 5.5 \times 13.5^2 = 167500$ in.-lb.

This beam is seen to be excessively strong, but a beam 4.5 in. x 13.5 in. would have a resisting moment of only 137000 in.-lb. Allowable deflection = 0.667 in. Actual deflection $= \frac{20 \times 20}{44 \times 13.5} = 0.6675$ in.

The deflection in the formulas presented is dependent upon the stress, so the deflection found is that produced when the beam is fully stressed, that is, when the full resisting moment of 167500 in.-lb. is developed. Under the load found for the 20-ft. span the moment is only 143500 in.-lb., so the deflection will be less than that given.

This case may be dealt with as follows if it is desired to find the actual deflection. The divisor for the span squared is 41 for a fiber stress of 1300 lb. per square inch, 44 for a fiber stress of 1000 lb. per square inch and 46 for a fiber stress of 800 lb. per square inch. The divisor is seen to alter by 1 for each 100 lb. change in unit fiber stress. Find the maximum fiber stress for the bending moment developed and then applying the proper divisor ascertain the actual deflection.

$$f = \frac{143500}{\frac{bh^2}{6}} = \frac{6 \times 143500}{5.5 \times 13.5^2} = 859.2 \text{ lb. per square inch.}$$

The divisor for all practical purposes is 45.6.

$$D = \frac{L^2}{45.6\ h} = \frac{20 \times 20}{45.6 \times 13.5} = 0.65 \text{ in.}$$

The load this beam can carry on a 20-ft. span with a deflection = 0.6675 in. is

$$W = \frac{8\ M}{12\ L} = \frac{167500}{1.5 \times 20} = 5600 \text{ lb.}$$

All the computations have been made with a slide rule, so in some cases the terminal figures in the results may differ slightly from those found by arithmetical computations, but when dealing with large quantities small differences in the units place make no material difference in results.

The calculations for deflection in wooden beams can never give exact results, for woods vary in texture throughout and the amount of moisture and seasoning also act to increase or decrease deflection, but the results given in the foregoing series of computations must be relied on as being as nearly correct as it is possible to obtain.

(To be continued)

Details of an Open-Air Swimming Pool

A Bathing Pavilion in Which the Water Heating Source Is a Steam Boiler with Oil Fuel

IDEAL conditions for a bath were enjoyed by the primitive man at some seasons of the year, but in Pasadena, Cal., these conditions are to be provided as nearly as possible all the year round. The open-air swimming pool at Brookside Park, Pasadena, a view of which is here reproduced, has been built adjacent to a fine baseball field. It is surrounded by a lawn, on which are tennis courts and cactus beds, and is reached by a winding road near the waters of the Arroyo Seco.

The pool measures 50 x 100 ft. and at one end is 2 ft. 6 in. deep and deepens to 8 ft. 6 in. at the other end. It has a capacity of 183,000 gal. The water is pumped into it from a well 500 ft. away through a 12-in. pipe and enters the pool at a temperature of 57 deg., requiring about 2½ hours to fill the bath, after which the heating system is put in operation and the temperature of the water raised to about 74 deg. The interior of the bath is coated with an english cement, which not only gives a smooth finish but a white color. For the convenience of the bather a bath house has been erected in which there are 150 bath rooms, of which 30 are for ladies and the rest for men and boys. These bath rooms are 3 ft. 6 in. in width and are 4 ft. deep.

Water for domestic purposes was originally pumped by a power plant in which two steam boilers were used. This has been changed so that the pumping is now done by electrically driven machinery and the water is heated by one of the old boilers which is of the safety water-tube type of 80-hp. capacity.

After the plunge is filled, the heating system has raised the temperature of the water to about 74 deg., the fuel supply to the boiler is shut off and not started again until the temperature drops below 65 deg., which usually takes about 24 hours. To raise the temperature of the 183,000 gal. in the tank after each filling from 57 deg. to 74 deg. usually requires 6 hours time and a fuel consumption of 2½ bbl. of oil at a cost of 90 cents per barrel. The second and third day the heating is done in about half the time required after the refill, as water is not allowed to drop below 65 deg. The plunge is emptied and thoroughly cleaned on Wednesday and Saturday nights, and each day the water lever is raised so as to overflow into the trough around the edge of the pool. This is done to get rid of any leaves or any other foul or foreign matter that may be floating on the surface. The city chemist makes two tests a week on the water in the plunge and instructs the caretakers as to the amount of bleaching powder or chlorine to use each day.

The heating boiler and the circulating pump are in a house some 300 ft. from the pool and the 8-in. pipe that is used for draining the pool is provided with valves so that it can also be used in circulating the water from the pool to the pump and boiler and return to the pool by means of a 4-in. main, which branches into two 3-in. mains, one running down each side of the pool, and 2½-in. connections with valves on them are made to the pool at two different points. The circulating pump has a capacity of 250 gal. per minute, and as the water passes through the boiler it is heated to a temperature of about 85 deg., so that when it enters the plunge bath there is no danger of a bather suffering any inconvenience from coming into contact with the incoming hot current.

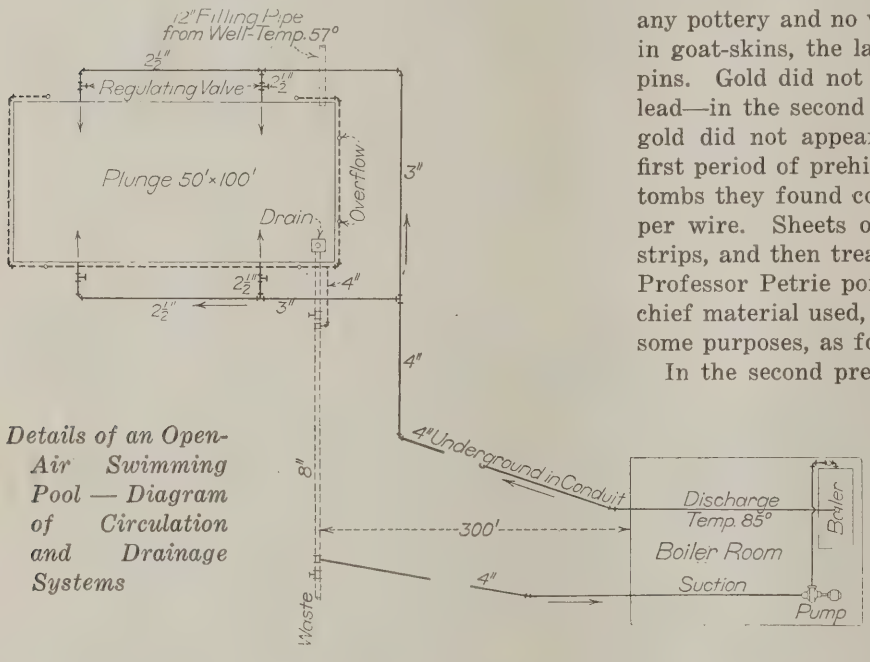
In addition to the bath rooms, there are toilet rooms and shower baths provided for both men and women. At one corner of the pool, which is sheltered on two sides by the bath house, there is a

Details of an Open-Air Swimming Pool at Brookside Park, Pasadena, California

bubbling drinking fountain which is also adjacent to the office where arrangements can be made for the use of the various bath rooms.

Arrangements are made for lighting the pool at night by means of electric lamps, and it will be noted that on two of them are large life preserving floats. The bath being largely patronized by children as well as men and women, there are a number of instructors and guards and every convenience is furnished that goes to make an up-to-date swimming pool. With the sun shining upon the water and the air flowing across it, ideal sanitary conditions exist.

Provision is made for thoroughly cleaning the pool when it is emptied and with the provision for overflowing into what may be termed a scum gutter, which also serves as a life rail, the surface of the water is skimmed and there is little probability of contamination. Recent examinations by those in charge of the pool have led to the determination of keeping the pool open experimentally all this winter, although it is not anticipated that the revenue from the use of the bath house will be equal to the expenses. In addition to frequently emptying and refilling the pool, provisions are made for pumping fresh water into the pool daily and drawing off water from the surface.



Details of an Open-Air Swimming Pool — Diagram of Circulation and Drainage Systems

The construction work has been performed under the general supervision of Chairman Metcalf of the City Commission, and under the direct management of Superintendent Sherer. The water supply and drainage systems were passed upon by A. C. Shover, city plumbing inspector.

Exhibition of Trade School Work

The closing exercises of the School Department of the General Society of Mechanics and Tradesmen were held in the Engineering Societies Building, 25 West Thirty-ninth street, on the evening of Thursday, April 15, when the graduating class was addressed by Albert Shiels, Department of Education. An exhibition of the work of the pupils was held at the Mechanics Institute, 16 West Forty-fourth street, on Thursday, April 8.

Building on Long Island, N. Y.

According to the annual summary of building operations on suburban Long Island, which was recently made public by the Long Island Railroad Co., there were nearly 7000 new dwelling, stores, factories and miscellaneous structures erected in various parts of the island in 1914. This number of new buildings is somewhat less than for the previous year, but nearly 54,000 dwellings which were put up in the nine previous years have been occupied. Altogether more than 70,000 buildings have been erected on Long Island outside of Long Island City and the old city of Brooklyn in the past decade.

Use of Metals in Ancient Egypt

According to Professor Petrie, of Manchester, England, copper was used throughout all the periods of civilization. When the Egyptians had scarcely any pottery and no weaving, when men were buried in goat-skins, the latter were fastened with copper pins. Gold did not come in earlier than silver and lead—in the second prehistoric period. Practically gold did not appear throughout the whole of the first period of prehistoric civilization. In the royal tombs they found copper much used, including copper wire. Sheets of copper were cut into narrow strips, and then treated with the hammer. Bronze, Professor Petrie points out, became much later the chief material used, but copper was always used for some purposes, as for domestic vessels.

In the second prehistoric period, gold, silver and lead came in all together. During the first and second dynasties there was a percentage of silver in what appeared to be the gold used to the amount of 13 to 19, showing that electrum was the standard material and not gold. Leaf gold in Egypt was not beaten out so thin as ours. Silver, it appeared, was on the whole scarce. Lead in the eighteenth dynasty came into use in large quantities, and then became very common. Pure tin was not found before the eighteenth dynasty, and therefore the bronze found before that time was probably produced by the simultaneous reduction of copper and tin ores together. Arsenic was used as a hardening material from an early period.

The common use of iron began about 1200 B.C. Antimony was practically unknown in early Egypt and zinc was not found till Roman times.

A Narrow Apartment House

A striking illustration of the value of ground areas in certain sections of New York City is found in the improvement which is about to be made on an 18 ft. lot in Fifth avenue between Fifty-seventh and Fifty-eighth streets. On this narrow frontage a 9-story apartment house is about to be erected from plans prepared by architects Hazard & Erskine, and will involve an expenditure of approximately $100,000. The ground floor will be devoted to store purposes, while the upper portion of the building will be arranged as bachelor quarters.

CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

Front Elevation for Small Bank Building

From W. R. G., Dixon, Ill.—I am sending herewith sketch of a front elevation of a small one-story bank building which I trust will meet with the approval of "A. B." whose inquiry appeared in a recent issue. I have intended to show something plain, yet with enough ornamentation to offset the monotony of an entire wall of brick. I had in mind either a dark brownish brick, a white or a gray-white brick with either Bedford stone trim and entrance or some gray granite, but this can be varied to suit the taste.

I have also intended to follow the Tuscan order all the way through and think it would make a very attractive building. The bases for the pedestals should project about 6 or 8 in. from the front line of the wall. As a suggestion I would say that the columns would look well either fine axed or polished.

I take this occasion to state that I enjoy every copy of *The Building Age*.

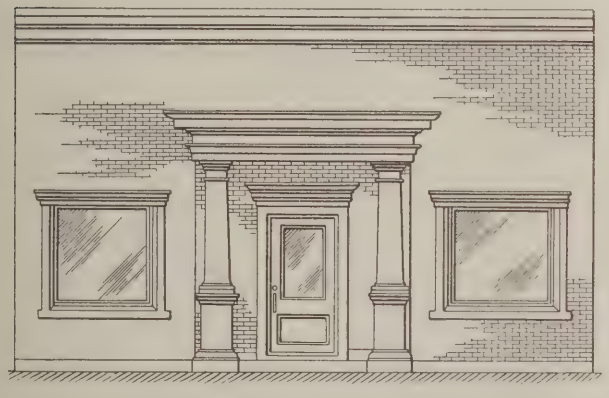


Fig. 1—Sketch Submitted by "W. R. G."

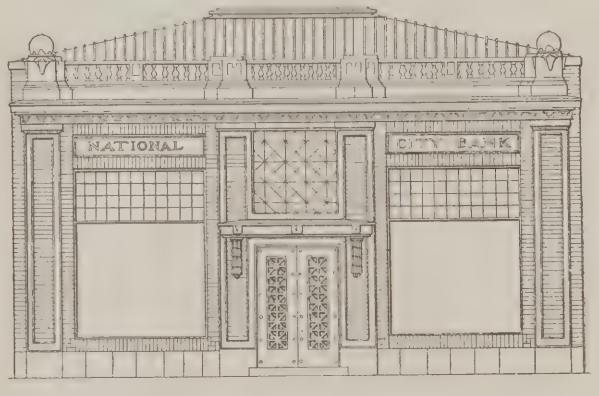


Fig. 2—Design of J. W. Haggart

Front Elevation for a Small Bank Building

From J. W. Haggart, Woonsocket, R. I.—I am sending a sketch of the front elevation of a 35-ft. bank building which may possibly be of interest to "A. B.," Marthasville, Mo., who inquired for such a drawing in a recent issue of the paper.

Water-Proof Enclosure for Sleeping Porch

From C. C. H., Brookville, Pa.—I have a problem which I desire to submit to brother subscribers of *The Building Age* in the hope that they can help me out of my difficulty. Two years ago I remodeled one of our fine dwellings in this town and put on an extra story which constitutes the third floor of the house. On the rear of this third floor I built a large open sleeping porch, erecting a rather extensive galvanized iron pipe frame and covered it with the best army standard duck, with drop curtains on three sides to roll up.

The trouble comes from the chimney of the heating furnace, which is located near this end of the house. A short time ago sparks from the chimney fell on the canvas, burnt it up and caused some damage to the building. I would like to know if there is such a thing as asbestos canvas that can be used in place of the army duck? It must be weather as well as fireproof, and it must be very strong, for I rope it to the pipe rafters and drive it down over the pipe foot beams, drawing it as tight as a drum head.

I do not want to put up a stationary roof, as it holds the heat so long, while the canvas will cool off in 15 minutes after the sun goes down. I would like very much to have the readers of the Correspondence Department discuss this matter, as it is possible that what they may have to say will prove interesting to others besides myself. I have a sample of asbestos canvas that will not burn, but it will not do for outside work, as it is not weatherproof. The material must also be pliable so as to stretch over the pipe frame work.

Concrete Floor for a Factory Building

From J. F. W., Natick, R. I.—I would like to ask through the Correspondence columns for a little information which I am sure the practical men in the trade can furnish. I have a basement 125 ft. long and 70 ft. wide wherein I intend to put down a 4-in. concrete floor with 4 x 6-in. Chestnut treated with carbolineum dovetailed and run lengthwise of the building in order to sustain machinery which is to

be put in place just as soon as the cement is hard enough to lay the top floor. What I desire to know is which flooring will last the longer, 1⅛-in. maple or ⅞ matched hard pine. I have some square edge 4 x 6-in. hard pine floors that have been in 8 years and are now rotted out in some places. Will the carbolineum be of any help to the wood when bedded in the concrete? I also have an engine belt power 30 ft. high, 16 ft. wide and 16 ft. deep, the siding of which is of Congo roofing paper 3-ply with ⅞ x 3 in. strips nailed over the laps which run up and down. About 9 o'clock every morning I find water leaking into the room and the cause I think is due to condensation. I would like to know some way to overcome it.

Note—The question as to which kind of flooring will last the longer depends upon the work the floor must stand. Maple is a term applied to several woods, but sugar maple is the variety best suited for floors. Hard pine is a carpenter's term and means nothing, but in some parts of the country long leaf yellow pine is usually considered to be intended when the expression hard pine is used. Which floor to use depends very much upon the cost and if the cost is approximately the same for the same thickness, maple of the best quality would be preferable to pine. To make a comparison between 1⅛-in. maple and ⅞-in. pine is unfair to both woods because a ⅞-in. floor would be too thin to use for the floor of a manufacturing plant unless it is only a top wearing surface laid on another floor of heavier material. A good preservative should be used in all wood embedded in earth or concrete or placed in a position where the air is shut off or moisture may get in. I would not mix carbolineum in the concrete, for it will hurt the concrete and not help the wood. The condensation on the thin walls of the building appearing at nine in the morning is evidently on the north wall and shows up at a time when the sun has warmed the south and east walls to the same temperature as the air in the building, which air is no doubt heavily charged with moisture. The cooler walls cause the air to drop some of the moisture. Making the walls double will be of some assistance and may cure the trouble. If the building is heated locate the steam coils on the side where the condensation appears. ERNEST MCCULLOUGH.

Proper Proportions for a Flag Pole

From J. J. U. Pittsfield, Mass.—As the correspondent signing himself "O. K.," Wapinitta, Ore., has started the ball rolling touching the query as to the proper proportions for a flag pole, I would like to take a kick at the ball to continue its rolling. As "O. K." does not quite touch the questions asked by "W. R." I will endeavor to hit at some of them.

First—What should be the length of a flag pole in relation to the hight of the building, measuring from the ground to the top of the pole?

There is no set rule to guide us in determining the length of a pole as this is influenced by the shape of the building where the pole is to be located, also by the lines of the structure; whether horizontal, or vertical; whether a long and low building, or a narrow and high one. The long pole would look out of place near a low building, as would a short pole near a tall building. The surroundings have a great deal to do with determining the length of a pole. It is largely a matter of taste and of a little judgment. If "W. R" would use his eye and a little judgment he could, in a few minutes, determine the length of the pole to be used.

Second—The proper length of a flag for a pole set in the ground is 1-3 its length above the ground, measuring diagonally across the flag from the stars to the lower outside corner.

The length of a pole on top of a building is determined in the same way as a pole set in the ground. It is merely a matter of taste. A long pole would look out of place on a low building, and so a short pole would look out of place on a tall building. In my opinion the proper length for a pole on a building 5 or 6 stories high would be 2/3 the hight of the structure. The length of the flag for this pole would be 1/3 to ¼ its length.

Cement Post for Clothes Dryer

From Albert Marple, Tropico, Cal.—One of the multitudinous uses to which concrete can be utilized to great advantage is in the construction of

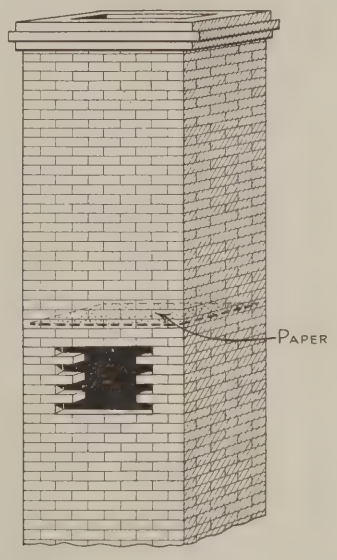
Cement Post for Clothes Dryer

posts of various kinds, such, for example, as that used for supporting a clothes rack or dryer in the back yard of country and suburban residences. Durability is one of the strong features of a post of this character, for it is practically indestructible and will last as long as the house itself. An interesting example of the use of a post of concrete construction is shown in the accompanying picture which represents a clothes drying rack in the center of the lawn of a house at Long Beach, Cal. At the base the post is about 12 in. in diameter and tapers gradually to a point about 6 in. from the top,

where it narrows abruptly to the place upon which the arms rest. The post is made of a mixture consisting of 1 part cement, 2 parts sand, 3 parts gravel, and was built in position. The "forms" were set up and then the cement was poured in it and allowed to set. The base extends about 2½ ft. into the ground. The wooden arms are 2 x 2 in. in cross section, are 9 ft. long and made of Oregon pine.

Remodeling Top of Brick Chimney

From H. B., West Pittston, Pa.—Not long ago I had a job which called for the building of 8 ft. on the top of a smoke stack or flue which was



Remodeling Top of a Brick Chimney

18 x 32 in. in area. The flue was on the roof of a department store and the furnace was going all the time. The gas fumes, soot, etc., were so bad that after five minutes' work I was ready to quit. I finally solved the problem of overcoming this as shown in the accompanying. sketch. It will be observed that I made an opening in the wide side of the chimney, then covered the flue with paper as indicated by the dotted lines, which tended to divert the smoke, etc., out of the hole in the side. After the 8 ft. of new chimney had been built and the job was completed I dropped two or three matches on the paper and burned it out, then filled up the hole in the side.

Detailed Information on Roof Framing

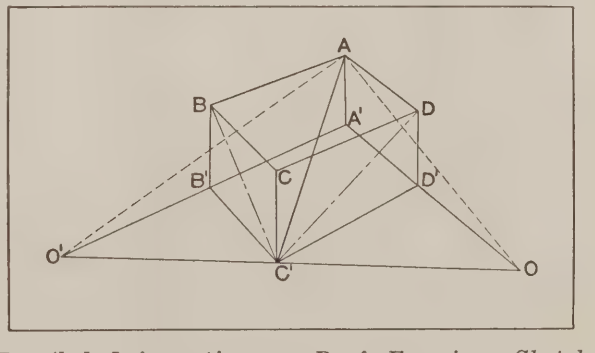
From T. H. A., Tacoma, Wash.—There appeared on page 51 of the November issue of *The Building Age* some comments by a correspondent suggesting that more detailed information be given in regard to the subjects presented. I, myself, am a young builder and not having any friends engaged in the business, it has been necessary for me to gather my knowledge from books and magazines, along with the work on the job. In doing this I have encountered many explanations which were confusing and some which were often inaccurate. Like most beginners, I am sometimes in doubt as to where theory ends and practice begins; therefore, I like to read articles by boss carpenters, which explain principles upon which they base their practical methods in order to get an idea to what extent theory is involved.

In roof framing, for instance, a geometrical proof should accompany every explanation. By the way, I think every carpenter should school himself in plane geometry, and if it is not generally understood he should turn his efforts to some other field of endeavor. I once read the following statement in a text of good authority, "The true length taken on the blade and the horizontal run taken on the tongue of the steel square will give cheek cut against the ridge of hip or valley rafter." As I could not see why this could be true, I puzzled over it until I arrived at the following solution:

My plan of attack is always to find a right triangle, one of the acute angles of which is the required angle. In all cases, if you locate this triangle and compute the length of the legs, proportionate lengths taken on the tongue and blade of the steel square will give you the angle. In this case the required line across the back of the rafter, which, with the plumb cut, will give the cheek cut, must obviously lay in the plane of the back of the rafter and also in the vertical plane of the ridge to which it is adjacent; hence, it coincides with the line of intersection between these two planes.

To assist the imaginative eye, consider the valley as the diagonal of an oblong box, as $A\ C'$ in $A\ B\ C\ D$ and $A'\ B'\ C'\ D'$ of the accompanying diagram. The bottom of the box is in the horizontal plane of the eave plates and the sides $A\ B\ B'\ A'$ and $A\ D\ D'\ A'$ have vertical planes passing through the ridge $A\ D$ and $A\ B$, while the sides $B\ C\ C'\ B'$ and $C\ D\ D'\ C'$ are vertical planes through the common rafters $B\ C'$ and $D\ C'$.

It is seen that the horizontal trace of the plane of the back of the rafter $A\ C'$ is perpendicular to $A\ C'$ and also to $A'\ C'$, and pierces the plane $A\ D\ D'\ A'$ at O, and the plane $A\ B\ B'\ A'$ at O'—hence $A\ O'$ and $A\ O$ are the lines of intersection between the plane of the back of $A\ C'$ and the vertical planes of each ridge respectively. The triangles $A\ C'\ O$ and $A\ C'\ O'$ thus formed are both right triangles



Detailed Information on Roof Framing—Sketch Accompanying Letter of "T. H. A."

in the plane of the back of $A\ C'$ which contain the desired angles, namely $C'\ A\ O$ and $C'\ A\ O'$.

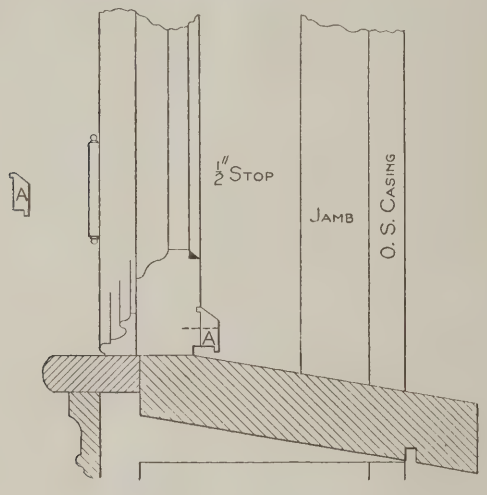
Now to compute the lengths of $A\ C'$, $C'\ O'$ and $C'\ O$ from the data usually known, namely the rise $A\ A'$, the run of common rafters $C'\ D'$ and $B'\ C'$ we use the axiom of geometry which states that the sum of the squares of the legs of a right triangle is equal to the square of the hypotenuse. We first find the run of the hip which is $A'\ C'$ from the

triangle A' B' C'; then we find A C' from the tri-triangle A A' C'.

In plan we have four similar right triangles, hence A' D' : A' C' :: D' C' : C' O and A' B' : A' C' :: B' C' : C' O'. Using distances on the square proportionate to these lengths we find our angles. From the above we see that only when the plan angle is 45 deg. to the ridge will the true length and horizontal run give the required angle.

Preventing Windows from Leaking

From N. W. C., Hampden Highlands, Me.—Last spring a man asked me to look over his windows and see if anything could be done to prevent their leaking. He said they had always leaked and he did not care if it took me all summer but he wanted a good job. Upon examination of the windows I found the stool cap had shrunk away from the sill, leaving nearly one-eighth of an inch opening in which the water could run. The builder had only rabbeted the corner of the bottom rail about an eighth of an inch by a quarter leaving practically no "drip." In order to remedy the difficulty, I cut out some strips of North Carolina pine similar to that shown at "A" in the sketch; plowed the bottom rails, painted the groove and bradded the strips as shown. Up to the present time there has been no leak.



Preventing Windows From Leaking—Sketch Submitted by "N. W. C."

In this connection I take the opportunity of stating that I have read the paper now known as *The Building Age* for nearly 30 years. I began while I was quite a small boy to pick out the "funny things" which at that time were sandwiched in among the advertisements. Now nothing inside the wrapper "gets by" me.

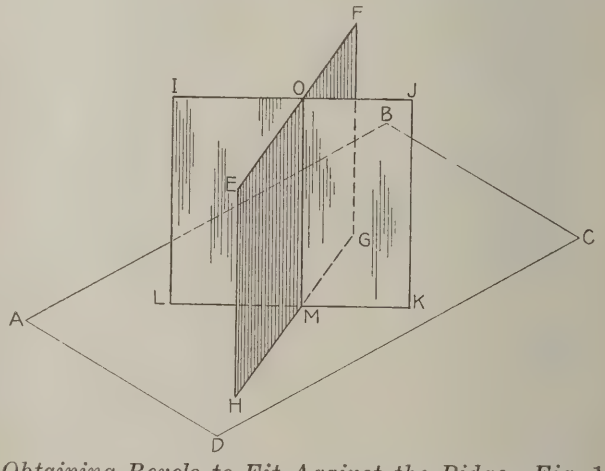
Moving a Heavy Building on the Snow

From D. P. B., Redford, N. Y.—The moving of buildings from one site to another is usually done in times when the weather is mild and the ground free from snow, but the latter part of March I had a job which called for the moving of a heavy building on the snow. I had to dig it out of the frozen ground and rock and then put it on four lumbering sleds to move it. After hitching on the team the first attempts failed. The owner was a lumberman and was down in the mouth then and there. He had chains and single blocks for loading logs and these were utilized in the work. There was a fence about 150 ft. away so I directed him to make one end of the chains fast to a fence post and hitch the team to the other. The first "draw" moved it out on good snow. In half an hour it had been moved 50 rods. Then I changed ends and had it ready to climb a snow drift 6 ft. deep and 8 rods long covering up an old stone wall. After digging this out 2 ft. I started again, but stuck fast on the rocks as the snow was softening fast. I jacked up the rear end with canted jacks and started, and the way we plowed that drift was a caution. We landed it at the destination 70 rods away by evening. The entire time was four days, but half the time was taken up in removing other buildings to make room for this one and snowing bare ground. The actual moving time was less than two hours.

Obtaining Bevels to Fit Against the Ridge

From J. M., St. Louis, Mo.—I have been a subscriber to *The Building Age* for a number of years and take the opportunity of explaining for the benefit of readers who may be interested my method of obtaining the bevel across the top of a hip or valley rafter to fit it against the ridge. I have received valuable suggestions from the Correspondence columns but I believe the department would be made more valuable if those discussing the question of roof cuts, etc., would explain why they use certain lines to arrive at the results. I for one would like to see the practical man write on the subject of roof framing, including all its cuts and bevels, in a manner which would give this information.

Referring to Fig. 1 of the sketches it may be stated that a plane is a flat surface—such as a table top—without thickness and indefinite in length and breadth. A plane angle is an angle whose sides lie in the same plane. In the sketch, Fig. 1, two planes I J K L and E F G H are perpendicular to the third plane A B C D. Their intersection O M is perpendicular to the plane A B C D. It will also be seen



Obtaining Bevels to Fit Against the Ridge—Fig. 1 —Showing Two Planes Perpendicular to a Third Plane

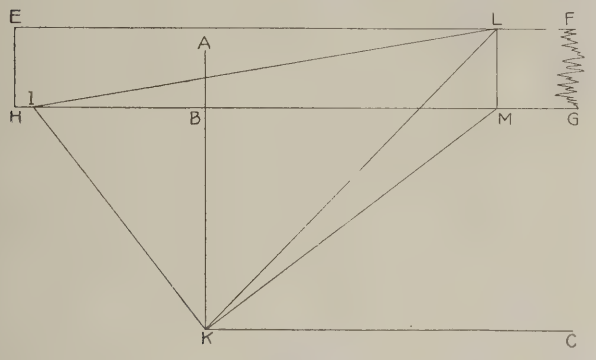
that O M is perpendicular to every line in the plane that passes through its foot. The point M is called the foot.

The following geometrical truths are deduced from the above. First, if two planes are perpen-

dicular to a third plane their intersection is perpendicular to the plane.

Second, if a line is perpendicular to a plane, it is perpendicular to every line in that plane passing through its foot.

Referring now to Fig. 2 of the sketches it may be stated that *E F G H* is a plane passed through the



Obtaining Bevels to Fit Against the Ridge—Fig. 2 —Showing How to Cut the Bevel

ridge and is perpendicular to the horizontal plane of the plates *A K C*. It will be seen that *I L* is the intersection of the plane of the top edge of the hip with the vertical plane *E F G H*.

It will be seen that *I K* is the intersection of the plane of the top edge of the hip with the horizontal plane, and that *K M* is the run, *M L* the rise, and *K L* the length of the hip.

The bevel to cut the hip is the angle *I L K* and we can lay this angle off if we know any two sides and included angle of the triangle *I K L*. Knowing the length of one side of the triangle *K L*—the length of the hip—and that *I K L* is a right angle we must find the length of the side *I K*. It is known that *I K* is the intersection of the plane of the top edge of the hip and the horizontal plane and both these planes are perpendicular to the plane of the side of the hip.

Since *I K* is perpendicular to the plane of the side of the hip it is perpendicular to every line passing through its foot lying in that plane, therefore it is perpendicular to *K M*. The angle *I K M* is a right angle.

From similar triangles *M B* (the run of the common rafter) is to *B K* (run of the common rafter) as *A M* (the run of hip) is to *I K*, or $I K = \frac{B K, B M}{K M}$

From the above proportion it is plain that where both lines are equal that *I K* equals *K M* the run of the hip, and that the length of the hip on the blade, and the run of the hip on the tongue on the square gives the bevel.

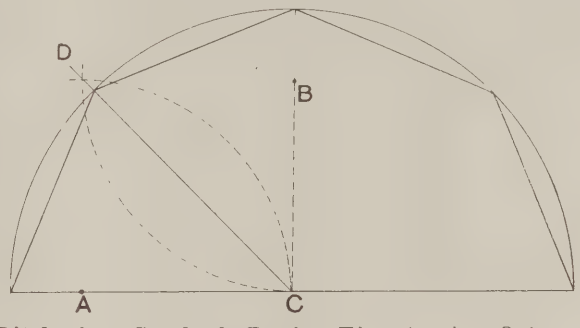
Remodeling an Old Dwelling

From D. P. B., Redford, N. Y.—Referring to the problem of "T. B." presented on page 56 of the April issue, I would say that there is another method of covering the old dwelling to which he refers, but it presents some difficulties caused by cornice and openings. If these difficulties can be overcome a nice job will result by using rock-faced sheets for outside forms, riveting the joints at the ends and filling inside with a 1:2 cement mortar, using 5 per cent of Maltha.

It will be quite difficult to get an extra foundation to carry his brick. The openings and the cornice will give more trouble than rock facing. A slate will be cheap and unsightly, and no one will be deceived by thinking it looks like brick. Stucco would be the cheapest efficient job and should be applied to metal lath. Wood swells and checks the mortar before setting. Perhaps the correspondent can find one of the tiles now on the market that will suit.

Pitch for Gambrel Roofs

From R. W. W., Dayton, N. Y.—As there has been considerable discussion in the Correspondence columns regarding the proper pitch for gambrel roofs, I submit two sketches, showing the way to apply the steel square in order to secure the proper cuts. Fig. 1 is an octagon or eight-sided figure and a semicircle is drawn and divided into four parts, as shown. By connecting the points the outline is obtained. The way to divide the parts is to take the point *C* as center and with radii *A* and *B* draw the segments indicated by the dotted lines. Where these intersect draw the bisecting line *C D*. The



Pitch for Gambrel Roofs—Fig. 1—An Octagon Used for Obtaining the Outline

lower rafters are quite steep and the upper ones rather flat.

Referring to Fig. 2, the diagram shows the outline to be a little different, the pitches being 60 and 30 deg., respectively. The cuts and lengths are the same, and when placed on the roof are reversed. Placing the steel square at the seat line *A*, we find the figures 12 and 7, which are correct or nearly so in wood framing for a 30 deg. pitch. Mark the line, but do not cut, as we wish to cut on the bi-

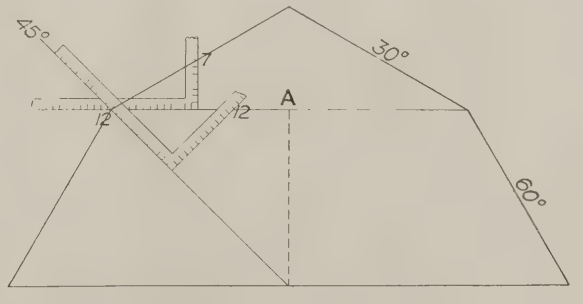


Fig. 2—Showing How the Steel Square May Be Used

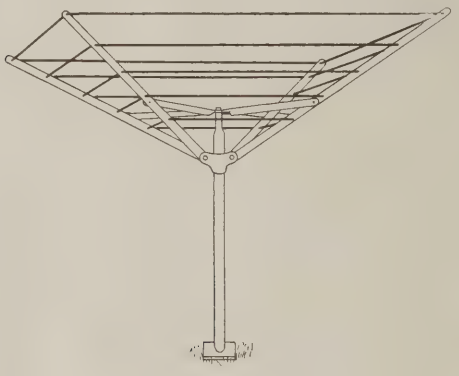
secting line already drawn. Holding the square on the seat line in the manner shown in the diagram, shove the blade or the tongue—it does not matter which—down until it touches the bisecting line, being sure that 12 on the square is stationary at the angle point of the rafters. We look at the other point and also see the figure 12 on the square

directly at the seat line; then 12 and 12 or 45 deg. is the proper cut at the junction of these two rafters reckoned from the seat line. Having obtained the right figures on the square to use for these cuts, that is, 7 for the plumb and seat cuts, and 12 and 12 for the bisecting cut, we can figure the lengths by scale, say 1 inch to the foot and 1-12 to an inch with the square. Cuts for octagon-shaped roofs are found in the same way, the figures being 5 and 12 on the square.

I do not claim these proportions are the best or the only ones, as no doubt there are several others which perhaps are better than these. If such is the case, I would be glad to see them in print, but thinking what I offer may help some of the younger men in the trade, I submit them for consideration.

Construction of a Clothes Dryer

From D. P. B., Redford, N. Y.—In answer to "J. M. B.," Monroeton, Pa., I enclose two sketches



Construction of a Clothes Dryer—Fig. 1—A Common Form of Apparatus

of clothes dryers. Fig. 1 needs no explanation. Fig. 2 folds up by loosening the set screw in the collar and letting it down the arms become vertical. The braces on the arms may be hinged in any manner that will allow them to hang vertical and

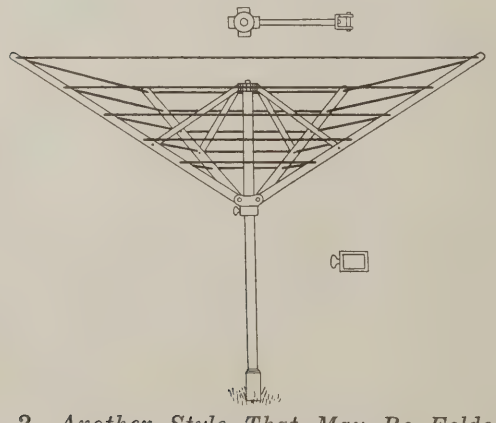


Fig. 2—Another Style That May Be Folded By Loosening the Set Screw

the arms to close up. Reel irons may be purchased on the market, as may also the style of dryer shown in Fig. 1 of the cuts.

Flat Brick Arch Construction

From Builder, New York.—Referring to the query of "P. N. R.," Prescott, Ont., I would say that flat arches are supported by iron lintels and also by tie-rods when the horizontal thrust cannot be otherwise counteracted. For my part I should not want plank used, as the correspondent describes, as lintels are far preferable.

Making a Hole in Glass

From R. M., Turin, N. Y.—There appeared in the December issue of *The Building Age* some directions telling how to make a hole in glass. I tried the plan proposed but it was not a success, and I would like to learn through the Correspondence column of some other way.

Note:—There is a bare possibility that our correspondent did not have his lead hot enough to accomplish the purpose. However, as he desires some other way of making a hole we suggest that he use a glass drill made of an ordinary three-cornered file tapered down at one end. It is much used by glaziers for cutting holes in glass. The spot where the hole is to be drilled is wet with turpentine and as the drilling proceeds the glass about the spot is kept wet with this liquid until the hole is completed.

Still another way is to make a solution of 1 oz. of camphor, ½ oz. spirits of turpentine and 3 dr. of ether. Keep the end of the drilling tool wet with this fluid while the drilling is in progress. The sharp corner of a broken point of a file is a good drilling tool for the purpose.

Rendering a Cellar Water-Tight

From Builder, Clinton Co., N. Y.— If "C. H. H.," Waldwick, N. J., will read what appears about rendering cellars water-tight on page 53 of *The Building Age* for August, 1914, he will learn how to remedy the trouble with his cellar. The tests there stated have stood the pressure well. After once drying out tar paper will not hold water to any extent for there is nothing waterproofing in tar paper that cannot be put into cement mortar. It may be well to smash up the present floor and use it as aggregate in the new floor. It will take about 10 barrels of cement and 30 barrels of sand with 50 gallons of Maltha to give a 3 in. coat on the floor and a 1 in. coat on the walls.

I would state in this connection that the oil used in the experiments referred to in the August issue is known as Maltha.

Dimensions Wanted for a Flour Bin

From W. W., Providence, R. I.—I shall take it as a favor if some of the readers of *The Building Age* will furnish through the Correspondence Department, the dimensions of a flour bin such, for example, as the one described in the March issue, page 40, and to have a capacity of a barrel of flour.

Some idea of the value of mahogany may be gathered from the statement that a New York firm is said to have recently paid $8,000 for a mahogany log 4 ft. square and 24 ft. long.

In India where electric current is not available fans in country bungalows are often attached to and operated by small spirit stoves.

Falling Line System of Hand Railing

The Tangent and Falling-Line Systems Described —The Value of Each in Practical Work

By Morris Williams*

THE falling-line system of hand railing, as its name implies, has for its basic principle the falling line in contradistinction to the tangent system which has the tangent for its basic principle. Viewing it in this light it stands by itself as a radical innovation from all preceding methods since the others differ only in the arrangement of lines pertaining to the development of the tangent system are considered of secondary importance—a mere result of an ideal object instead of a basic principle or controlling factors.

The center of a wreath constructed upon the principles involved in either of the tangent methods will be a straight line coinciding with the center line of the plank plane, resulting in the necessity for the pitch of the plane to align with the pitch of the

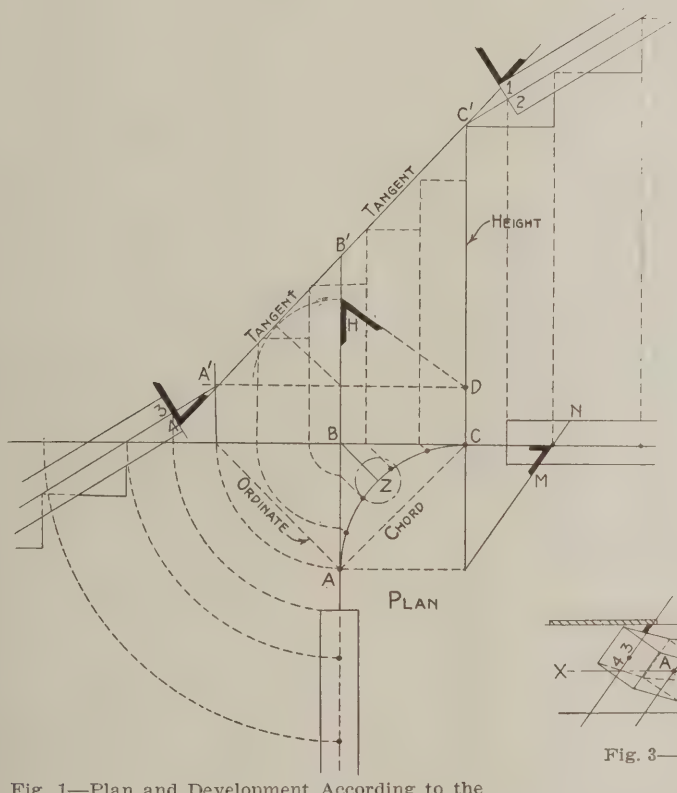


Fig. 1—Plan and Development According to the Tangent System.

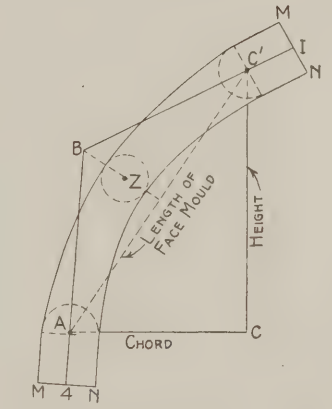


Fig. 2—Diagram Showing How to Lay Out the Face Mold for Fig. 1

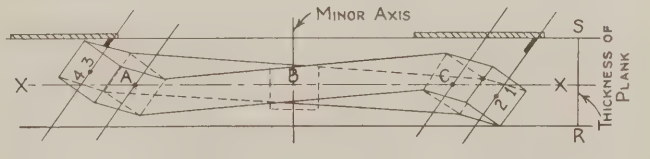


Fig. 3—Showing the Squared Wreath as Produced by the Tangent System

The Falling Line System of Hand Railing—By Morris Williams

gents as necessary factors in the formation of the oblique plane whereon the rail rises around and above its plan curve.

In all the tangent system methods the wreath is assumed to lie upon such a plane and the joints are made square to the tangents and face of the plane, thus relegating the system to the tangents and the plane as the controlling factors.

The falling-line system is based upon the assumption that the tangents should not be the controlling factors, for the reason that they cannot fail in such connection to entail many very objectionable limitations. The tangents, therefore, in the falling-line system are considered of secondary importance—a mere result of an ideal object instead of a basic principle or controlling factors.

The center of a wreath constructed upon the principles involved in either of the tangent methods will be a straight line coinciding with the center line of the plank plane, resulting in the necessity for the pitch of the plane to align with the pitch of the straight flights adjoining the cylinder. The least deviation in this connection necessitates the ramping either of the wreath or of the connecting straight rails of the flights.

It is the latter method that is generally adopted for this purpose in the tangent system and is considered very objectionable, owing to the need of extra joints and extra labor entailed. Very often, too, the finished execution fails to give a satisfactory appearance to the rail. The basic principle of the falling-line method eliminates this objectionable feature of the tangent methods. In the words of its author "It is a method that solves every possible case and without the limiting conditions of the

*Author of *The Stair Builders' Guide.*

tangent methods. In the falling-line method we plan the center line of the wreath to go where the stair requirements demand and then work out the face mold to suit the falling line, having no thought as to whether the curve shall lie in a plane as in the tangent system; the aim being to carry the rail where it ought to go and let details such as the pitch of tangent, direction of joint with reference to the plane surface and other secondary matters work out as they may."

In the present article will be shown the distinctive features of the two methods. Fig. 1 illustrates the plan and development of a 16-in. quarter turn containing five winders placed at the intersection of two flights. The tangents are snown deviating in pitch from that of the flight rails and calling for a ramp at both the top and bottom as shown at *C'* and *A'*.

The joints at 2 and 3 are made square to the straight rails and the bevels shown at these points indicate the difference between the rail pitch and the tangent pitch.

The extra thickness of the plank required to ramp the wreath is shown at 1-2 and 3-4. The bevel at *H* is the one required to twist the wreath.

In Fig. 2 is represented the face mold where the line *A-C* is made equal in length to the plan chord *A-C* of Fig. 1 and the hight *C-C'* is made equal to the hight *D-C'* of Fig. 1. The dotted inclined line *A-C'* of Fig. 2 determines the exact length of the face mold. To find the angle between the tangents, place within the compasses the length of the tangents shown at *A'-B'* and *B'-C'* of Fig. 1. Then with *A'* and *C'* of Fig. 2 as centers intersect at *B*. Connect *B* with *C'* and *B* with *A* extended, as shown to *I* at the end *C'* and to 4 at the end *A*. The extensions at *C'*-1 and *A'*-4 should equal the distances shown in Fig. 1 from *A'* to 3' and from *C'* to 2 respectively. Now make *B-z* of Fig. 2 equal *B-z* in Fig. 1 and the width at *A* and *C'* of Fig. 2 equal to *M-N* on the bevel in Fig. 1. By bending a lath to touch the points thus found the contour of the face mold is determined. The bevel *M-N* is the same as the bevel at *H*.

The joints at the ends *I* and 4 of Fig. 2 are made square to the tangents, but owing to the ramp they are not to be made square with the face of the plank as usual, but to the bevels shown upon the tangents in Fig. 1 at 1 and 3.

In Fig. 3 is represented the wreath ramped by dropping the end *C* below the center line the distance 1-2 shown at 1-2 in Fig. 1 and raising the end *A* the distance 3-4 shown at 3-4 in Fig. 1. This is about as far as the tangent methods can go in the construction of a ramped wreath and is the cause for the ramps generally to be worked in the adjoining straight rails because it is found in practice that the joints by being made square to the tangents on the face of the plank and downwards to the bevels shown at 1 and 4 in Fig. 1, will not butt with the square ends of the straight rails without a considerable amount of troublesome tinkering, resulting very often in the failure of a satisfactory job.

(To be continued)

Ornamental glass that has a smooth and a roughened or embossed face should be put in with the smooth side of the glass to the weather.

Special Hardware in a Hospital Building

One of the more recent additions to the group of buildings constituting the Johns Hopkins Hospital at Baltimore, Md., is the Phipps Psychiatric Clinic, a U-shaped structure which covers an area of about 170 x 200 ft. It is six stories in hight, and on the two side wings the top floor is utilized as a roof garden. In the wings the walls carry the floors and in the front the floors are carried partly by the walls and partly by steel columns. The structure is of brick and the roof is of slate. Fire escapes located at the rear ends of the two wings are unlike those with which the general public is familiar, because they have to meet the severe necessities of suitability for insane and possibly refractory persons. Essentially, they consist of helical chutes winding round and round from the top of the building to a point near the ground level.

As the building is intended to provide extensive quarters for the treatment and care of the insane and for research into mental troubles it was important that the hardware should be designed so that no points of attachments be furnished from which persons mentally deranged might hang bedclothes or their own clothing and thus provide themselves with a means of ending their earthly career. In consequence the hinges are of the tight pin type and so constructed that they cannot be used for suicidal purposes. No knobs are used throughout the building. Instead, a lever handle, standing when in repose at an angle of 45 deg., is employed. If an attempt is made to attach a slip noose, the moment a weight is applied the noose will slide off. A sash fastener is used of such character as to provide no point of attachment. An interesting precaution takes care of the difficulty an attendant may have in getting a key in the lock in a hurry or in the midst of a tussle. The keyhole is arranged above the lever and the escutcheon provides a depressed key-way of funnel shape. Wherever a key may be thrust in this key-way, the key will be guided directly to the keyhole. In connection with the lock fastener used on the inside sliding shutters rivets are employed instead of screws. An inmate cannot accordingly use a coin or any other substitute for a screwdriver. Throughout the building there are several sets of locks controlled by master keys. Then there is a grand master key, which serves to open all these locks. The depressed keyway is used generally throughout the building. The hardware was supplied by Sargent & Co., 53 Water Street, New Haven, Conn.

According to the United States Geological Survey the value of the grindstones and pulp stones produced in this country in 1913 was $855,627 as compared with $916,339 in 1912.

Testing the Saw

Mr. A——, who was planning to build an outdoor sleeping porch at the back of his house, had an expensive new saw sent home from a hardware store. He left his office early the next afternoon with the intention of doing the work himself; he donned a pair of overalls and went at it in good spirits. An hour or so later he came tramping angrily into the house, his face dark with exasperation, and flung himself down in disgust.

"That new saw I bought isn't worth five cents." he stormed. "Why, the thing wouldn't cut butter!"

His small son Tommy looked up in wide-eyed surprise.

"Oh, yes, it would, daddy," he said, earnestly; "why, Ted and I sawed a whole brick in two with it just this morning!"—*Harper's Magazine.*

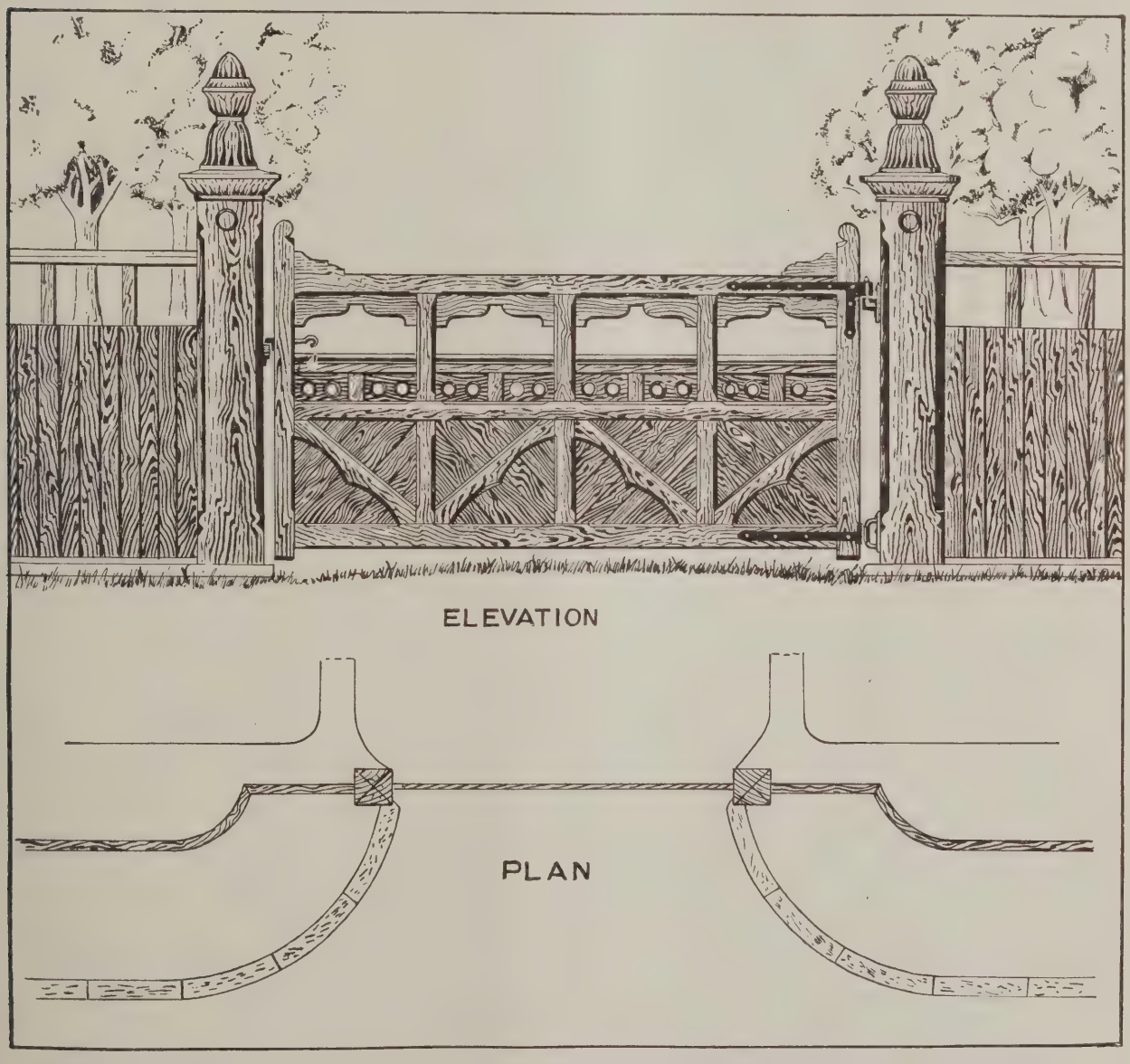
Design for Attractive Entrance Gateway

A Piece of Work Which the Builder Is Often Called Upon to Execute—Multiplicity of Methods of Treatment

FREQUENTLY one of the impressive features of the grounds surrounding a country or suburban home is found in the fencing and gateway, which are often of attractive and even artistic design. The treatment is varied according to the taste of the owner or builder, as well as to conform with the surroundings. As affording our readers a suggestion for an ornamental gateway which may be executed in oak or other wood, according to preference, we present herewith the plan and elevation of such a structure.

It will be seen that the gate posts are of a decidedly ornamental nature and about 1 ft. square in the cross section. The finials are planted on to the posts, although they may be made integral with them, according to preference. The posts extend about 4 ft. into the ground, and should have broken stone and dirt well tamped in, or placed in a setting of concrete.

The design, while simple, is none the less effective and has the additional advantage of being produced at a reasonable price, owing to the fact that much of the work is of the repetition order and can be machine-made to a very large extent. The material for the construction of the entrance gateway and fencing may be of English oak with oil dressed finish. The gate is 9 ft. long and 4 ft. 2 in. high and is fitted with self-closing hinges. The top rail of the fencing is weathered and forms a cap for the vertical studs, or posts, to which the fencing is



Design for an Entrance Gateway—Plan and Elevation, Showing Construction and Arrangement

secured. These vertical posts are rough sawn, as are also the rails, which are usually of triangular section. The oak boarding, or palings, as they are sometimes called, may be either rough sawn or finished, and secured in place by composition nails, the boards overlapping each other either consecutively or alternatively as fancy may dictate.

The plan shown herewith is produced on a somewhat smaller scale than the elevation. The small curved portions in the side fencing are a distinctive feature, the gate being set back something like 6 ft. and giving the driver of motor cars or other vehicles entering the grounds full view of the road before emerging into it.

A Mosque of Concrete Construction

A building of unusual interest and of reinforced concrete construction is the mosque which is being erected at Kuala Kangsar, in Perak, one of the Federated Malay States. Even the minarets and domes are built of concrete. Over the main building and 40 ft. above ground a large reinforced dome, 60 ft. in diameter, is supported on sixteen reinforced concrete columns, and above this there is another dome 80 ft. high.

Throughout the interior marble facing is used on the walls, columns and floor, while an elaborate design of gypsum ceilings and other Oriental decorations is carried out throughout the entire building.

All reinforcements for the concrete work, as well as the structural steel and metal lathing on which the plastering is placed, is of American manufacture.

A House with No Square Corners

A dwelling which is unique in many particulars is the new home that is being built in San Francisco by J. H. Wygant and which in a way recalls the days of early California and ancient Palestine. It is being constructed of hollow tile so arranged as to permit a free circulation of air from the basement upward at all times so as to maintain a cool summer temperature in the house.

All the windows are broad, giving unusually good lighting, and the living room, 29x13 feet in size, has a skylight and dome in the flat roof, which gives still better light.

Among the conveniences is a fuel elevator, the shaft for which adjoins the ample fireplace, and is disguised as a book case. The elevator is to be loaded in the basement and then lifted by a small windlass to the level of the first floor.

There is not a square corner in the house, all being rounded to permit easy cleaning. The kitchen and bathroom floors are of German stone, and the breakfast room floor is of cork.

Building Construction in India

What is said to be one of the most significant developments in connection with recent construction of large buildings in India has been the increasing use of American steel for reinforcing concrete work and of various American roofing materials made of heavy wool felt saturated with gummy compounds to render them waterproof. The use of expanded metal and reinforcing bars purchased in the United States, says special Consul Henry D. Baker, has resulted in greatly increasing the economy of recent building construction, as such material when used in the erection of walls, floors and ferro-concrete roofs saves both in space and labor cost, and is also said to be cooler and more sanitary than the native material. Its extensive use in India has been specially promoted by an American firm, which employs in India trained engineers from the United States who make a careful study of local conditions and then furnish technical advice, supervision and selling assistance to the different local agents of this product. They take care that contractors in charge of such buildings using such reinforced steel make no technical mistakes in the use of the material in building construction.

Reinforced concrete construction is most in evidence in Calcutta, where blocks of buildings are now in course of erection for the poorer classes in one of the suburbs. The project is intended to comprise the provision of 248 rooms, each 12 x 12 ft., with a 4-ft. veranda, and opening on to a central passage 7 ft. wide. The structures will be in blocks 200 ft. long and three stories high, with latrine accommodation at each end. All flooring and roofing are on the expanded metal system of reinforced concrete construction. The floors are designed to carry a live load of 75 lb. per sq. ft. over 6-ft. spans. The floors are 3 in. thick, with concrete mixed in the proportions of 1:2:4, while the expanded metal reinforcement consists of No. 15 metal, 3-in. mesh and ⅛-in. strands. Rapidity of construction and economy in cost were two of the deciding factors in adopting the above system for these buildings.

Building operations in Bombay as well as in Calcutta are active and the new houses are generally five and six stories high. There is not, however, anywhere an elevator carrying building materials nor any pneumatic machine at work for carrying the soft sandstone so much used on facade. The Indian mortar mill consists of an edge runner stone working in an annular trough about 20 ft. in diameter and 18 in. deep. The stone is fixed on a pole hinged to a central pin at one end and attached at the other to a draught animal that works on a circular path of about 15 ft. radius. The trough is roughly lined with masonry and the mortar ground in it is rarely free from lumps. Brick joints are, therefore, wide and the settlement great in proportion. Winches and pulley blocks are used without oil and the favorite method of raising weight is lifting by rope and blocks with a gang of men, who pause after each pull while one of them often chants a refrain.

A Notable Church Edifice

American architects often derive much of their inspiration in the designing of important work from a careful study of what has been done in earlier times—gathering suggestions here and there which in principle are adapted to the requirements of our domestic architecture. Especially have European cathedrals and churches been the objects of much consideration for it is these which

have had important influence on present-day construction in this country. A notable example of one of these old-time church edifices is the Val de Grace in Paris which was commenced in 1638 and after the surmounting of many difficulties finally completed in 1669. A picture of this magnificent edifice is shown on the facing page. The subsidiary structures—the cloister, the refectory, etc.—were carried out from 1655 to 1669.

An Old-Time French Cathedral—the Val de Grace, in Paris, Erected in 1638

The French Queen, Anne of Austria, commissioned Francois Mansart to erect the church, but the difficulties which he encountered in commencing

the work, including the costly nature of the foundations, led him to withdraw from it. His successor was Jacques Le Mercier, who followed out his plan except that he enlarged the chapel of the *chevet.* Le Mercier died in 1654 after a long interruption of the work caused by the troubles connected with the Fronde. Pierre Le Muet and Gabriel Le Duc were then appointed joint architects, the latter surviving his collaborator and completing the building, as already stated, in 1669.

The composition of the principal façade, separated from the Rue St. Jacques by a large court enclosed by a grille, is well shown in the picture. The niches in the side bays were formerly occupied by marble statues by François Anguier; for these were substituted, in 1866, two works by Devaulx, figures of Saint Bénoit and Saint Scholastique. In the lower pediment is the monogram of the royal foundress, grouped with a crown and palms. The upper pediment formerly contained the armorial bearings of the Queen, supported by two figures; the latter remain, but the coat-of-arms has given place to a clock dial.

The dome, constructed first in timber with a lead covering, was, in 1862-1869, strengthened by a steel construction inserted by the military engineers, who, however, carefully respected the exterior design. It is built on a circular plan, the angles at the base of the drum being occupied by turrets.

Internally the church is cruciform in plan, and has six lateral chapels opening out of the nave, three on each side. A small elliptical apartment behind the choir is still called *L'Oratoire de la Reine,* and is decorated with landscapes which are attributed to the painter Du Fresnoy. The arcades of the nave are decorated with bas-reliefs by Anguier, who is also credited with the relief decorations of the vault. Under the dome a baldacchino with six twisted columns of black marble contains the high altar; this was the design of Gabriel Le Duc, and was formerly decorated by a "Nativity" in marble by Anguier, which Napoleon removed and presented to the church of Saint Roch. This church having refused to refund the gift, it was replaced, under the Second Empire, by a copy of the original, made by MM. Lequien, Desprey and Clement Denis.

The interior of the cupola, which is 16 meters (about 52 ft.) in diameter, has been entirely redecorated with a large and fine composition in which Pierre Mignard, the artist, has symbolized the saints of the Old and New Testament, grouped around the Pascal Lamb. He has also grouped there the figures of Saint Louis and of Anne of Austria, the latter represented as making an offering of the church which she had caused to be built. There are also some fine paintings by Philippe and Jean Baptiste in the chapel of the Saint Sacrament.

The ancient monastery became, in 1814, a military hospital, to which the church is now attached.

The small diagonal streaks or wrinkles across the grain of a piece of timber not only betray weakness, but sometimes indicate periods of stress through which the wood passed when it was growing.

Use of Concrete in Winter

Ever since concrete began to be so extensively used in connection with building construction of all kinds opinions have been rather sharply divided as to the advisability of placing this material in freezing weather. There are many occasions when it is not only desirable but almost imperative to carry forward during the winter months construction work in which concrete is used, and just how this can be successfully accomplished has been told in a paper read a short time ago before the Boston Society of Civil Engineers by Leonard C. Wason, president of the Aberthaw Construction Company of Boston, Mass. His remarks were based upon an extended experience in the use of concrete and it appears to be generally considered that this matrial when laid in the winter months will prove to be just as good as that laid in the summer time and possibly more so, provided the necessary precautions to protect the concrete are taken.

The aggregates, he pointed out, must be free from frost when mixed. A live steam pipe should be shoved into the sand pile, the escaping steam heating it and removing all frost. The same may be done with the stone, but a canvas should be thrown over the top of the pile to retain the heat, which more readily escapes. When a considerable amount of heating is provided for in advance, steam pipes are laid on the ground, and stone as received is dumped upon them. Then there is a canvas thrown over to prevent storms getting into the pile and to retain the heat. The frost is thus easily and economically removed.

Salt is frequently used in the water to lower its freezing point. It is seldom worth while to heat the water itself. Little care need be used to prevent mass concrete from freezing, as the frost will usually only strike to a depth of about one inch. Buildings are inclosed with tarpaulin tied onto an outside staging, and the inclosed space is heated with salamanders burning coke. Sometimes it is possible to use steam.

Frost is removed from work by the use of salt and steam, and if the concrete surface is left rough it is common to sprinkle the top surface with salt to prevent freezing. In winter it is very common to put the finish on as a separate operation, after the building is enclosed, and not as an integral part of the construction, on account of the danger of freezing. After it is put on, it must be kept from freezing for the first forty-eight hours.

The expense of protection against the weather is not very great, and good results can be so surely guaranteed that it is not usual to discontinue work on account of cold weather.

Occasionally it is necessary to make some provision for the protection of the men. Shelters or wind shields are built in front of the benches where carpenters are making up forms, as well as around the men at the concrete mixer, whose work does not necessarily keep them warm. Where excavation is going on in the open, it is expedient to have a building with a good fire, where the men can warm themselves; and on a few jobs it has proved to be wise to provide hot coffee free in these shelters.

A great deal of the oak used on the Pacific coast comes from the eastern part of Asia.

Improving Building Conditions in Syracuse

An important conference was recently held in Syracuse, N. Y., by representative architects, building contractors, and material men of that city looking to some action which would tend to promote better business conditions in the building world and standardize architects' and builders' documents. The conference was held the last of March under the auspices of the Building Trades Employers' Association and later a permanent organization of a joint committee was effected. The result was the selection of the following officers:

President.....W. J. Burns
Vice-President.....E. K. Fenno
Secretary.....H. N. Smith
Assist. Secy.....J. A. Detor

As a result of the conference it was agreed to take up all matters in dispute and to endeavor to bring about a better understanding between all parties concerned as to the intent of architect's specifications. The presiding officer at the first meeting was William J. Burns, president of the Building Trades Employers' Association, who made a short address and called upon Melvin L. King, who spoke on the "main essentials of the architect and contractor." Mr. Burns made it clear as did other speakers that the building trades must work to keep contracts at home, and it was claimed that this could be done by a closer relationship between architects and building contractors. Albert L. Brockway spoke on "the architect," and H. N. Smith had for his subject "the contractor." Out of an attendance of 75 there were 16 architects.

Industrial Education in the South

Sometime ago we called attention in these columns to the work which was being done in one of the Southern Industrial Schools in teaching young men various trades and more especially in the line of building construction. One of the features of the course of instruction in carpentry is a series of lectures whereby the carpenters are taught the uses of various kinds of hardware. In the halftone engraving presented upon this page we show the interior of a classroom with the students in carpentry at the Hampton Institute studying hinges and butts made by the Stanley Works. The knowledge which is gained from the lectures in question is applied in putting on the hardware in the new buildings erected by student tradesmen and in the repair work of the 140 buildings which now belong to the Hampton Institute.

Industrial Education in the South—Class in Carpentry at Hampton Institute Studying Stanley Hinges and Butts

Type of School House in Singapore

One of the most modern buildings in Singapore, Straits Settlements, is the new Pearl Hill School, a two-story brick structure 190 x 78 ft. in plan, with the first floor of concrete, and the second floor of hard wood and Siam teak. The staircases are of reinforced concrete as well as an overhanging balcony, which in itself, is said to be capable of accommodating 200 children. The main assembly hall is 84 ft. long.

There are 16 classrooms on each floor; also 2 rooms, each 20 x 22 ft., which will accommodate a total of 600 children.

New Publications

Structural Steel Drafting and Elementary Design. By Charles D. Conklin. 154 pages. Size, 8 x 11 in. Profusely illustrated. Bound in cloth. Published by John Wiley & Sons. Price, $2.50.

The object of this book, the author of which is in charge of structural design at the Cooper Union Schools in New York City, is to give to the young draftsman, in the structural steel companies as well as to the technical student, a text book from which he can obtain information upon the practical method of preparing shop detail drawings. In his preface the author points out that while some of the best works on design devote some space to this subject and some of the large bridge companies have complete books of standards, there would seem to be no complete book covering the methods of making detail drawings, and the work under review is intended to help to fill the deficiency. A number of typical simple designs have been worked out completely and shop drawings prepared for them, by which scheme the entire work of the structural steel drafting-room, including the engineering department, has been presented. The designs given are those most commonly met with in the drafting-room and form the basis of an excellent course in structural design and drafting for the technical school.

The matter is contained in 14 chapters and many of the illustrations are full page plates of details.

New York's New Market Building

For some little time past the work of remodeling the old Stern Brothers dry goods store in West Twenty-third street, New York City, into a huge public market, to be known as the Cosmopolitan Garden, has been in progress. The building has a frontage of 175 ft. on both Twenty-third and Twenty-second street, and is being altered at a cost of approximately $300,000, in accordance with plans prepared by architects Starrett & Van Vleck. The market is being fashioned after the well known Covent Garden of London, and will have on the first and second floors more than 150 booths which will be leased to provision dealers from all parts of the country. The third floor covering an area of 35,000 sq. ft. will be fitted up as a restaurant capable of seating 2500 people. On the roof will be an immense greenhouse for the display of horticultural products and a large cut-flower department. This floor will have an average hight of 30 ft. covered with a canopy of glass.

Death of the President of the Cortright Metal Roofing Company

After a long illness S. P. Darlington, late president of the Cortright Metal Roofing Company, Philadelphia, Pa., and Chicago, Ill., died at his home in the former city at the age of 79 years. He was the founder of the company of which he was president and prior to that time he had been identified with the Pennsylvania Railroad Company as superintendent of the Harrisburug Division, and had engaged in the manufacture of wheels and wheel material in West Chester. We are able to state that the company will continue the business in the future along the same lines which have characterized its successful operations in the past. Walter M. Boggs, who has heretofore acted as vice-president and general manager, will continue in that capacity, and we understand that there will be no changes in the active management of the business.

The New Building Contract Documents

One of the first instances coming to our knowledge of the practical adoption of the new building contract documents agreed upon by the National Association of Builders' Exchanges and the American Institute of Architects, is that in connection with the Methodist Episcopal Church in Louisville, Ky., the plans and specifications of which were prepared by Capt. Brinton B. Davis. Much satisfaction has been expressed at his action in so promptly inaugurating the use of the new documents, for it is generally predicted that building improvements carried out under the conditions recommended by them will be materially reduced in cost to the owner and that many of the serious losses, delays and embarrassments heretofore encountered will be eliminated.

Death of William Disston

William Disston, president of Henry Disston & Sons, saw manufacturers, died at his summer home near Philadelphia, Pa., on April 5, aged 56 years. He was born in Philadelphia, June 24, 1859, and after graduating from the Episcopal Academy served for 7 years as a saw workman in his father's factory, acquainting himself with the duties of every department, which eminently fitted him to assume the management of the huge enterprise. He became president in 1896, on the death of his elder brother, Hamilton Disston. In addition to being president of the saw works, he was head of the Henry Disston & Sons File Company and Henry Disston & Sons Steel Works.

Model Apartment for Artists

One of the latest improvements on the upper west side in the Borough of Manhattan, N. Y., is the apartment hotel for artists about to be erected on a plot fronting 150 ft. on the north side of Sixty-seventh street, and adjoining the northwest corner of Central Park West. It will be known as the Hotel des Artistes, will contain about 100 suites, and the household arrangements will be such that tenants may have their food cooked without extra charge in a community kitchen and sent direct to the rooms in service elevators.

The building has been designed by George M. Pollard, the architect who planned most of the fine studio buildings in that immediate section. The façade will be in the Gothic style of architecture, with light brick and terra cotta above the stone base, relieved by a frieze of decorative tile. The entire cost, including the land, is estimated at $1,250,000.

William A. Jordan, age 92 years, a native of Maryland, but for the past 75 years a resident of New Orleans, La., the oldest contractor in the city, died April 4.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in March, 1915, and March, 1914

AS the spring season gets under way reports from leading cities regarding projected work are of more than usual interest. The showing for the month of March, as indicated by figures from 116 cities, indicates a percentage shrinkage as compared with the same month last year just about equal to that for February. The figures available show that in March there was a falling off of 11.9 per cent. as compared with March, 1914, while in February the percentage was 11.6. Of the 116 cities reporting, 55 show increases and 61 decreases.

In the case of the cities in the Eastern states there is practically no change as compared with a year ago, the totals being $34,966,055 and $34,977,131, respectively. Of the 45 eastern cities reporting, 28 show increases and 17 decreases. Contrary to the showing in February, the Borough of Manhattan, N. Y., reports a rather heavy shrinkage as compared with March last year, but the figures for the first three months are far ahead of the first quarter of 1914, this increase being due largely to the greater activity in hotel, tenement house and loft building construction. In the boroughs of the Bronx, Brooklyn and Richmond the estimated cost of building operations is ahead of March a year ago, but in Queens there has been a slight falling off.

In the Bronx there was nearly double the work planned during the first three months of the year than was the case a year ago, and the tenement houses now being erected show much improvement in construction over those put up in previous years. The change is found largely in the more comfortable size of the rooms, and instead of there being 22 and 23 rooms on a floor of a 50-ft. wide tenement the space is now divided into 13 to 18 rooms. The accompanying table will give the reader an idea of the cost of the work projected in the two periods:

CITIES IN THE EASTERN STATES

	March, 1915	March, 1914
Albany	$342,855	$947,900
Altoona	68,528	105,387
Atlantic City	242,917	199,741
Auburn	27,265	61,950
Beverly	38,385	9,575
Boston	4,719,000	4,532,000
Binghamton	134,878	133,869
Brockton	186,000	191,775
Buffalo	830,000	600,000
East Orange	86,732	214,608
Elizabeth	96,508	112,579
Erie	296,966	199,784
Harrisburg	152,750	111,500
Haverhill	87,250	191,760
Hoboken	47,450	49,360
Holyoke	24,725	43,865
Jersey City	663,000	385,000
Lawrence	288,880	72,050
Manchester,	83,086	136,610
Montclair N. J.	131,908	119,701
Newark	643,392	321,240
New Bedford	587,775	463,510
New Haven	825,470	425,380
New York:		
Manhattan	4,965,380	7,912,254
Bronx	2,668,112	1,831,168
Brooklyn	4,296,815	3,736,130
Queens	1,906,152	2,831,855
Richmond	245,492	136,255
Passaic	288,360	64,122
Paterson	76,973	100,347
Philadelphia	5,388,265	5,175,530
Pittsburgh	1,006,997	958,616
Portland, Me.	161,750	57,435
Reading	164,350	171,050
Rochester	1,000,000	775,030
Scranton	115,974	48,808
Schenectady	81,336	163,713
Springfield	570,588	563,018
Syracuse	520,533	143,700
Trenton	89,323	192,868
Troy	68,106	16,999
Utica	94,855	37,735
Wilkes-Barre	257,752	44,303
Woonsocket, R. I.	29,127	35,823
Worcester	364,095	351,228

In the middle section of the country 33 cities have reported, showing a falling off in March as compared with the same month last year of 10.54 per cent. Of these cities 16 show increases and 17 decreases. In Chicago there was a noticeable falling off in new work, and with the strike which has just been inaugurated, tying up operations involving many millions of dollars, the outlook for an active April is not encouraging. Grand Rapids shows a heavy shrinkage as do Kansas City, Mo.; Minneapolis and St. Paul. The cities showing improvement as compared with a year ago include Cincinnati, which also reports a notable increase for the first three months of the year as compared with the first quarter of last year, the figures being $2,807,-119 and $1,761,235, respectively; Detroit, Evansville, Milwaukee and Toledo.

CITIES IN THE MIDDLE STATES

	March, 1915	March, 1914
Akron	437,605	288,160
Cedar Rapids	152,000	170,850
Canton	189,250	1 36,550
Chicago	7,403,750	7,729,800
Cincinnati	1,356,124	863,810
Cleveland	4,022,035	4,070,255
Columbus	519,200	655,995
Dayton	112,465	363,885
Davenport	73,865	132,500
Des Moines	119,365	275,750
Detroit	2,839,490	2,300,720
Duluth	159,128	181,961
East St. Louis	80,955	86,287
Evansville	402,327	107,615
Fort Wayne	254,290	176,775
Grand Rapids	260,429	1,239,253
Indianapolis	889,349	784,404
Kansas City, Kan.	165,285	161,131
Kansas City, Mo.	848,595	1,516,280
Lincoln, Neb.	97,450	73,000
Minneapolis	1,372,530	2,093,915
Milwaukee	942,921	696,183
Omaha	332,860	321,165
Peoria	159,175	408,560
Saginaw	81,215	35,095
St. Louis	1,268,878	1,450,034
St. Paul	822,624	2,343,949
Springfield	88,920	79,140
Superior	67,235	80,171
Sioux City	167,675	286,535
Toledo	763,258	556,928
Topeka	56,030	46,220
Youngstown	206,605	148,295

From the Southern zone we have reports from 20 cities, of which 16 show a decrease and 4 an increase with a resulting falling off of 26.3 per cent. for that entire section. Notable activity occurred in the filing of plans in Baltimore, which since the first of January shows more building operations planned than in any previous corresponding period.

CITIES IN SOUTHERN STATES

	March, 1915	March, 1914
Atlanta	267,417	561,644
Baltimore	1,459,426	918,362
Birmingham	154,555	236,595
Chattanooga	40,865	111,410
Dallas	147,690	807,213
Huntington, W. Va.	390,800	119,735
Jacksonville	259,500	239,023
Louisville	518,100	654,400
Macon	84,351	68,623
Memphis	345,785	370,300
Nashville	190,570	229,980
New Orleans	194,385	230,609
Norfolk	180,694	346,845
Richmond	284,826	539,848
Savannah	132,700	193,850
Shreveport	47,479	122,503
Tampa	116,387	114,855
Tuscon	31,598	46,328
Washington	714,826	1,544,778
Wilmington	108,326	211,000

In the extreme western section of the country the contrast is greater than in any of the other zones reporting, which may be due to some extent to the fact that the Exposition building and activities incident thereto in San Francisco and San Diego have been com-

pleted. An examination of the accompanying table shows that in San Francisco the operations in March were less than what they were for the same month last year, and the same applies with greater emphasis in the case of San Diego. Los Angeles is also far behind the record of a year ago. Of the 16 cities reporting, 7 show incerases and 11 decreases with a loss for the section of 45.07 per cent.

CITIES IN WESTERN STATES

	March, 1915	March, 1914
Berkeley	140,950	263,550
Butte	54,340	49,850
Colorado Springs	22,700	14,178
Denver	181,130	311,610
Fresno	167,748	74,930
Los Angeles	1,124,063	2,179,756
Oakland	500,373	625,907
Portland	503,755	882,965
Pueblo	8,360	33,720

CITIES IN WESTERN STATES—(*Continued*)

	March, 1915	March, 1914
Sacramento	148,725	236,174
San Diego	94,285	262,686
Salt Lake City	209,385	307,150
San Francisco	1,405,038	3,956,475
San Jose	97,971	79,315
Seattle	689,675	923,480
Spokane	102,660	86,335
Stockton	140,814	105,481
Tacoma	192,450	137,968

Taking the country over there is undoubtedly a large amount of work in prospect, some of which is entirely new undertakings due to the steady growth of the communities and some is that which has been held over from last year on account of the more or less uncertain outlook due to the European war and the difficulty in financing the projects. The promise is for a fair year's business, all things considered.

Current News of Builders' Exchanges

Organization of New Exchanges—Campaign to Promote Building Operations—New Quarters for Rochester Exchange

A Builders' Exchange at Chattanooga, Tenn.

LEADING contractors and building supply dealers of the city of Chattanooga, Tenn., have just formed a Builders Exchange with 56 charter members. Temporary organization was perfected at the first meeting by electing as president C. M. Willingham, who is also president of Willingham & Co., lumber manufacturers, and as secretary, Lee K. Wert, who is also secretary-treasurer of the Lookout Planing Mills. The committee on permanent organization is composed of Mr. Willingham, W. E. Love of the Mountain City Stove & Mfg. Company, F. B. Sloan of Sloan & Co., Anthony F. Hahn, contractor, and Gus A. Wood, master plumber, gas and steamfitter. There are a large number of contractors and supply dealers in the "Dynamo City" eligible to membership in the new organization, and it is anticipated there will soon be 100 enrolled. The next meeting will be held at the call of the organization committee, which in the meantime has applied to the National Association of Builders' Exchanges for a charter.

The architects of the city have organized what is called the "Society of Chattanooga Architects" for the fraternal and professional welfare of architects in the city. A constitution and by-laws have been adopted and the following officers elected: J. D. Alsup, president; R. H. Hunt, vice-president; W. H. Sears, secretary and treasurer.

Novel Campaign of the Birmingham Exchange

After several months' preparation the Builders' Exchange of Birmingham, Ala., inaugurated a few weeks ago a "build-now" campaign which is greatly assisting in bringing owners and contractors together in order to grasp the opportunity which offers. Secretary Stafford of the Exchange has stated that 375 men have recently been placed to work on new construction, and indications are that in the immediate future many more idle artisans will find employment through the same channels. The secretary states that the great majority of the workmen gladly welcome the chance for employment and that he has a waiting list a large part of the time of men willing to work at their trades at the reduced wage scale for the first man who will start construction.

President J. A. Millsom recently appointed a committee of representative citizens to call on architects and contractors and secure a list of proposed construction. The method of procedure is for the committee to call upon the owners who propose to erect these buildings, show them the saving they can make by building now and the many men to whom they could give a chance to make an honest living at a time when that chance is badly needed. The committee then places the owner in touch with bankers for the purpose of securing the loan necessary to the work and thus give added impetus to the construction campaign.

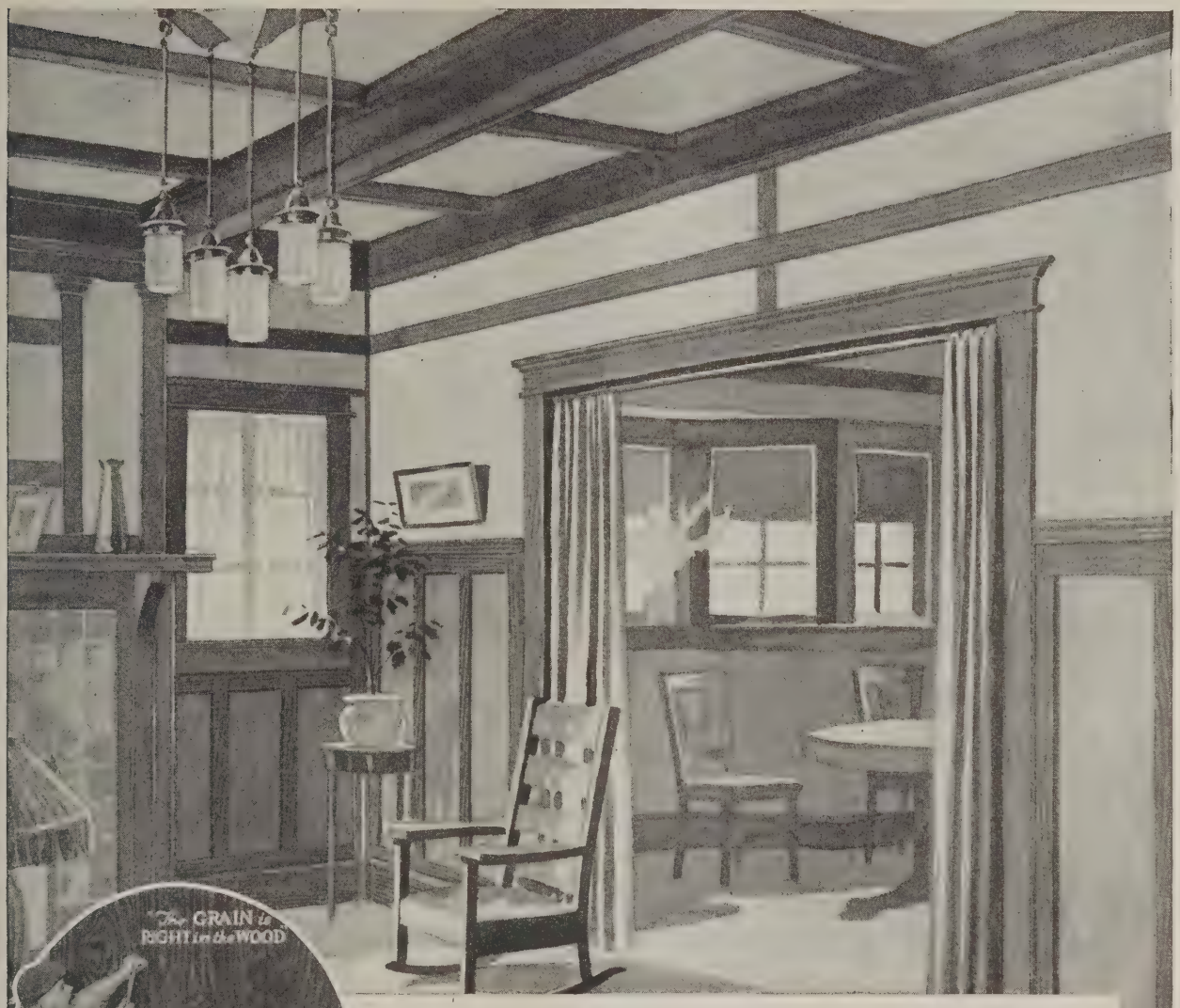
New Quarters of Rochester Exchange

The formal opening of the new quarters in the Arlington building of the Builders' Exchange of Rochester, N. Y., occurred on the evening of April 8 with appropriate ceremonies. The quarters are in practically the same rooms that were occupied by the Exchange for 18 years, but in 1905 the organization moved into the German Insurance building, and in March moved back to the remodeled structure. In fact, the return to the home of its youth was something akin to coming from a Rip Van Winkle doze. At the housewarming one could shake hands with Frederichs, for instance, who built the Chamber of Commerce building; with Fred Gleason, who was responsible for the construction of the city's six police precinct stations and the Exchange street jail; with Arthur G. Seitz, whose father put up the store of the Sibley-Linsay & Curr Company; with Richard Gorsline of the firm that reared the New York Central station and with many others whose municipal monuments will long outlive them.

The Builders' Exchange was organized in 1858 with Mayor Edgerton as a charter member and with headquarters in the Wilder Arcade. In its new home there is a meeting room, a lounging room and a reading room and office. A feature of the exercises was an address by Roland B. Woodward of the Chamber of Commerce, and music was rendered by Zeitler's orchestra.

The Builders' Exchange of San Antonio, Texas

What is described as an old-fashioned "Get-together" meeting, at which there were plenty of good things to eat and drink as well as the "makings" for a smoke, was held by the members of the Builders' Exchange of San Antonio, Texas, on the evening of Saturday, April 3, at the headquarters of the organization in the Alamo National Bank Building. The Exchange is an important organization which was formed several years ago in order to provide for closer relations between the builders and at the same time promote the mutual interests of all. The Exchange is planning an active campaign looking to the betterment of local building conditions, and this was one of the topics discussed at the "smoker" in question.



Overcomes the Cost of Decorative Panel Work

We wish to place in the hands of every architect and builder samples of Fiberlic Wood-Grain Panels so that rigid comparison may be made between them and the actual grained wood, and a searching test made of our claims that Fiberlic Panels are equal to grained wood panels in appearance and superior in strength, rigidity and endurance.

The comparative cost of Fiberlic Panels is very small. It puts decorative paneling within the reach of every class of home builder. Note these features particularly:

Fiberlic

Wood-Grain Panels

Have the Grain IN the Wood

Not printed on the surface or printed paper mounted as in the case of "wall boards." The grains of Fiberlic are right in the wood, reproduced from the wood. The process is ours—exclusively.

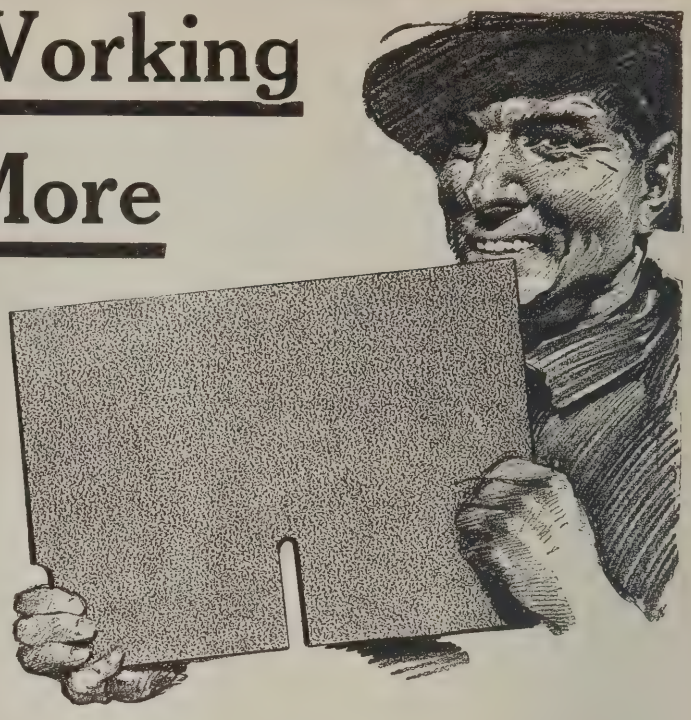
Do not confuse Fiberlic with "wall boards." Fiberlic is made from well-known, long root fibers of remarkable toughness and strength. The fibers are chemically treated under a recognized process and then built up under terrific pressure to any desired thickness. Fiberlic comes plain for walls and ceilings.

FIBERLIC
Wood-Grain Panels for
Dining Room
Living Room
Halls
Stairways
Dens
Bungalows, etc.

Write for Samples, Prices and Specifications

THE FIBERLIC COMPANY, CAMDEN, NEW JERSEY
140 Washington Street, North, Boston, Mass.

15 Salesmen Working For Me and More Coming



These salesmen are my customers — property owners — whose residences I have covered with NEPONSET Shingles. They are the biggest boosters of the shingle I know. They're turning business my way every week.

There is no roof so attractive as that covered with

NEPONSET Shingles

PATENTED

Each shingle is specially built up—the butt end being three times thicker than the top end! When laid they form seven layers. That will give you some idea of their durability. Why not get a sample and investigate for *yourself?*

The same materials are used in **Neponset** Shingles as in the well-known **PAROID** Roofing, also used in **Neponset** Proslate, the highest grade colored ready roofing ever made. **Neponset** Wall Board, **Neponset** Waterproof Building Paper and **Neponset** Floor Covering are other well-known **Neponset** products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me a sample of the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

The Storm Electric Dumbwaiter

A new idea in electrically operated dumbwaiters is found in the construction which has just been placed upon the market by the Storm Mfg. Company, 50 Vesey street, Newark, N. J. The machine is of such a nature

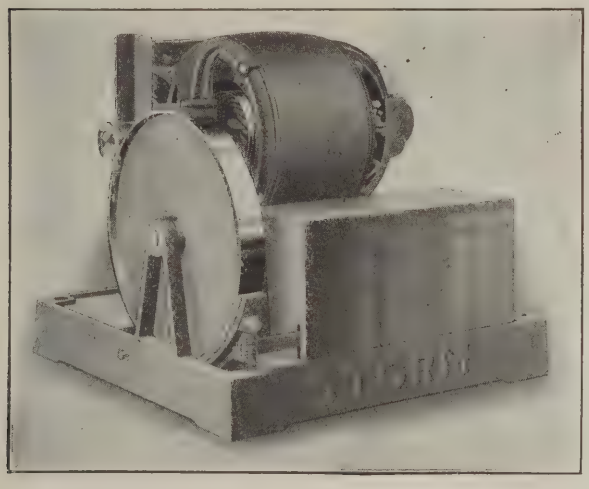


Fig. 1—The Storm Electric Dumbwaiter

that it can be placed in any well-hole where a hand machine of the same capacity is now operating and without disturbing anything except the overhead fixtures. The special feature and one to be emphasized consists of a friction drive instead of the usual worm gears. The capacity ranges from 100 to 125 lbs., and the speed from 50 to 60 ft. per minute. The general appearance of the machine is presented in Fig. 1. Special attention is called to the lo wcost of the machine and of its operation, as it can be operated from any light or power circuit. The machines are shipped fully assembled and have only to be set in position and wired from supply circuit switch, the claim being made that any good mechanic can instal the machine as well as the complete dumbwaiter. When so desired the machine can be equipped with ball bearings. The company has issued a circular relating to this new departure in electric dumbwaiters and at the same time is sending out a catalogue of Storm hand-power dumbwaiters.

Medusa Waterproofing in Paste Form

For the purpose of meeting a growing demand among architects and cement users for a waterproofing which can be dissolved in the water to be used in mixing the mortar or concrete, the Sandusky Portland Cement Company, Sandusky, Ohio, has perfected what is known as the "Medusa Waterproofing in Paste Form." The paste is identical with the powder in result, composition and waterproofing effect, the sole difference between the two being the greater ease and convenience of mixing which the paste form offers. The paste is shipped in one and five gallon cans, the former weighing 8 lbs. and the latter 40 lbs. The price is substantially the same as that of the powder and it contains also the same percentage of combined fatty acids, and is claimed therefore to be equal to the powder in waterproofing effect. In a folder which the company has issued directions for the use of the paste are given and the proportions to be used in order to give the most satisfactory results.

Building Contractors' Equipment

We have just received from the Chicago Builders' Specialties Company, room 1415, Lumber Exchange Building, Chicago, Ill., a copy of an attractive booklet which it is distributing among its friends in the trade. Special attention is called to the fact that the company carries a complete line of contractors' equipment and specialties, and having been in the business for the past 14 years the management is well qualified to know the equipment best suited for the particular kind of work contractors are called upon to execute. The booklet is fully illustrated and carries pictures of the "Little Devil" concrete mixer, floor surfacing machines, expanded metal, gasoline and steam hoists, wheelbarrows, bar benders, etc., etc.

Clin-Truss Wall Furring

A new application of Clinton wire which offers a method of furring wall surfaces in such a way as to give a free air space for the running of pipes and wires is being introduced to the attention of architects and builders by the Clinton Wire Cloth Company, Clinton, Mass. The transverse wires of the furring are crimped so as to give the heavy longitudinal wires the required offset from the wall surface. These offset wires run vertical with the wall and serve as the furring ribs to which the lath is attached. An idea of the arrangement involved may be gathered from an inspection of Figs. 2 and 3, which represent vertical and horizontal sections through a wall. The great advantage of this form of furring lies in the fact that it can be given practically any amount of offset with unobstructed air space, which is especially convenient where it is desired to run pipes or wiring in the space between the plaster and the wall. The steel wire of which the furring is made is thoroughly galvanized, and each horizontal and vertical wire is spaced by machinery and electrically welded at intersections so as to insure accurate and secure spacing of the furring members. The furring is secured to exterior brick or terra

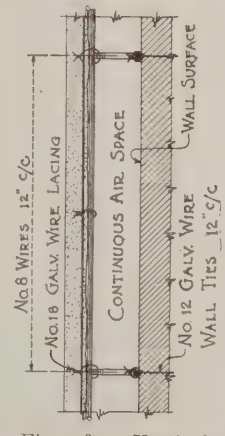
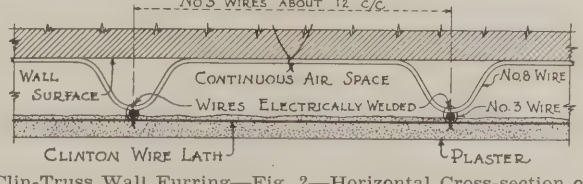


Fig. 3 — Vertical Section of a Wall



Clin-Truss Wall Furring—Fig. 2—Horizontal Cross-section of a Wall Showing the Way the Furring Is Used

cotta walls by No. 2 galvanized wire ties which are inserted in the mortar joints. For securing "Clin-Truss" to wood studding the company recommends the use of 1-in. No. 12 gauge wire staples. The company refers to the economy of this furring material and also

to its light weight as compared with other types of wall furring. The point is made that it is ideal for exterior wall furring to support stucco work and that it provides a perfect key for the mortar and insures against cracking and separation of the plastering from the background.

Disston's Exhibit at the Panama Exposition

Early recognizing the importance and value of the Panama-Pacific International Exposition to the business world, Henry Disston & Sons Inc., of Philadelphia, Pa., were among the first to apply for space in the Palace of Manufactures, with the purpose of making an exhibit that should be in harmony with the greatest exposition ever held and also with their own standing as "the oldest and largest manufacturers in the world of a full line of saws and saw tools from raw material to finished product." The magnificent display which they have now installed in a corner location on the central aisle of the building in question indicates that they have successfully carried out their intention with great credit to themselves and to the exposition. The exhibit as a whole very appropriately commemorates the 75th year of the house of Disston in the business of manufacturing good saws — 1915 being the Disston Diamond Jubilee. In regard to the exhibit, it may be stated that a set of balanced scales

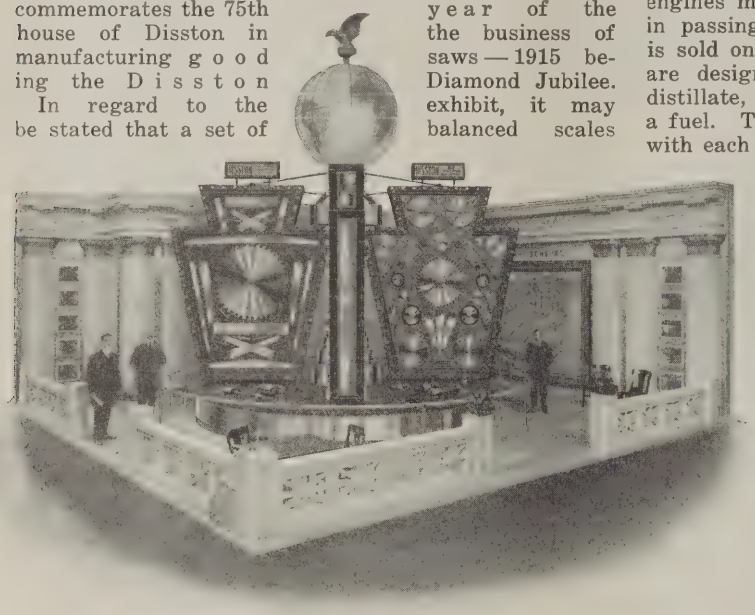


Fig. 4—General View of Exhibit of Disston & Sons at the Panama-Pacific Exposition Now Being Held in San Francisco

on a keystone, signifying justice to purchasers of Disston products is the trade mark of this firm and the keystone is made the *motif* of the exhibit schemes. Four immense keystones 12 ft. 6 in. high by 10 ft. 6 in. wide at the broadest part and 2 ft. thick, are mounted on a revolving turret 20 ft. in diameter, which stands 2 ft. above an inlaid mosaic floor. The turret and four keystones on which the saws and tools are mounted constitute the exhibit proper and this is encircled by a handsome nickle plated metal railing. The four keystones and turret are made of iron and wooden frame, with California redwood trim. The main body of the keystone and the top of the turret are covered with rich colored felt, and on the faces and edges of the keystones as well as in pyramid form in the center of the turret between the inner edges of the keystones, are shown saws of every description, from the smallest to the largest in commercial use. In addition to the saws and saw tools and files there is an extensive line of plumbs, levels, bricklayers' and plasterers' trowels, squares, bevels, mortise gauges, screw-drivers, and a great variety of knives adapted to many purposes. In the center of the three keystones there is a revolving disc 60 in. or larger on which, symmetrically arranged, are various saws and tools. On the faces of the other five keystones are displayed all kinds of hand and power-driven saws for cutting wood, metal, ivory, bone, fibre and other compositions. These saws vary in size as well as in pattern and use, and embrace hack and narrow metal cutting band saws, all kinds of wood cutting saws from the long cross-cut saws that are used in felling the monarchs of the forest and the largest band and circular saws that are used for reducing logs to lumber and shingles. Above the four keystones, in the form of a canopy is a revolving illuminated leaded glass globe of the world, 7 ft. in diameter, on which the different countries and hemispheres are distinguished by different colors and surmounted by a large golden American eagle bearing a scroll, "Quality Tells." An idea of the display may be gained from Fig. 4.

New Witte Engine Catalogue

We have before us a copy of a very attractively printed catalogue of 36 pages just issued from the press by the Witte Engine Works, 3197 Oakland avenue, Kansas City, Mo. It may be interesting to here state that in order to make the name of the concern more suggestive of its business, besides rendering it more easily remembered, the name was changed from the Witte Iron Works Company to the Witte Engine Works. The matter in the catalogue relates to the various lines of Witte engines made by this concern which it may be remarked in passing was established in 1870, and the product is sold only direct from factory to user. The engines are designed for using kerosene, gasoline, naphtha, distillate, solar oil and natural or manufactured gas as a fuel. The engines are all of the four-cycle type and with each is given a binding five-year guarantee. The early pages of the catalogue contain photographs of the officials of the company together with brief reference to the business career of each. There is also an interesting article entitled "Lower Cost of Engine Power," which shows the great strides which have been made in the last two or three years in the reduction of cost of dependable gasoline and kerosene engine power. Price making and operation cost are here figured out with striking clearness. The engines are of a nature to meet many requirements and in connection with the pictures full descriptive data is given so that the contractor, the woodworker, the builder, or in fact any one in need of power will readily understand the salient features of the different types. Several pages are devoted to "A Trip Through the Factory" wherein is described the various processes of manufacture and the illustrations represent interior views of different departments of the works. The last page is given up to "Specifications and equipment," showing the various lines of product turned out by the company. Incidentally the catalog fully explains the company's sales plan which is of more than ordinary interest. We understand that any reader of *The Building Age* who desires a copy of this very attractive catalogue, which is known as "No. 46," can secure one by making application to the address above given.

The Superior "Lodown" Warm Air Heater

Under the title "Healthful Home Heating," the Utica Heater Company, Utica, N. Y., is distributing an exceedingly attractive catalogue illustrating and describing the superior "Lodown" warm air furnace which is claimed to bring about the conditions suggested by the title of the catalog. The point is made that this heater provides not only warmth but also ventilation, and that it floods the home with a steady, consistent volume of fresh air, warmed to the proper temperature, and that it does away with dangerous draughts and cold corners. As its name implies it is low in hight, thus allowing ample room in the basement for a proper pitch of the warm air pipes even when the heater is installed in cellars with low ceilings. The merits of the heater in question are set forth at great length and many of the features are illustrated in a way to clearly indicate the construction involved. Accompanying the pamphlet in question is another entitled "Successful

(*Continued on page 74*)

Estimates FREE!

Lower Than Others! GUARANTEED Right!

JAP-A-TOP ROOFING

Beautiful — Durable. Surfaced with genuine Slate, 2 colors—Red and Grayish Green.

Per roll of 100 Square Feet—**$2.25.**

Jap-A-Top Diamond Point Roofing—in rolls but goes on to look like Shingles—per roll of 100 sq. ft.—**$3.00.**

Price per sq. of Jap-A-Top Shingles 424 Shingles—**$4.75.**

Also Other Quality Roofing as low per roll of 100 sq.ft. **90c** see Catalog, pages 117 to 125.

Windows

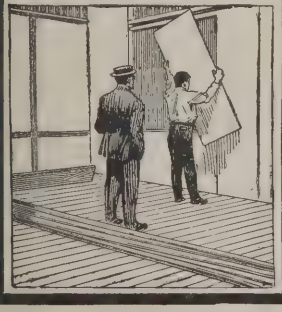
We have plain and fancy windows in all standard sizes and at all prices. Check Rail Windows 70c up. Plain rail, glazed, 76c up. Transoms, 38c each. 8x10 window glass 8½c per light. Any size at equally low prices. Safe delivery guaranteed. Dealers charge 3 to 5 times our prices. See pages 44 to 46 of Catalog.

Builders' Hardware

Everything in Builders' Hardware direct to you at wholesale—hinges, locks, door sets, window sets, etc. See catalog, pages 127 to 153

Wallboard

Wallboard is the Great Modern Substitute for Lath and Plaster. Comes in sheets ready for use. Goes on dry. Cold-proof, vermin-proof, handsome. **Beats Plaster—Costs Less.** Wallboard costs 50 per cent less to lay. Quality Wallboard 1000 Sq. Ft.—$22. See Special Wallboard Offers in Grand Free Catalog, pages 108 to 111.



LET our contractors' Service Bureau give you a **"Guaranteed Right Estimate"** on your bill of materials. Get Gordon-Van Tine's low, money-saving figures! **A complete house or any part of a house at wholesale prices.** Our **"mill-direct-to-builder"** plan of selling **saves you dollars on the bill for every nickle in freight.** No time wasted. **Prompt deliveries** Guaranteed. More than

14,000 Contractors, Carpenters, Builders Buy Regularly at Our Wholesale Prices

Do the same! **All stock fresh and clean.** Weather protected piling sheds and loading platforms. **Three strong banks and 100,000 home builders** speak for our **reliability.** Remember we ship 90% of orders same day received. Hundreds of items ready to ship from our stock that local yards would usually take weeks to have made to special order.

Direct to You Anywhere Satisfaction Guaranteed or Money Back

You, Mr. Contractor are **sole** judge of what constitutes satisfaction. No arguments — no lengthy correspondence — just **money back** if you are not satisfied and goods are not as represented in every way.

Over 14,000 other shrewd contractors and builders deal with us **straight along.** What is profitable for them is **profitable for you.**

Let Our Contractors Service Bureau Help YOU

Let it estimate, **plan, solve your knotty problems and increase your profits. It can.** Put this unique free service to work for yourself. Write your requirements and **get our figures.**

LUMBER IN CAR LOTS SAVE $100 to $300

Send for our Special Latest Lumber List, Millions of feet of clear, dry, clean, seasoned lumber at Wholesale Prices. Everything in Lumber. **All your wants supplied at a moment's notice.** Dimension, Heavy Joists and Timber, Drop Siding, Bevel Siding, Ceiling, Flooring, Partition, Wainscoating, Finishing Lumber, Lath, Shingles, Boards, Posts, Poles and Battens—all grades in accordance with rules of the Lumbermen's Association. **Buy at wholesale;** take the dealer's profits yourself. We ship to you anywhere by fast freight. Our immense lumber yards connect direct with twenty-six lines of railway. **Quick Shipments —safe delivery—and satisfaction guaranteed.** Get our wholesale prices, see Special Lumber Price List in Catalog,—pages 81 to 83.

Front Doors

We make all styles and sizes of doors—for both outside and inside use—quality guaranteed from $1.07 up. Hundreds of special designs ready for immediate shipment. Glazed or unglazed. Oak, white and Yellow Pine, Fir, Cypress, Oak Veneer, Solid Yellow Pine and Front Doors.

We carry the largest door stock in America ready for prompt delivery. See pages 9 to 32 in Catalog.

Stair and Other Millwork

You can buy material for a complete flight of stairs for $23.93. We carry in stock, designs which admit of many variations and offer an infinite variety of arrangements. Prompt delivery—no delays. The advice of our expert stair builders is also at your disposal free. We will be glad to quote you on stair work of any special dimensions. We are also prepared to make prompt deliveries on mill work in hundreds of special designs. All now in stock. No delays. No long waits. Shipments same day order is received. Don't let your local yards hold up your jobs. Get our big Catalog.

Use this Coupon!

Get this great 5000 Bargain Catalog Free! Everything builders need is in it. Lumber, Millwork, Builders' Hardware, Glass, Paints, Roofing, Wall Board, Doors, Windows, Screens, Porches, Mouldings, Stairwork, Flooring, Shingles, Nails, Enamels, Frames, Hot Bed Sash and thousands of other tremendous money savers. **Costs you nothing** to get this great book. Yours on request. **Free.** Simply fill out and send the coupon. If you want a Free "Guaranteed Right Estimate" write us your needs at the same time. **Clip the Coupon now.**

FREE! → **5000 Bargain Catalog**

GORDON-VAN TINE CO.,
763 Federal St., Davenport, Iowa.

Gentlemen:—Please send the books checked below.

☐ **Building Material** { Lumber, Millwork, Hardware, Paints, Etc. ☐ **Plan Book**

In sending for Plan Book, enclose 10 cents for postage and mailing You will receive the books by return mail.

Name.....

Address .....

Occupation.....

Gordon Van-Tine Company

In Business Half a Century

Everything is Always Sold at Wholesale Prices Direct to You. The Biggest Catalog Building Material Concern in the World. Experienced in Prompt Service, Expert Buying and Square Dealing.

763 Federal Street **Davenport, Iowa**

Heating with Imperial Boilers," and within its covers the construction in question is illustrated and described in a way to appeal to the contractor, the architect and the house owner. The concluding paragraph in the catalogue reads as follows:

"Back of the 'Imperial' is a company whose interest does not stop with a sale of the boiler. We want every user of an 'Imperial' to be satisfied and there is no limit to what we will do to please them. We are at all times glad to consult with users of 'Imperial' boilers or with prospective buyers and will willingly give the benefit of our experience in all matters pertaining to heating."

Grained Wood Panels

The widespread revival of grained panel work in the home has resulted in the Fiberlic Company, Camden, N. J., introducing to the attention of architects, builders and house owners generally, Fiberlic wood-grained panels, one of the effects produced by this material being clearly indicated in the interior view presented in Fig. 5 of the cuts. The makers of Fiberlic draw special attention to the distinction between their product and wall board which is no doubt due to the basic material used in the former. The point is made that when one compares Fiberlic panels with the real

Fig. 5—Interior of Room Showing Grained Wood Panels

grained-wood it is difficult to distinguish one from the other provided of course that comparisons are made with similar grains and finish. Fiberlic has the grains right in the wood—reproduced from the natural wood under a patented process developed by the company. Fiberlic, as we have already stated in these columns, is made from the fibers of an imported root, and these fibers are put through a chemical process to remove all resinous matter. They are then built up under great pressure to any desired thickness. Another important feature to which the makers direct attention is that the Fiberlic panels lend themselves to practically any desired color scheme.

"Rock Cork" Stucco Sheathing

The merits of what is known as "Rock Cork" stucco sheathing are set forth in a 16-page illustrated booklet recently issued by the Banner Rock Products Co., Alexandria, Ind. This product is made from quarried rock, and is converted into fibers which are bound together with a waterproofing binder. The composition being mineral, is fire and decay proof, and presents a surface to which stucco adheres tenaciously. An instance of the durability of this product is found in a section of "Rock Cork" which was placed on the roof of a building where it was continuously exposed to the direct action of the elements for a period of five years. It was taken down and applied to a wall with Portland cement plaster, and then plaster was applied to the exposed side. The application of this sheathing can begin at any point on the building, and the size of the sections is such that they are easily handled by one man from small scaffolds. "Rock Cork" stucco

(*Continued on page 76.*)

sheathing is ½ in. thick, measures 16 x 18 in. and can be nailed with three-penny nails, three to each square foot. It is suggested that the stucco finish be applied in two coats—the first to be one part Portland cement and two parts sand in case of a Portland cement finish. If stucco mixtures are used the first coat should be of a thin consistency and the second application as desired. The company has issued another interesting 63-page catalogue entitled "Facts Shown by the Camera." The illustrations show the manufacture of "Rock Cork" from quarry to ovens, and many pages are devoted to a series of exhaustive tests which were conducted to demonstrate the insulating efficiency of this product. Either or both of these catalogues may be had on application.

A Builders' Transit Level

A leveling instrument of the convertible type but which is said to excel in the fact that it has all the features of a regular builders' transit is illustrated in Fig. 6 of the engravings. In its normal position the instrument is a first-class architects' level and in less than half a minute one can attach the makers' patent standards and then the instrument can be used to the full extent of a builders' transit. It is in fact an architects' level, a convertible level and a builders' transit in combination. It has a 12-in. achromatic telescope, and a 1⅛ objective giving a perfect illumination line of collimation correct for all distances. The weight of the transit level with attachment is only 8¼ lbs. It is made by Geier & Bluhm, Troy, N. Y., from whom an attractive circular can be obtained which describes the additions and improvements which have been made to the makers' regular line of high-grade engineering instruments used by architects, contractors, builders, millwrights, engineers and surveyors.

Fig. 6—A Builder's Transit Level

Wood Grain Finishes Applied to Wall Board

The graining of wood has been accomplished for a good many years by the use of rollers and graining tools, the grain being cut upon the rollers and then the latter applied to the wood in such a way as to produce the grain. While to a certain extent the operation is automatic, it has been hand work and the results have depended considerably upon the skill of the operator. Grain finishes have been applied to wall board in this way with very good results.

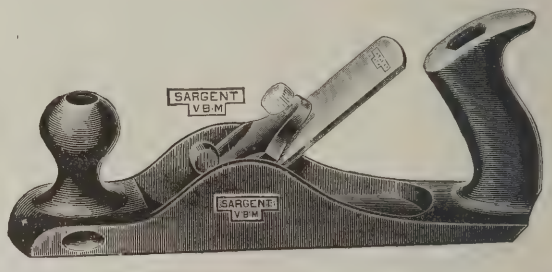
The Heppes Company, makers of "Utility" wall board, have just installed extensive machinery for applying grain finishes to this product. The new process by which the finishes are applied insures an actual reproduction of the wood, not stained, but grained in a way to make this new-style "Utility" board distinctive. It comes in four beautiful wood grains; flat oak, quartered oak, Circassian walnut and mahogany. Heretofore to obtain the handsome effects of these expensive woods on the walls of a home required a fat purse and a willing spender, but now "Utility" board duplicates the rich, pleasing texture

(*Continued on page 78.*)

of these expensive woods, yet brings the cost within the reach of practically everyone. "Utility" board is made of layers of fiber board which are lastingly welded together with hot asphalt into one stiff, unbending sheet. It is an inexpensive substitute for lath and plaster, for "Utility" board has in-built qualities of durability that assure it permanence of good looks and it nails direct to studding and joists or right over old plaster or ceiling without removing the plaster or ceiling from the walls.

Some New Sargent Planes

We take pleasure in presenting to the attention of our readers illustrations of some of the new planes which have recently been added to the line turned out by Sargent & Co., 53 Water Street, New Haven, Conn. Fig. 7 is a view of an iron roughing plane, some-



Some New Sargent Planes—Fig. 7—An Iron Roughing Plane

times called a Scrub plane and also known as a "Bismarck" or "Shrup" plane. The cutter is rounded so that its contact surface with the wood will not be too great when set for a deep cut. This grooved cutter is said to remove the surface very rapidly. The body, handle and knob of the plane is made of a single piece. The weight of the plane is an advantage in clinging to the wood on heavy work for which it is intended. The forward end of the bed is milled up slightly in order to prevent the plane from being hindered in use by any roughness or obstructions in the wood which may come up before it. A plane of this kind is said to be especially useful where it is desired to take off a large amount of wood surface, such for example as in evening up thresholds. The plane is made in two styles known as Nos. 160 and 161, and provided with 1-in. and 1½-in. cutters respectively. The company also makes a style known as No. 162 which has the same features as Nos. 160 and 161 except that it is made with two cutters, each of which is 1 in. wide. The two cutters give two points of contact and the plane is intended for extra heavy work where a wide surface is to be cut down.

In Fig. 8 we show a view of a rabbet plane, four sizes of which are offered. No. 1506 is 4 in. long and has a 1-in. cutter; No. 1507 is 5½ in. long and is pro-

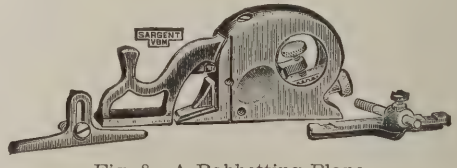


Fig. 8—A Rabbetting Plane

vided with a ¾-in. cutter; No. 1508 is 6½ in. long with 1-in. cutter and No. 1509 is 7½ in. long with 1¼-in. cutter. These are nickel plated and are drilled and tapped for an adjustable fence and depth gauge, and when furnished in that way are designated as Nos. 1506½, 1507½, 1508½ and 1509½. The only one, however, carried regularly in stock is No. 1507½. The planes are especially designed for high-grade cabinet work, the sides and bottom being exactly right angles so that they may be used flat on their sides or either right or left end. The mouths are adjustable for any width required. By removing the forward section entirely the plane becomes a "bull nose" plane with the cutter at the extreme end.

(*Continued on page 80.*)

The company states that No. 1507½ is a Fillister plane, which may also be described as a rabbet plane adjustable for width of cut. For this purpose a fence is provided which may be regulated to insure the proper width and is reversible. In addition to this a gauge regulates the depth of cut. The planes are designed to fit the hand of the user and for this purpose are rounded up at the rear end. They also have depressions on each side for the thumb and finger as may be seen from an inspection of the illustration.

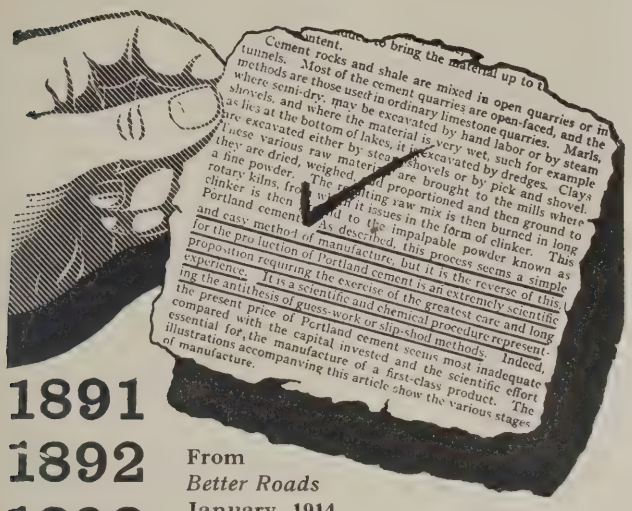
Something About "Steelcrete"

In an attractively illustrated pamphlet sent out by the Consolidated Expanded Metal Companies, with offices in the Architects' Building, 101 Park Avenue, New York City, are set forth the merits and some of the various applications of "Steelcrete"—a cold drawn mesh made from basic open-hearth steel. Being an integral sheet it is impossible to unravel the strands or distort the diamonds. The illustrations in this pamphlet were selected to demonstrate the peculiar adaptability of "Steelcrete" mesh to the construction of machine tool guards and other protecting devices. The guards are strong, low in cost and may be readily constructed out of standard angles and sections. The "Steelcrete" guards provide for ventilation of the moving parts of a machine, and at the same time permit the moving parts to readily be seen. With the open mesh guard any smoke or unfamiliar sound is readily detected in time to stop the machine and cool the journal before little if any harm has occurred. The guards also permit of the easy oiling of a machine without the necessity of removing the guards. Accompanying the pamphlet is another setting forth the merits of the universal slab computer for calculating reinforced concrete slabs. This computer is made of celluloid and approximates in size 4¾ x 6¼ in. The lettering on the computer is given a finished coat which protects it from rubbing off. This computer can be used in calculating a reinforced concrete slab limited by any unit stress in concrete, any unit stress in steel and any bending moment commonly used in reinforced concrete construction. The range of spans, loads per square foot and thickness of slab cover all cases commonly encountered in practice.

The Fox Universal Wood Trimmers

"Universal" wood trimmers of the bench, floor and column types are brought to the attention of carpenters and builders in the form of a loose-leaf catalogue sent out by the Fox Machine Co., Grand Rapids, Mich. Complete specifications are presented with each machine, accompanying which are two interesting chapters descriptive of "Universal" trimmer knives and suggestions as to their proper care. The machines are made in three sizes of the bench type and two sizes each of the floor and column types. It is said that the "Style A" wood trimmer was the first of its kind introduced to the market, since when its use has grown extensively among carpenters and builders. The gauges of this machine are supported at the top and bottom, so that there is little possibility of their getting in the path of the knives and ruining both devices. The special construction upon the gauge keeps the shearing edge of the knife at the same distance from the knife itself, which insures perfect work at all angles. The latter have a range from 45 to 90 deg., the principal angles being marked on the bed, while the 45 and 90 deg. angles are located by means of a hardened stop pin. The carriage which carries the knife is operated by means of a rolling gear which meshes into the rack on the bed and another rack at the center of the carriage. The lever is removable for transportation. As in all "Universal" trimmers, the power is applied to the center of the carriage and the operating lever moves in the same direction as the knife. The two larger types of this trimmer are equipped with a pair of triangular gauges, and the smaller style can be supplied for an extra charge. It

(*Continued on page* 82.)



From
Better Roads
January, 1914

1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914

24 Years' Experience

That is what ALPHA Portland Cement represents today.

ALPHA was a pioneer American Brand. It had to meet the competition of European cements and prove superiority. It did so.

During these twenty-four years ALPHA chemists have been real bosses. Their word has been law in everything affecting the quality of

ALPHA

The Guaranteed Portland Cement—The High-Water Mark of Quality

A 24 years' record of high quality, of dependability and responsibility, means something to the discriminating buyer. ALPHA Portland Cement, while being made, is inspected hourly by chemists. In composition, thorough burning and fine grinding, it is an exceptional Portland cement.

As a result of this extra care in manufacture, every sack of ALPHA Cement is ***guaranteed*** to more than meet all standard tests.

When hundreds of thousands of barrels of ALPHA are used on big engineering jobs, where cement has to meet the most exacting tests, don't you think you will do well to use "the guaranteed Portland cement" rather than some brand not so well made or so carefully tested?

Six great plants on six trunk line railroads, with a capacity of 25,000 barrels a day and storage for 2,000,000 barrels, insure prompt shipment at all times of thoroughly burned, thoroughly ground and thoroughly seasoned cement.

Send for the ALPHA Book No. 17, giving valuable information about cement and concrete work generally. This illustrated book tells how to do stucco work, how to build concrete barns, silos, ice-houses, and other small concrete buildings, walks, tanks, storage cellars, steps, etc.

ALPHA PORTLAND CEMENT CO.

General Offices: Easton, Pa.

Sales Office: New York, Chicago, Philadelphia, Boston, Pittsburgh, Baltimore, Buffalo, Savannah.

No successful architect can ignore the preservation of his work. Therefore the writing of specifications for painting is important. The addition of

Zinc

to paint greatly enhances the protecting qualities of that paint. This has been made clear in a little booklet, "*One of Your Problems*," which we would like to send to architects.

The New Jersey Zinc Company
Room 503, 55 Wall Street, New York

is stated that all "Universal" trimmers are equipped with high-grade knives, having a perfect temper and the correct concavity. The latter provision has been made because if the knives were left absolutely flat the sharpening process would wear the face away at the cutting edge, thus leaving the knife thicker at the back and causing the wood to crowd away.

A Description of "E-Cod Fabric"

A material that serves as an excellent base for plastering, and is well adapted for exterior stucco work, is the combination termed "E-Cod Fabric," made by the E. D. Coddington Manufacturing Co., 1410 Ashland Block, Chicago, Ill. It has been placed on the market after many years of experimenting, and after the inventor discovered that a perfect bond can be established between cement mortar and roofing felt. "E-Cod Fabric" is a combination of waterproof felt and galvanized steel wires, so devised as to secure the maximum efficiency of the two materials, and produce a fabric as a plastering base, at reasonable cost. The steel reinforcement consists of No. 14 gauge, hard-

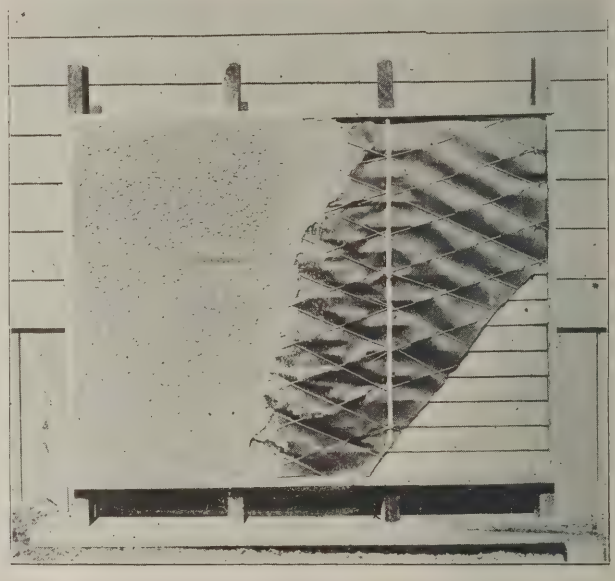


Fig. 9—Showing Application of "E-Cod" Fabric

drawn, galvanized straight steel wires, crossing the felt sheet diagonally in a diamond pattern, one set being woven through the felt, while the second set passes between the first set and the felt. The tarred felt backing of the fabric accomplishes, first, the initial bond with the mortar. The latter of any consistency adheres readily to the fibrous surface and after setting cannot be separated. Secondly, no plaster is wasted as it cannot fall through the foundation. The pressure of the trowel forces the mortar against the felt sheet, the latter being held to the frame by the wires and their attachments. The wires, therefore, are completely embedded, making a reinforced slab of mortar of any desired thickness. No deterioration of metal can take place under such conditions. This material is equally applicable to inside work, the claim being made that it is waterproof, fireproof and rustproof. It can also be used to great advantage in overcoating old frame houses by plastering over sheathing, drop siding, battens or clapboards, with or without furring. The illustration, Fig. 9, shows a sample of cement rough casting on "E-Cod Fabric" attached directly to sheathing without furring. It is said that by using this material from 25 to 30 per cent. can be saved in the cost of plaster and plasterer's labor. Shipment is made in rolls 32-in. wide, containing approximately 18 sq. yds. each. The rolls weigh about 40 lbs. each. The fabric unrolls perfectly flat, and requires no bending back. It is cut and fitted with ordinary tools, and can be rapidly attached to the frame.

(*Continued on page* 84.)

Rent this Level 10 Months Then It's Yours

Builders and Contractors

This is not the old style Architect's Level. It is the newest 1915 model *convertible* level. There is not a single Builder or Contractor who has not almost daily need for this instrument, for laying out buildings, locating foundation piers, leveling up foundations, walls and floors, aligning shafting, walls, piers, etc., for getting angles, locating levels anywhere, ditching, laying streets and walks, running straight lines, and a hundred other uses.

Instruction Book Free

Complete illustrated booklet, telling how a builder or contractor can use the Convertible Level, sent free on request.

WARNING

The Level we offer is the new Aloe Convertible Level, 1915 model. Don't confuse the Convertible Level with the ordinary old style Architect's Level. The only work that can be satisfactorily done with the ordinary Architect's Level is the determining of elevations. But the Convertible Level, besides its use as a level, is a modified **transit** and broadens the use of the level 100%. You can't afford to buy any but the Aloe Convertible Level.

HALF CENTURY REPUTATION

We have been manufacturers of transits and levels since 1863, and our instruments are the standard of the world.

FREE TRIAL

We allow you to convince yourself by a trial of the instrument before you obligate yourself.

THE RENT BUYS IT

No large cash outlay needed. Just pay the rent for a few months and the instrument is your absolute property.

Send Coupon—No Obligation

Send the attached coupon today and we'll send illustrated booklet and complete details of how you can own the Aloe Convertible Level for 10 months' rent.

A. S. Aloe Co., 625 Olive St., St. Louis, Mo.

COUPON

A. S. Aloe Co.,
625 Olive St., St. Louis, Mo.

Please send free instruction book on the use of the Convertible Level, 1915 Model, and complete details of your rental plan. This request in no way obligates me.

Name.....

Occupation.....

Street.....

City..... State.....

B. A., May, '15.

Weigh this Evidence

Here's the greatest improvement of recent years in the way of a double-action door spring—the

"Standard" Checking Spring Hinge

Combines all the advantages of the old style double-action hinge with the all-important Door Check feature—an ingenious device, so constructed that the door swings slowly, stopping at "dead center." No "swing bang" motion; can't fly back unexpectedly, causing a score of different accidents.

The Standard Checking Spring Hinge fills a long-felt want. Children are safe where it is used. Works like a charm; absolutely noiseless; push it open as hard as you like. It comes back only so fast. The only practical hinge of the kind for double-acting doors between dining room and pantry or kitchen in residences, apartments, hospitals, vestibules, churches, or public buildings. Guaranteed absolutely dependable. Made in two sizes. Positively Guaranteed.

Specify this modern hinge in your buildings. Your name and address on a postal card will bring complete information. Write while you think of it.

Or This—Safety

This—Danger

THE STANDARD MFG. CO.

SHELBY, OHIO

The Garage Door Problem

The garage door problem is treated with exceptional detail and accuracy in the latest sixteen-page catalog issued by the Richards-Wilcox Manufacturing Company, Aurora, Ill. This edition has additional merit inasmuch as an effort is made to assist architects in providing for the proper sliding doors in their garage work and shows the various possibilities of handling the sliding door proposition. It is recommended in this respect that the hangers designated for various sizes or weights of doors should be specified by number to insure the satisfaction that is desired. In the first five pages of the catalog will be found concise descriptions for the correct installation of door hangers, each phase of the constructive operations being illustrated with detail and sectional drawings of the work. The information is so compiled that the contractor is sure of an efficient installation and a pleased client if the directions are followed. The "R-W" ball-bearing trolley garage door hangers represent the highest type of hanger construction. The yoke is made of steel and the cones machined and all case hardened. The high duty steel balls are perfectly true, insuring an easy, smooth operation of the hangers under loads. By their vertical adjustment compensation is made for any settling due to the shrinkage of lumber. The lateral adjustment prevents the chafing of the door. The remainder of the catalog illustrates and describes in detail the general line manufactured by the company. Here again are to be found suggestions and specifications which are solutions to garage door difficulties. The contractor undertaking this class of work will find the Richards-Wilcox latest literature a valuable addition to his files, and those interested can secure a copy of the catalogue in question upon application to the company.

Dixon's "Atom" Eraser

We take pleasure in presenting in Fig. 10 of the illustrations a faithful likeness of what is said to be the smallest member in the Dixon family of erasive

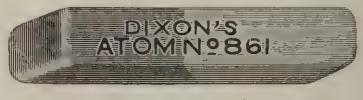


Fig. 10—General View of Dixon's "Atom" Eraser

rubbers. Despite its size and price it is said to be of the same pure and sturdy stock of which its family so proudly boasts. Socially unlike its relatives, the Dixon "Atom" eraser No. 861 serves to rectify the pen and pencil mistakes of *all* who err. "Atom" is both for the girl or boy for only the smallest in dominational value of Uncle Sam's coins with which to purchase caoutchouc in ablution. Any further information regarding this particular eraser will be gladly furnished upon request to the Joseph Dixon Crucible Company, Jersey City, N. J.

"Santilite" Composition Flooring

A composition flooring said to meet the requirements of modern fireproof and sanitary building construction is "Santilite," which is laid in a plastic state over any wood or cement floor and which is claimed to "set" in 8 to 10 hours into a smooth jointless surface with no cracks to collect filth, germs or moisture. Because of these qualities it is claimed to have a wide range of use for hospitals, factories, offices, schools, banks, residences and public buildings. It is manufactured by the Sanitary Composition Floor Corp., 315 West Fayette street, Syracuse, N. Y., and the statement is made that all the minerals and colors used in making "Santilite" are subjected to a thorough chemical analysis which absolutely insures the standardization of the mineral and color for purity. The claim is made that "Santilite" contains no sand or other abrasive materials, but only such as will give a perfect composition floor. The flooring is shipped in the form of dry powder and a liquid. It is laid in plastic state on any old or new wood, cement or hollow tile floor. It is also stated that in laying it

(*Continued on page* 86.)

on cement it bonds perfectly with the old cement, but with wood, use is generally made of a 27-gauge expanded metal lath to stiffen the old floor and to prevent the floor from cracking because of foundation settlements. The powder and liquid are mixed in a dry, clean mortar box to the consistency of second coat wall plaster. It is laid ⅜ of an inch thick, by means of ⅜-in. strips or "grounds" laid 2½ ft. apart, which are removed as soon as the composition is in place. When 100 to 200 sq. ft. of floor space is covered with "Santilite" it is troweled as smooth as possible, workmen getting about the floor with kneeling boards or planks. It will set for final troweling in from 5 to 7 hours, at which time all the trowel marks are worked out smooth and the entire surface well sealed. It will harden in 24 hours, but should be covered with building paper or sawdust for 72 hours until thoroughly hardened, then it should be brushed clean and two coats of 1 part kerosene and 2 parts boiled linseed oil applied, and after the second coat is dry polish with a dry cloth. The colors are tile red, French gray, dark gray, buff and green.

The Acme Concrete Tile Machine

A new candidate for popular favor in the way of a concrete tile machine is that which we illustrate in Fig. 11 of the engravings and which is made by the Acme Tile Machine Company, La Grange, Ind. The frame is cast in one piece, is simple and compact, yet strong and durable, there being no small or weak parts to break or get out of order. The bearings on the drive shaft are only 9½ in. apart and the feeding table is only 34 in. from the floor. The packer shaft is 1¾ in. in diameter, and the gear that drives it has a sleeve 5 in. long. The packer heads and packers are made of chilled iron. The shaft is raised or lowered by means of a heavy thread cut in it and is operated by split nuts which are engaged with the thread and securely locked in raising and lowering the packer. The change is made by shifting the lever on the top of the gear box. The company points out that the machine is not automatic, but at all times is under perfect control of the operator. The packer is continually in motion and may be allowed to make as many revolutions as desired on the bottom of the tile before starting on the upward motion, thus insuring a well packed tile. The table or mould carrier has provision for two casings. When the tile is made an empty casing is placed in position by bearing down on the lever and swinging the table. It is said that six tile per minute can easily be produced, which means 3600 tile in ten hours, but this number it is claimed can be increased by running the machine at higher speed. The Acme tile machine makes all sizes of tile from 4 in. up to 12 in. in diameter and either 12 or 18 in. in length. A circular which the company has issued illustrates and describes these machines in detail and gives the cost of concrete tile of various sizes and thickness of wall. The point is made that all machines are shipped on 15 days' trial, thus giving the contractor opportunity to demonstrate their merit.

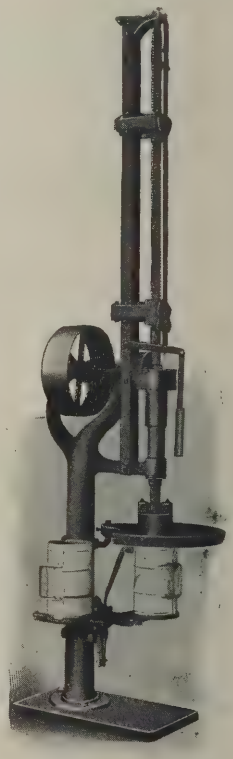


Fig. 11 — The Acme Concrete Tile Machine

Characteristics of "Flexotile" Stucco

Convincing arguments as to the qualities of "Flexotile" stucco, made by the Flexotile Floor Co., Rockford, Ill., are contained in two attractive books which are being distributed among building contractors throughout the country. The results of exhaustive tests are

(*Continued on page 88.*)

presented with full details over the signatures of metallurgists, analytical chemists, architects and builders. It is claimed that "Flexotile" exterior plaster is fireproof, totally impervious to water, and can be applied as well in the depth of winter as in summer. This product is a chemical rubber and contains no Portland cement. It is prepared by mixing an aggregate of granite, gravel or crushed stone all through the material, making it in reality a sort of concrete. While the mixture is plastic, it has sufficient strength and adhesiveness to carry in one coat its own weight and that of the aggregate without sagging during the process of crystallization. It is said that it will not chip or break near the ground where it is apt to be struck with coal chutes, etc. It is guaranteed to maintain a perfectly dry interior if applied according to instructions. It is manufactured in forty-two mineral colors which are guaranteed not to fade. "Flexotile" is a composition that has been used extensively in the Middle West on floors and stairs. In the former case it adds from 3 to 4½ lbs. per square foot to the weight of the floor. It is said that "Flexotile" has no equal in the kitchen as a sanitary cove base or as wainscoting. Handsome and artistic fireplaces, mantels, newels, etc., can be made of this product according to instructions which the company will furnish to any contractor. Enclosed in the catalogues is a color plate with twenty different colorings which may be produced in "Flexotile" floors. A specially prepared Carborundum floor has also been manufactured for factories where heavy trucking is done.

New Type of Reinforced Metal Lath

On a great many classes of work a special form of metal lath combining a furring or reinforcing with the mesh is found to be of advantage. Such a material is particularly adapted for use in solid plaster partitions

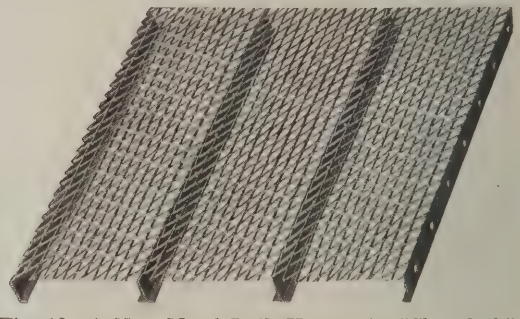


Fig. 12—A New Metal Lath Known As "Chanelath"

and for lathing suspended ceilings. A combined lath and reinforcing is also of material advantage as a "form" and reinforcing in the construction of concrete roofs and floors. The material shown in Fig. 12 has just been put on the market to supply the demand for the class of metal lath mentioned. The reinforcing or furring members of "Chanelath," as it is called, consist of T-shaped ribs spaced 4 in. apart and connected by a small mesh lath. The ribs are solid and the mesh extends in an unbroken surface across the entire sheet. This insures a perfect key when the "Chanelath" is to be covered with plaster. The T-shaped ribs are very efficient when the "Chanelath" is used as a reinforcing for concrete because of their shape. Everyone familiar with reinforced concrete design knows that a twisted or deformed reinforcing member is much more efficient than one that is perfectly smooth. This new product is being marketed by the North-Western Expanded Metal Company, 904 Old Colony Building, Chicago, Ill., and is furnished in sheets of any width that is a multiple of 4 in. up to and including 4 ft. The lengths are 6, 8, 9, 10 and 12 ft.

In preparing the concrete for the new subways which are being built in New York City the mixing on some of the sections is being done with Koehring mixers, made by the Koehring Machine Company, Milwaukee, Wis.

(*Continued on page* 90.)

How Portable Electric Tools Save Labor

The use of portable electric tools is rapidly increasing. At first these were tools only employed for drilling and grinding metal, but lately building contractors and wood-working plants have found them almost indispensable for different kinds of work. William Miller & Son, a contracting firm in Cincinnati, Ohio, recently handled a rush job that could not have been completed on time without the use of a portable electric screw driver. The contract in question called for the finishing of 54 12-ft. single benches for a ball park. A total of 50 gross No. 11 1½-in. screws was used on this job, and the contractor's record shows that the total labor included 25½ hr. carpenter's time and 29 hr. apprentice's time. The saving of time and labor effected is estimated at over 75 per cent. as compared with hand labor. In Fig. 13 of the illustrations is shown the latest type of an electric screwdriver made by the United States Electrical Tool Company, Cincinnati, Ohio. It is claimed by the maker that this tool has proved a great time and labor saver for driving wood screws or lag screws or for putting on nuts. Its construction is simple as a friction clutch with a spring release engages the driving bitt, so that when the pressure is released the motor continues running and the driving bitt is stationary. The tool is equipped with a universal motor to operate on both direct and alternating current.

Fig. 13—General View of Electric Screw Driver

TRADE NOTES

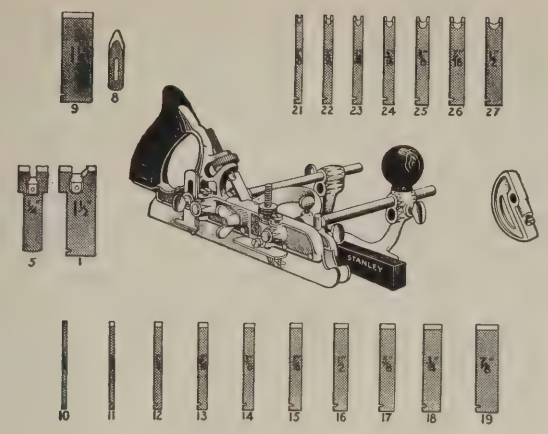
Universal Portland Cement Company, Chicago, Ill., makes announcement of the resignation of J. P. Beck as publicity manager and the appointment of Robert F. Hall, who for several years has been connected with the sales department of the company, as his successor.

Batavia Clamp Company, Batavia, N. Y., is distributing a neat little pamphlet of a size convenient to carry in the pocket and setting forth the merits of Colt's clamps which are made in a variety of styles and sizes thus adapting them to many requirements. Special emphasis is laid upon the clamps which are adapted for use in connection with concrete work.

Howarth Reversible sash centers is the subject matter of a 36-page catalogue profusely illustrated which is being sent out by the manufacturers, the Michigan Engine Valve Company, 115 and 117 West Columbia street, Detroit, Mich. The construction and operation of these goods are set forth in a way to render the matter especially interesting to architects, builders and house owners generally, and a copy of the catalog can be secured on application to the address given.

O. S. Larkby, secretary, Edwards Manufacturing Co., Cincinnati, Ohio, has been elected secretary of

(*Continued on page* 92)



Stanley "Forty-Five"

Seven Tools in One

1.—Beading and Centre Beading Plane. 2.—Rabbet and Filletster Plane. 3.—Dado Plane. 4.—Plow Plane. 5.—Matching Plane. 6.—Sash Plane. 7.—Superior Slitting Plane.

With each Plane are furnished twenty-one cutters, all of which are shown in the cut.

The Plane, together with the 21 cutters, is packed in a neat, substantial box.

Send for special 12-page circular printed in three colors, describing in detail this most useful tool.

ADDRESS

STANLEY RULE & LEVEL CO.
NEW BRITAIN. CONN. U.S.A.

PULL-EASY

TRADE MARK

Nail Collars Save Dollars

Just as this contractor says.

They offer a simple, easy and sure method of saving money, time and lumber.

Temporary work, such as scaffolding, can be taken down quickly without splitting the lumber.

The pictures show just how simple the operation is. If your dealer does not handle

THE COLLAR

ON THE NAIL

IN PLACE

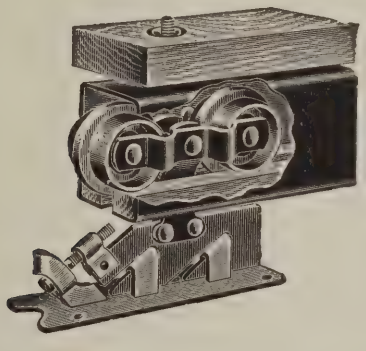
IN THE CLAW

PULL-EASY Nail Collars

write to us.

Write to us anyway for free sample

Wagner-Behm Co.
Room 1202
20 E. Jackson Blvd.
Chicago, Ill.



Slides

the doors in thousands of homes.

No. 122 R-W Royal House Door Hanger

A good, honest, substantial hanger, noiseless, ball-bearing, direct center-hung with adjustment in both hanger and track.

At your dealers.

Richards-Wilcox
MANUFACTURING CO.
AURORA, ILL. U.S.A.

"A Hanger for Any Door that Slides"

The finest product of the greatest plant—

DISSTON "D-115"

The hand-saw which in material, temper, toughness, adjustment and finish is as near perfection as the greatest saw-works in the world can produce after three-quarters of a century's specialized experience.

If you as a mechanic take pride in your tools, add the "D-115" to your kit.

Write for Descriptive Circular "D-115"

Henry Disston & Sons, Inc.
Philadelphia, U. S. A.

the Hyde Park Country Club, a prominent social organization of that city.

J. W. Coulson & Co., Columbus, Ohio, are distributing a very attractive catalogue setting forth the merits of their popular ventilating system for store fronts. The catalogue is profusely illustrated with half-tone engravings of buildings in connection with which this system has been installed. Accompanying the catalogue are 1914 full-size details of the company's patent storefront construction.

At a meeting of the Yale & Towne Mfg. Company held at Stamford, Conn., in March, Henry R. Towne, having declined reelection as president after 46 years of service in that position, was elected Chairman of the Board and Walter C. Allen, previously a vice-president and general manager, who has been with the company 23 years, was elected president of the company. The executive organization of the company is now constituted as follows: Chairman of the Board, H. R. Towne; president and general manager, Walter C. Allen; vice-president, Schuyler Merritt who has been with the company 38 years; secretary, J. H. Towne, who has been with the company 24 years; treasurer, John B. Milliken, who has served the company for 5 years. The superintendent of the works is Joseph A. Horne, who has been with the company 24 years.

A catalogue which should find a ready place in the files of the progressive building contractor is that issued by the Willis Manufacturing Co., Galesburg, Ill., descriptive of fireproof windows, standard tin clad fire doors, shutters and fixtures, skylights and ventilators. In the introduction the company calls attention to the fact that its fireproof products illustrated and described in the first thirty pages have sufficient recommendation for their use in that they are approved by the National Board of Fire Underwriters. Windows are also equipped with the latest safety devices sanctioned by this body. The catalogue presents complete details of fourteen different styles of windows, and the same number of pages are devoted to fire doors and fixtures. In all there are fifty pages of valuable data, skylights and ventilators being treated in the closing chapters of the attractive work.

The Grinnell Automatic Sprinkler Bulletin for April contains an unusual amount of interesting matter dealing both directly and indirectly with the advantages resulting from the use of automatic sprinklers as a safeguard against fire in buildings. There are numerous half-tone illustrations representing interior and exterior views, and not the least important is the record of 191 fires under Grinnell sprinklers reported between December, 1914 and March, 1915. At the close of the Bulletin is a list of proprietors of the Grinnel apparatus for the Eastern Hemisphere and also a directory of the company issuing the Bulletin—the General Fire Extinguisher Company, 275 West Exchange street, Providence, R. I.

George S. Edwards, vice-president, Edwards Manufacturing Company, Cincinnati, Ohio, has been elected as a member of the Board of Directors of the Hyde Park Country Club, and is now serving his second term in that capacity.

Kolesch & Co., 138 Fulton street, New York, is distributing a special price list of the Kern drawing instruments which embrace a varied assortment, well adapted to meet the requirements of the draftsman. In revising its catalogue the company decided to eliminate some of the numbers of drawing instruments and these are being offered at special prices while the stock lasts.

White Pine Bureau, 1536 Merchants' Bank building, St. Paul, Minn., presents an announcement elsewhere in this issue which is likely to interest every carpenter-contractor, builder and woodworker. It relates to the publication to begin next month of a Bi-Monthly white pine magazine, which is intended for free distribution among contractors and architects and others.

Eugene Dietzgen Company, 166 West Monroe street, Chicago, Ill., is directing attention to its simplified reading tapes which will be found of special interest owing to the fact that the number of feet and inches can be read at a glance without looking either forward or backward. The steel tapes combine conven-

(*Continued on page 94*)

ience and accuracy and are so constructed as to make them especially adapted for hard wear. The company carries an extensive line of drawing materials, measuring tapes and surveying instruments and any reader can obtain a copy of "Catalogue B," in which the goods are described, by addressing the company.

Building contractors and others employing a number of workmen and who have to make up payrolls involving wages by the hour will find unusually convenient a little book just brought out by Oliver W. Haring, Clinton, Iowa, and entitled "Haring's Paymaster." It consists of a scale of wages by hours and half hours from 1 to 100 arranged in convenient form for reference. The price is $1.00 postpaid.

A well-illustrated catalogue with approximately one hundred pages descriptive of a diversified line of builders' hardware has just been issued by the Allith-Prouty Co., Danville, Ill. The products shown consist of door hangers, floor hinges, store ladders, fire door hardware, merchandise carriers and hardware specialties. The last page of the publication has a classified index, so that the reader is not compelled to search the entire volume before discovering information on a certain commodity. The company has devoted considerable care to the preparation of this catalogue, every product being treated in much detail and illustrations are profuse. The first sixty pages contain valuable information on door hangers and fire door hardware, and with each department goes full directions for correct installation. Readers of *The Building Age* will be supplied with a copy of Catalogue No. 45 by writing the company.

The Standard Screen Co., of 1848 West Fourteenth street, Chicago, Ill., has issued a catalogue of door and window screens which will be of interest to readers of *The Building Age*. The company states that its products are giving universal satisfaction due mainly to superior construction and the care which is exercised in selecting material which enter into their manufacture. The frames of these screens are made from thoroughly seasoned choice Northern white pine. The corners are mortised, joined with waterproof glue and fastened with steel dowel pins. They are made in two thicknesses—⅞ in. and 1⅛ in.—to suit all types of dwellings. In connection with its sliding screens the company calls attention to the fact that they are made with a special corner joint, tenoned and grooved. The rails lap over the stiles, which prevents the splitting of grooved edges so common with most screens. Frames are shipped painted one coat of black unless otherwise ordered. The screened doors are made in eight styles of Northern white pine, and they can also be had in oak or birch. The catalogue contains full specifications and prices of all products.

The Berger Mfg. Company, Canton, Ohio, has reelected as directors Edward A. Langenbach, Charles Kreig, H. R. Jones, Albert Hochwalt and R. H. Yancey.

Automatic Sash Holder Mfg. Company, 50 Church street, New York City, is distributing illustrated leaflets calling attention to the automatic sash holder which it has placed upon the market. The holder is provided with a roller which freely revolves with the uplifting of the sash, and at the release the ratchet falls into the stop, thereby holding the roller rigid and with the spring pressure against the frame secures the sash at any point desired. The springs are of specially tempered piano wire and all other metal parts are selected, tested and approved. An illustration of the sash holder appeared in these columns when it was first brought to the attention of the trade.

We have received a copy of the second volume of "Industrial Plants" by Chas. T. Main, of 201 Devonshire street, Boston, Mass., which is a volume of 62 pages profusely illustrated with half tone engravings of some of the work designed by him. The pictures include both interior and exterior views of textile mills and industrial plants of various kinds, some of which are operated by water power and some by steam power.

Chicago Builders' Specialties Company expects to move into more commodious quarters in the New Lumber Exchange Building the 1st of May. In the new location the company will enjoy increased facilities and

(*Continued on page 96*)

it extends a cordial invitation to all its friends in the trade to call when in the neighborhood.

Robert A. Hall, who succeeded J. P. Beck as Publicity Manager of the Universal Portland Cement Company of Chicago, Ill., is well known throughout the cement industry because of his activities in this association. For the past six years he was connected with the sales department of the company, and his experience and education eminently fitted him for the work he has now undertaken.

Transfer Stained Shingle Company, 150 Main street, North Tonawanda, N. Y., is sending out free sample strips cut direct from shingles which show the color and wood just as the shingles would appear on a house, the idea being to enable the architect, the builder or the house owner to select his house shingles from these samples. "Weatherbest" stained shingles are said to be made only from the finest grades of red and white cedar shingle stock and are treated with "Weatherbest" stain, which is a scientific combination of wood-preserving elements with mineral and chemical colors.

Roberds Mfg. Company, Marion, Ind., has prepared for free distribution some very useful information for contractors and builders, which is designed to be helpful in connection with all kinds of building construction. In addition to this data the company will mail free to anyone asking for it a beautiful panel, showing its wall boards in actual colored designs.

Otis Elevator Company, with offices in all the principal cities of the world, has issued a very attractive catalogue of 56 pages relating to Otis gravity spiral conveyors for lowering packaged merchandise, and boxed, cased, bagged and barreled goods. The conveyors are illustrated and described in great detail and there is also a partial classified list of stores and buildings in which these conveyors have been installed. The last page gives a directory of Otis offices in the United States and Canada.

The Armor Clad Mfg. Company, Canton, Ohio, has just sent out a little pamphlet of a size convenient to carry in the pocket, relating to sanitary, white enamel steel cabinets for the office and the home. Illustrations of the different styles manufactured are presented, together with brief particulars covering dimensions, prices and style of finish.

SITUATION WANTED—Architectural Draftsman, 27 years of age, married, Technical graduate, good all around man, very good references, location immaterial. Address H. S., 835 Lafayette St., Jamestown, N. Y.

THE BUILDING AGE

TABLE OF CONTENTS FOR JUNE, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, JUNE, 1915

Summer Cottage in the Maine Woods

The Cozy Bungalow of a New York Man Designed by a California Architect—Its Picturesque Setting

By Charles Alma Byers

THE Western bungalow has had wide recognition; has become popular throughout most of the United States, and has even invaded several foreign countries. Certainly no other style of home has ever had greater vogue, and there is every reason for believing that it will continue to grow in favor. The pictures which are here presented illustrate a very pretty summer bungalow home recently completed at Naples, Maine, the plans for which were prepared by Architect E. W. Stillwell, of Los Angeles, California. It is a far cry from Maine to California, and that a builder should order his plans from an architect located at the opposite extreme of the country is strong evidence of the appreciation of the Western type of bungalow. It was built entirely from plans and specifications supplied by the Western designer, and the construction work was superintended by a carriage builder instead of a regular building contractor.

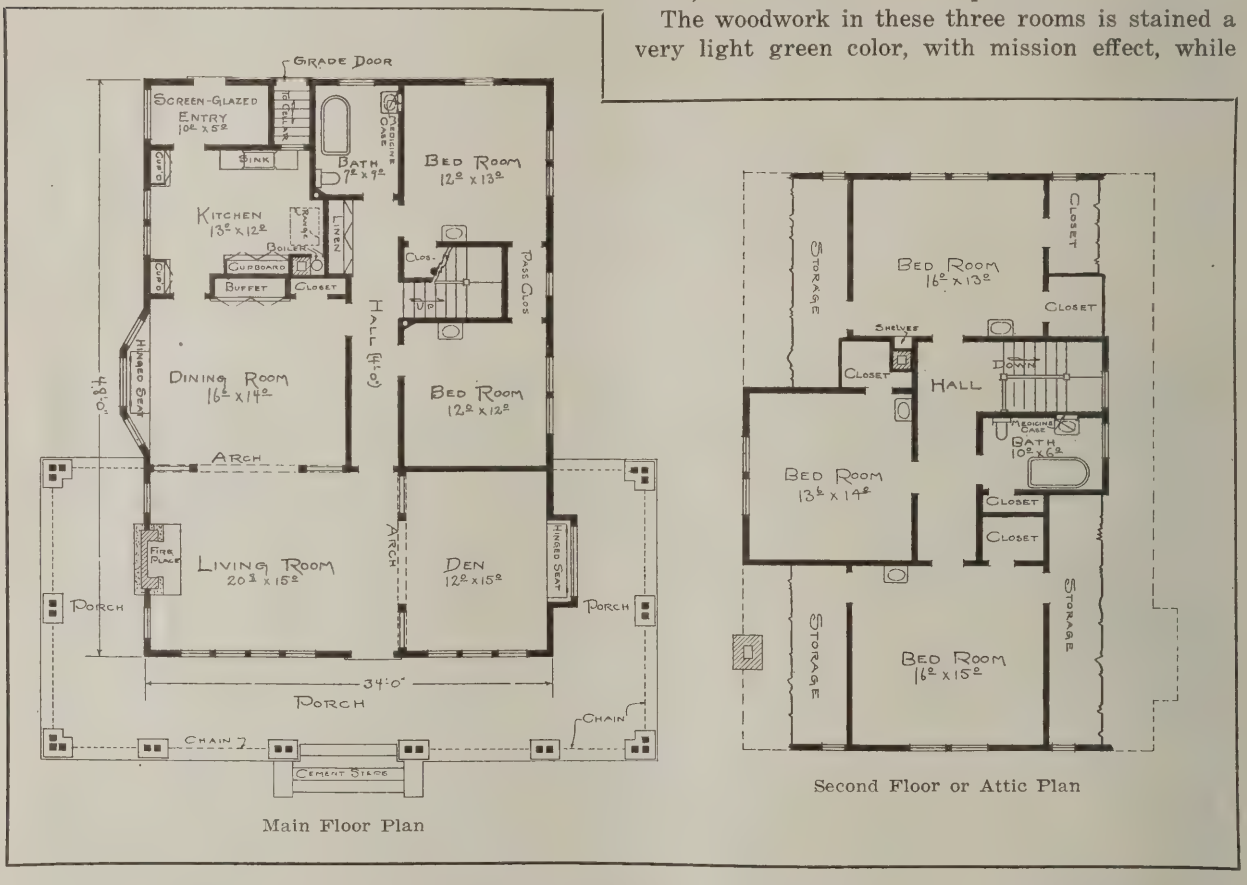
View in Living Room of Summer Cottage Looking Toward the Open Fireplace—Architect E. W. Stillwell, Los Angeles, Cal.

The bungalow is the four-months summer home of J. K. Robinson, of New York City. It is located on the shore of a small lake in the Maine woods, and its setting is therefore ideal. It is entirely surrounded by the trees of the natural forest, and only a short distance away—reached by a board walk—is a neat little boat house, designed to correspond with the bungalow in architecture, and a picture of which is included in the illustrations.

The house is what is usually described as a story and a half in hight, and while the upstair rooms have sufficiently high ceilings the building has the appearance of being comparatively low and flat—characteristic of the genuine bungalow. The several well-planned gables have much to do with the size and hight of these second-floor rooms, and at the same time add to the attractiveness of the exterior. One of the most admirable features of the effective for a house located as this one. It consists of a soft green color for the siding shingles and gable boards and white for the trim. The roof is painted a lighter shade of green than that used for the walls, and the natural color of the stone work is a rather dark gray.

The house contains nine rooms, besides the two bath-rooms—six on the lower floor and three on the second floor. The living-room, dining-room and den are all connected by broad open arches, giving an appearance of unusual spaciousness to this part of the house. In the living-room is a large fireplace, constructed of field stones, and in the dining-room is a small, well-designed built-in buffet. This room also contains a window-seat, with a hinged top, and a small closet. The den likewise possesses a window-seat, with a hinged top. A chain-suspended seat is a feature of the furnishing of the living-room, at one side of the fireplace.

The woodwork in these three rooms is stained a very light green color, with mission effect, while



A Summer Cottage in the Maine Woods—Floor Plans Scale 1/16 *In. to the Foot*

house, especially since it is designed for summer use, is the broad veranda which extends across the entire front and back a considerable distance on each side. Like the foundation, the pedestals of the porch are of field stones, with copings of cement, and the solid columns are 6 x 6 in. size. The flooring is of cement, and between the pedestals galvanized iron chains are suspended to form the only railing.

The outside covering of the house is pine shingles, and the gables are of 1 x 12-in. boards, battened. The roof is also of shingles, and has an overhang of 3 ft. There are numerous windows, all large and of plain glass, which give plenty of light to the rooms and also enhance the beauty of the outside appearance.

The color scheme of the exterior is particularly in all other rooms the pine is only waxed, leaving it possessed of its natural color. The ceiling joists are 4 x 6 in., covered on top with 4 in. ceiling and left exposed. The arch columns used between the living-room, dining-room and den are 7½ in. square, boxed.

A hall leading from the living-room connects directly with all of the first-floor rooms, except the den, including the bath-room and the stairway leading to the second floor. This hall also contains a closet for linen. The kitchen possesses all of the conveniences of a well-regulated city home, including three cupboards, sink, draught cooler, hot-water boiler, and so forth. Back of it is the customary screen-porch.

The house contains a total of five sleeping-rooms—two on the first floor and three on the second

Summer Cottage in the Maine Woods of Mr. J. K. Robinson of New York City—View Looking Toward the Left-Hand Front Corner of the Building

floor. Each of them contains an individual wash bowl and one or more closets. Besides the closets on the second floor are three large storage rooms. A hall provides direct connections with all of the second-floor rooms, including the bathroom.

Under the rear of the house there is a cellar, 10 x 31 ft. in dimensions, with cement flooring and concrete walls.

Although it is planned only for summer use, the bungalow is strongly and warmly constructed throughout. It is set on 8 x 8 in. sills, has 6 x 6 in. corner posts, and girders of the same size. The first-floor joists are 2 x 8 in. and the second-floor joists, as already mentioned, are 4 x 6 in. The rafters are 2 x 6 in. except the end ones, which are 2 x 8 in.

If equipped with furnace heat, which could have been installed for an

THE NEAT LITTLE BOAT HOUSE AT THE LAKE DESIGNED TO CORRESPOND WITH THE BUNGALOW IN ITS ARCHITECTURE

Another View of the Summer Cottage, Clearly Showing the Massive Stone Foundations

additional cost of about $125, the house would be equally suitable for winter use. The cool evenings of this locality often necessitate some heat, but the fireplace always proves sufficient.

Why Contractors Should Carefully Read Specifications

Every now and then we hear a contractor raising Cain because he was caught by a "tricky specification." Of course, he blames the architect. He himself is just as much at fault. He should read the specifications—once, twice and three times, and then have somebody else read them, says a writer in a recent issue of the *Architect and Engineer*.

The trouble is he doesn't take the time to study them. He is anxious to submit his bid, and after the bid has gone in and he is awarded the contract at a figure much lower than the bids of his competitors, he wonders why. He goes back to the specifications and reads them more carefully, to discover a clause here and another clause there that means dollars saved the owner and added expense for himself. Then the light breaks and he curses the owner, the architect and everybody else that had anything to do with the plans.

The other day we heard a sub-contractor ripping up a well-known architect for his "tricky contract form," as he called it. It seems there was a clause in the contract that he was to receive his pay thirty-five days after completion of the building. He read the contract "thirty-five days after completion of his work," which was the ornamental iron. He waited thirty-five days after finishing the job and then went to the architect for his money.

"Let's see your contract," demanded the architect.

The iron man handed it over.

"This says you shall be paid thirty-five days after the building has been finished and accepted," said the architect. "Come back again in a couple of months, and if the building is completed you will get your money."

Meanwhile the ornamental iron man has about $1,500 tied up—money he needs very much to meet his pay-roll.

Workmen's Houses in India

One of the most prominent features connected with the present development of India is the zealous attention paid in some of the larger cities to providing more sanitary housing accommodations for workmen. The need of this may perhaps be more readily understood by the statement that out of the total population of Bombay 76 per cent live in one room tenements, and many of the rooms are occupied by more than one family.

The tenement buildings in some instances are said to have their rooms constructed like the steerage quarters of a ship; that is, with bunks one over another. Bedrooms and kitchens are sometimes combined. Between the buildings are narrow passageways into which all manner of refuse is thrown by the tenants and which are used for drainage purposes. That these dwellings are unfit for human habitation is well recognized by the municipal authorities of Bombay, and in order to provide better accommodations sanitary "chawls" or tenements have been built for nearly 20,000 persons. A "chawl" in India means a building so constructed as to be suitable for letting in separate tenements, each consisting of a single room or of two rooms, but not of more than two rooms.

The new "chawls" erected are of a style which it is hoped will eventually provide accommodations for all of Bombay's working classes. Reinforced concrete and iron fittings are used in their construction. The roofs of these "chawls" have walls about them and are easily accessible for those who wish recreation in fresh air and sunlight and also on which the children may play. There is no woodwork visible, for it is stated that if wooden material were used at all inside the building it might be chopped up for fuel.

The water supply is obtained from taps, each of which is provided with a device which permits of only sufficient water to flow out at one time to fill a good sized pail or native vessel. Originally the water was drawn by pressing down a lever but it was found the residents would tie weights to the lever so that the water kept continually flowing and resulting in enormous waste.

The new buildings which are provided follow the rule that throughout the length of one side of every living room there shall be external air space open to the sky extending to a distance, measured horizontally from the room wall, of at least half the hight of the top of the opposite house above the floor of the room. This is called the "63½ degree rule" because the angle at which the light from the minimum air space so prescribed shall strike the floor is an angle of approximately 63½, which has a tangent of 2 to 1. Thus, if an alley between two houses is only 10 ft. broad the hight of each house above the plinth must be limited to 20 ft. if the lowest rooms are to satisfy the 63½ rule. If two houses of the maximum hight ordinarily allowed in Bombay, that is, 70 ft., are built side by side and have side rooms depending upon the space between the houses for their light and ventilation, then to satisfy the 63½ rule that space must be 35 ft. broad. This rule is also now enforced under municipal by-laws all over Calcutta.

A Church Built of Fossil Stone

In the state of New York there is a unique stone quarry, the product of which is composed of fossil vegetable fibers, petrified cedar leaves, branches, twigs, broken bark and stumps all consolidated into one homogeneous whole. The theory is that as those parts of cedar trees fell one layer upon another in the depths, once the bed of a prehistoric lake, they were saturated with the dampness of the swamp and with the lime held in solution. The result was in the course of ages a limestone of great hardness.

There is a church at Mumford built of this stone, and at first glance one would infer that it was constructed of rough sandstone smeared with an uneven coating of gritty, coarse plaster, but a closer view would show that instead of plaster there were traceries of delicate leaves, bits of broken branches, fragments of mossy bark, splinters of wood, etc. Every block of stone in the four walls is a closely cemented mass of dainty fossils—an exhibition of prehistoric vegetation standing forth in bold relief as imperishable stone.

The Dining Room as Viewed from the Living Room and Looking Toward the Bay Window and Built-in Buffet. The Door to the Hall Is at the Extreme Right, and Not Shown in the Picture

Another View in the Living Room of the Summer Cottage in the Maine Woods, Showing the Rustic Open Fireplace of Field Stone, with Chimney Breast Above. At the Right Is the Dining Room

Elementary Perspective Drawing—III

The System Known as the "Plan in Perspective" or the "Measuring Point" System—The Principles Involved

By George W. Kittredge*

ANOTHER system, somewhat more complicated, perhaps, than the one just described, sometimes called the "plan in perspective," or the "measuring point" system, is much easier of manipulation, since it does away with the "viewing" operations of the system explained above. Its general principles will be made clear by reference to Fig. 5 in which the same subject is employed as before, so that comparisons may be readily made. According to this systm the method of finding the vanishing points is essentially the same as already shown in Fig. 4. The plan must be so placed with reference to the picture plane as to give the desired view, the point of sight chosen and the points P^l and P^r found; also the horizontal line and the vanishing points V^l and V^r found, all as before, after which we have no further use for the plan in its position above the perspective, and even this can usually be dispensed with, as will be explained later.

How the Work Is Accomplished

A general idea of how the work is accomplished in this system may be obtained by supposing that the two sides of the subject to be shown in the perspective view, or the front and side in the present case, are hinged together at the corner shown by the angle A of the plan, Fig. 4, or by ST of the elevations; that they are first opened out into one plane and stood up on the line of the picture plane in plan, and that afterwards each side is swung back from A as center, to its position, shown by AC and AK of the plan. In other words, all of the horizontal distances are first set off each way from G on a line in the perspective view corresponding with the lower edge of the picture plane, called the ground line; that is, the measurements of the left side are set off to the left and those of the front to the right of G, and are afterwards carried, or swung back, by a method which constitutes the feature of this system, to the lines in the view corresponding with AC and AK in the plan—that is, to the lines drawn from G toward V^l and V^r.

An Explanation of the Method

In explanation of this method let us first set off on the picture plane from A toward P^l of Fig. 5 all of the spaces of the side elevation, as shown by AC^1, and connect C^1 with C of the plan. If, now, straight lines be drawn from the several points in AC^1, parallel to C^1C, to cut the line AC, the several spaces in AC^1 will be thus accurately transferred to the line AC, because AC^1 is equal to AC. The method above referred to consists in performing this operation in the perspective view, as it has just now been done in the plan. We have seen, in Fig. 4, how the vanishing point of the lines in an oblique surface, as CD, has been obtained, as shown at p^1 of that figure. Therefore the vanishing point of the parallel lines just drawn between AC^1 and AC, of Fig. 5, can be found by first drawing a line from S parallel to C^1C, to cut the picture plane as shown at p, Fig. 5, and then dropping this point into the horizon line, as shown at M^r. It will now be seen that the spaces previously set off from A to C^1 could have been set off instead upon the ground line from G to the left, extending to C^2, and carried thence toward M^r, to cut GC, the base line of the building, thereby giving these spaces in perspective, with exactly the same result as was obtained by viewing the points as in Fig. 4.

A Measuring Point

The point M^r is termed, for distinction, a measuring point, because by its use the measurements which are taken direct from the elevations are first set off on the ground line, and then transferred or swung back to the receding lines of the picture as explained, where each space is decreased in due proportion to its distance from the point of sight by the convergence of the lines drawn toward M^r. Being also a vanishing point, the position of M^r on the horizon line has been determined by the methods applicable to any vanishing point, as explained above, but there is another and an easier method of locating it, the reason for which will be made clear by noting the following conditions: First, C^1A has been made equal to CA, therefore the triangle C^1AC is geometrically termed "isosceles." Second, since all the sides of the triangle pP^lS have been drawn parallel, respectively, to the sides of the smaller triangle, therefore the larger triangle is also isosceles, and P^lp is consequently equal to P^lS. Therefore the point M^r can be located by describing an arc from P^l as center, with a radius equal to P^lS to intersect the picture plane at p, whence it is dropped into the horizon line as shown. In the same manner, with P^r as center and P^rS as a radius, the point p^1 is located and dropped into the horizon line at M^l, and is the measuring point for use in transferring measurements of the front of the building to the proper receding line of the picture, all as shown.

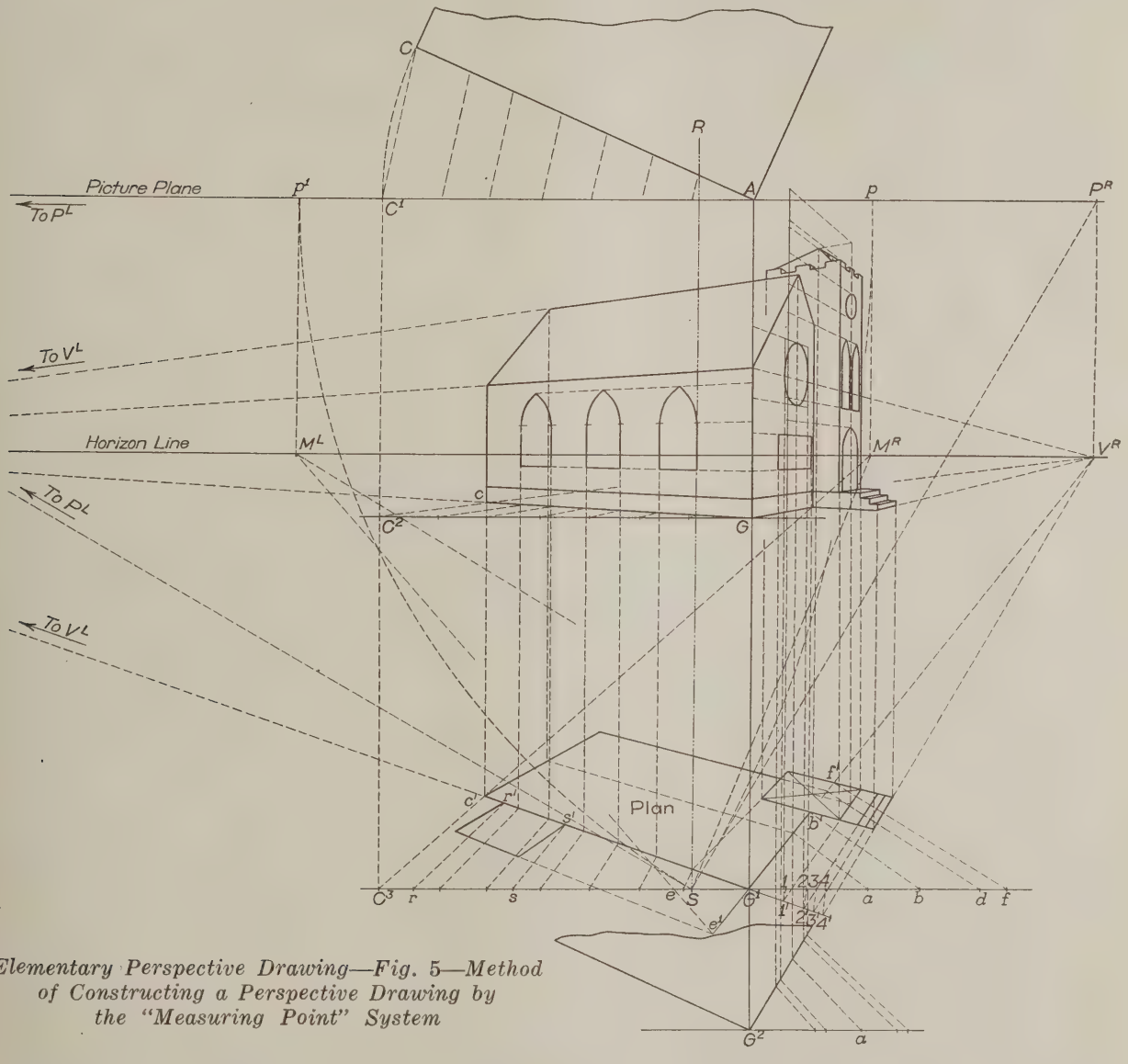
It will be observed that in consequence of the extreme obliquity of the lines, in cases where the horizon line is very low, as in the present instance, there is danger of error in making these intersections.

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

To obviate this difficulty the ground line may be assumed at a lower level, as, for instance, at G^1, from which lines may be drawn to the vanishing points, just as though the foundations of the building were being begun many feet below the grade level. The several points representing the spaces shown upon the side elevation of the building may now be set off on the ground line, drawn through G^1, as shown by G^1C^3, instead of upon GC^2, as before explained, whence the vanishing lines are drawn toward M^r, as before, giving the intersections on G^1c', with much less liability to error than if obtained upon Gc above. From the points thus obtained on G^1c', lines can now be carried upward into the view to locate the sides of the windows, showing as the lines pass through the points on Gc that the result is the same as though the lines were obtained from points on Gc.

Measurements representing distances across the front of the building, as taken from the front elevation, can now be set off on the ground line, from G^1 to the right, as shown by a, b, d, and f, and transferred or carried back to the vanishing line G^1V^r by lines drawn toward the left measuring point, M^l, as shown, whence they are projected upward into the perspective view.

These operations remain very simple so long as the subject represented has no parts which project forward of the planes which intersect in the picture plane. We have seen how the measurements taken from the side elevation—that is, those from T toward the left—were set off on the ground line from G^1 toward the left. Referring now to the side elevation (Fig. 4), it will be noticed that a portion of the tower and the steps extend to the right of T, the point corresponding with G of the perspective, Fig. 5. These points must obviously be set off on the ground line to the right of G^1, as shown by 1, 2, 3, and 4. The vanishing line G^1c' must now be extended to the right and below the ground line, as shown, and the points just set off on the ground line brought forward, radiating from M^r to intersect it as shown by 1′, 2′, 3′, and 4′. Since, now, these intersections do not represent points of detail in the plane of the side of the building extended, but in two other planes situated further back from the picture plane—viz., the side walls of the tower and steps—lines must be carried back from 1′, 2′, 3′, and 4′ toward V^r to meet the lines of those planes, which were located from points b and f on the ground line, as previously explained, obtaining the intersections at b' and f'. Through these points lines are now drawn from the point V^l to meet the line from 1′ drawn toward V^r, as well as those drawn from 2′, 3′, and 4′. By the carrying out of this system it will be seen that a complete plan of



Elementary Perspective Drawing—Fig. 5—Method of Constructing a Perspective Drawing by the "Measuring Point" System

the building may be constructed in perspective upon a plane assumed at any convenient level below the picture which will insure the greatest degree of accuracy in obtaining the intersections.

Locating a Projecting Detail

Following out the method just described in locating the tower and steps in the plan, the position of any extension or projecting detail in the side of the structure may be also located. Thus, suppose that the farther window of the building were changed into a side entrance, its width would be set off first, on G^1C^r, as shown by points r and s, which points must be carried toward M to cut G^1c' at r' and s', and thence brought forward from V^r, as shown, forming the sides of this entrance in the plan. This projection of the steps, hood, vestibule, or whatever it may be, would, of course, be shown on the front elevation at the left of the line ST of that view (Fig. 4), which measurement would then be set off to the left of G^1 on the ground line of the plan in Fig. 5, as shown at e. The point e must then be brought forward from the direction of M^l to cut G^1V^r extended below, as shown at e^1, and thence carried toward V^l to intersect the lines just drawn from r' and s', all as shown, thus completing the plan of the side entrance. From the several points of the completed plan in perspective lines can now be erected into the view above just as any elevation is projected from an ordinary plan.

Making Use of a Second Ground Line

If there should be danger of confusion from having to set off a great many points on the ground line, another ground line may be drawn at any convenient position above or below the first, upon which certain of the points can be set off and the work continued as before. Thus, through the point G^1, directly below G^1, another ground line has been drawn, upon which the widths of the circular and the rectangular windows of the front elevation have been set off, and lines from the points thus obtained, carried first toward M^l to intersect a line drawn from G^1 to V^r, thence upward to their place in the view, with exactly the same result as if the points had been set off on the upper ground line. This is shown by the point a, representing the center line of the front and apex of the roof, which has been located on both ground lines to show the coincidence. The lines diverging from G^2 constitute simply a portion of another plan in perspective exactly below the first or above, as the case may be.

How Two Systems May Be Tested

Should any doubt exist in the mind of the reader as to the comparative results of the two systems of perspective explained, a test can easily be made by embodying both methods in the same drawing, in which, if no errors are made, the vertical lines of the perspective view as obtained from the plan above by "viewing" will exactly coincide with those erected from the plan in perspective below.

The method of determining the hights of points by this system differs in no respect from that already explained in the former system, viz., that of setting off the points on any vertical lines, as GA, which is at once in the picture plane and in the planes of those sides in which the hights are sought, all as shown in the illustration, and as explained in connection with Fig. 4, remembering that lines drawn to the vanishing points intersect in this case with lines erected from the plan below instead of with lines dropped from the plan above as before. Fig. 5 has been reproduced herewith to a scale somewhat larger than that employed in Fig. 4, for the sake of clearness and ease in following out the various lines and operations. To accomplish this, that portion of the drawing at the left has been omitted, but as it is in every respect similar to the corresponding part of Fig. 4, there need be no chance of misunderstanding the references to it. In the rendering of this drawing some of the dotted lines have been omitted or carried through only a portion of their course to avoid confusion, but if any doubt arises as to the meaning or destination of any line, the same can easily be discovered by applying a straightedge thereto.

(To be continued)

Reinforced Concrete and the Edison Fire

We have received from Thomas A. Edison, whose plant at Orange, N. J., was seriously damaged by fire in December last, the following letter which is self-explanatory:

"The Detroit Brick Manufacturers' and Dealers' Association is distributing throughout the United States a pamphlet entitled 'The Edison Fire,' the contents consisting of a reprint of an article appearing in a trade journal, *The Clay Worker*. The entire purpose of this publication is to discredit, and if possible, retard the use of reinforced concrete in the construction of fireproof buildings.

"The results of the fire at my plant on December 9, 1914, are used in an entirely false and misleading manner. Of the seven reinforced concrete buildings none were destroyed. A small section of the upper floor of one of the buildings fell in, but was supported by the lower floors. The pamphlet referred to presents three views of this, the suggestion being that they were of three different buildings. The brick Administration Building to which they refer, which remains standing, was protected by an adjacent concrete building and was not subjected to the fire.

"Every brick and steel building which was attacked by the fire was completely destroyed, together with all the machinery they contained, while the damage done to the concrete buildings amounted to about 12½ per cent., and of the machinery contained in the concrete buildings 98 per cent. was saved and is now in operation. Manufacturing was resumed in some of the old concrete buildings within a few weeks after the date of the fire.

"Temperatures were far in excess of those in the ordinary fire, but reinforced concrete showed its superiority over any other fire resisting material.

"I regret that any representative of the brick interests should have seen fit to sponsor this publication, the evident purpose of which is to deceive. The millions of dollars of fire losses in this country annually make it a matter of moment that the superiority of reinforced concrete for fireproof structures should be thoroughly understood, and it is for such purpose that I have written this letter."

A log raft containing one million feet of cedar, said to be the largest ever floated on the Pacific, recently made the trip from British Columbia to Puget Sound. It was 100 ft. long and 70 ft. wide; it stood 15 ft. out of the water and 20 ft. under.

A Round Dairy Barn of Hollow Tile

A Type of Farm Building Regarded by Many as More Economical Than the Rectangular Shape

By W. E. Frudden

SOMETHING of a departure from the ordinary type of farm barn is the round construction illustrated herewith. As will be seen from the plans the barn has a diameter of 60 ft. and clay blocks were used in its building. The ground floor provides space for 35 to 40 dairy cattle, while the second floor has room for 18 horses, 3 grain bins and a driveway 12 ft. wide. In the center is a hollow clay block silo measuring 16 ft. in diameter by 54 ft. in hight and having a capacity of 200 tons. The arrangement is such that hay can be hoisted to the large mow from the wagon in the driveway on the second floor.

When filling the silo the ensilage cutter is placed where indicated on the second floor and power is belted from the outside. The wagons loaded with stalks are driven into the barn beside the machine where they are unloaded and then the cutter is quickly put to work.

Reference to the floor plans shows at a glance the general interior arrangement. One-half of the floor space is now used for dairy cattle, while the other half is used for calf pens or for shelter for fattening steers in the winter. The entire ground floor is made of 4 in. of concrete underlaid with gravel so as to provide proper drainage.

Appearance of the Barn as Viewed from the Point Indicated by the Arrow "A" on the Floor Plan on next page

A 60 ft. round barn is well adapted for one row of stalls, a 16 ft. diameter silo in the center with wide passage ways both in front and back of the cattle. A feed alley 4 ft. 6 in. wide extends around the silo and in front of the concrete mangers. Such an arrangement results in a great saving of time when feeding the stock.

The pipe stanchions are imbedded in the concrete floor and a 14 in. gutter extends around the outside with a 4 ft. alley outside of it. The stalls are easily cleaned since a litter carrier is tracked around the entire barn and the material emptied at the back lot. For the farmer who has a pressure water supply he can easily clean the barn and the floors could be kept at all times in a sanitary condition.

Sanitation in the dairy barn is of vital importance, and the ground floor of the barn here shown is light and airy. Twenty-one windows around the outside wall flood the interior with sunlight. Each window has nine lights, 9 x 12, and the top row of lights is so made that they will drop back when ventilation is needed. The hay chute and the silage chute both carry away to the cupola the foul air from the cows. Many who plan rectangular barns disagree on the location of the cattle stalls. Some would have the cows face the outside walls, while others prefer to have them face the center so that the gutters will be swept daily by the sunlight and thereby thoroughly disinfect them.

The standard Iowa silo was first built in the center, and was a guide for the construction of the circular barn walls. Heavy concrete foundation walls for the silo and the barn were built down below the frost line. A special type of hollow clay blocks was used for the first two stories of the barn, the resulting wall being about 10 in. thick and at frequent intervals reinforcing wire was placed in the mortar joints. In the silo, however, each joint is reinforced. Building a silo fifty-four feet high when the diameter is but sixteen feet is to be only recommended in such cases as this—where the barn surrounding it acts as a support or protection. Usually silos are built to a hight double the diameter so that thirty-two feet would be the limit for this diameter of silo.

On the second floor of the building is the horse barn, where nine double stalls provide room for eighteen horses. While it does not require this large number of horses for the carrying on of the farm work of this half section, the owner finds the

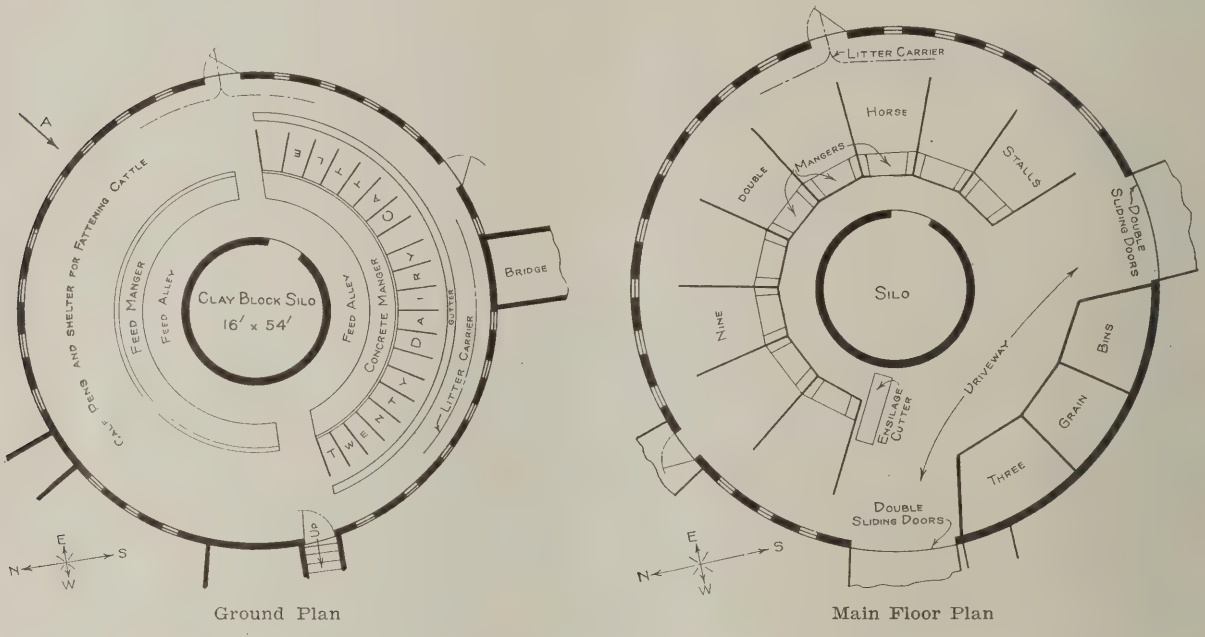
extra space a valuable asset. By extending the stall partitions he has a very convenient box stall for the mare and the colt which is a requirement of most corn-belt farms. The partitions of the stalls and the mangers and feed boxes as well are made of heavy two inch plank. In the horse barn are labor-saving devices. The hay chute drops the hay directly into the four-foot wide feed alley next to the silo wall, from whence it can be fed into the mangers without being carried any great distance. Three large grain bins take up about one-third of the space of the horse barn floor. These provide for a good supply of grain in a place where it is needed. Double sliding doors hung on covered hinges close the doorways, which are 12 ft. wide.

A concrete floor reinforced with heavy steel forms the second floor. While this is not a necessity, still a solid floor of this type has many advantages over the old plank floor supported by plank joists. In the horse stalls two inch plank have been laid over the concrete so as to protect the horses' hoofs. The windows in the horse barn are the same size as used in the dairy barn below. There are sixteen of them and the top third can be lowered if desired. They provide an abundance of light even to the center of the building. In cleaning out the horse stables a manure carrier has been tracked around behind the stables so that this work is reduced to a minimum.

Hip roof barns such as the one here described provide for the greatest possible storage for hay. There are no troublesome braces in the mow and since the circular track has been installed one man can easily handle the hay as it is elevated. The hay mow floor is of frame construction covered with matched lumber to keep dust and dirt from the floor beneath. Asphalt shingles cover the roof, rendering it less liable to catch fire than where wooden shingles are used. A galvanized metal aerator at the peak aids in keeping fresh and pure the air in the barn and also adds considerably to the external appearance of the buillding.

The cost of this barn will probably run as high as $4,000, but the question of local prices of labor and materials will very appreciably affect the total.

At the University of Illinois, the Agricultural Experiment Station has for several years used a round barn for the housing of their dairy herd. Complete costs and material records were kept during the process of the construction so that comparisons might be made with rectangular barns of the same capacity and floor space. Their barn was entirely of frame construction, but as a matter of comparison it is interesting to note that $799.76 was the total cost of lumber for the 60 ft. diameter barn, while $1,023.27 was the cost of the lumber for a rectangular barn 36 x 78½ ft. in size. Both barns have nearly the same cubical content, 117,669 cubic feet for the round barn and 117,138 cubic feet for the rectangular barn. When we consider the foundation materials and the cost of the silo for the two types of barns, we find that $1,045.66 was the total cost of material in the round barn against $1,424.43 in the plank frame barn, while the materials in a mortised frame barn of the same size would cost $1,634.57.



Ground Plan — Main Floor Plan

A Round Dairy Barn of Hollow Tile—Plans Showing General Interior Arrangement

The barn here illustrated is located on the farm of A. R. Brooks in Chickasaw County, nothern Iowa, and has met with great satisfaction.

Office Building on Old Astor House Site

When the new subways were commenced at the lower end of Manhattan Island it was necessary to demolish the southern half of the historic Astor House, owing to the danger of that portion of the building falling down. Now that the subway loop from Vesey street to Broadway has been finished a 7-story office building will be erected upon the vacant site. It will be of steel skeleton-frame construction with the façade of the first two floors of ornamental iron, chiefly pillars, as these floors are to be used for store purposes. On the second floor will be an iron balcony of design and construction such as were built to old-time hotels. Upon the second floor the façade will be limestone block. About midway in the Vesey street façade of the

building will be a shield, and a similar decoration will break the simplicity of the Broadway façade. The new structure has been designed by Architect Charles A. Platt and is estimated to cost $500,000.

The foundation work has been in progress for some weeks past, and the statement is made that the cost will be something like $40,000 more than if there were no subway tubes to be considered. The foundation will be different from that of any office building in the city in that it will be constructed outside the subway and between the tracks of the sub-surface route.

Family sentiment surrounds the property on which the new building will rise, as it was the site of the home of the founder of the Astor fortune, and the Astor House is said to have been one of the first big developments attempted by the Astors.

Heating Concrete Aggregates

In view of the extent to which concrete work is carried on during the winter months, when temperatures are below the freezing point, the following comments by W. M. Kinney, of the Universal Portland Cement Company, as to the highest temperature to which concrete materials can be heated without injuring the concrete, will prove of interest.

A Round Dairy Barn of Hollow Tile—Another View of the Structure

Too high a temperature will cause many sands to turn red, while certain varieties of stone and gravel if overheated are likely to soften or crack. A temperature not exceeding 150 deg. F. will generally prove most satisfactory. It should be remembered, however, that one of the objects in heating aggregates is to insure that the concrete when deposited will have a temperature of approximately 100 deg. F., which will assist in the development of internal heat and promote early hardening, provided adequate protection is afforded for such length of time as is necessary to accomplish this object. Heating by steam has an advantage over heating by the use of the ordinary types of sand heaters. When these are used there is a possibility of damaging some of the material next to the heater from the extreme heat often necessary to thaw out sand or gravel at the top of the pile, unless it is occasionally turned to insure uniform heating.

Sand and stone may safely be heated by piling them directly on pipe coils supplied with steam, or

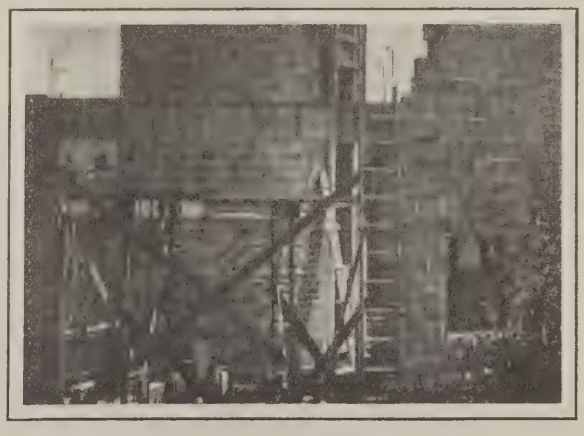
A View Taken During the Progress of the Work

by covering with tarpaulins and applying steam directly to the materials. Short pieces of iron pipe connected with the boiler by lengths of hose are often stuck into piles of aggregates and steam allowed to escape through the materials. With a good steam pressure this system is quite effective and has the advantage of avoiding rehandling of materials, which is often necessary when using other methods.

Legal Duties of Architects

In recently denying the right of an architect to recover a balance due him from a town for services performed in connection with the erection of a school building, on the ground that he concealed from the school authorities information that the building would cost more than the amount which was available for the purpose, the Maine Supreme Judicial Court, page 546, volume 90, Atlantic Reporter said:

"The plaintiff was bound to bring to the performance of his contract reasonable care, an intelligence befitting his profession and undertaking,



Building the Silo in the Center of the Barn

and a proper investigation and knowledge of the business in hand, in all its details. The representations made to the defendants should be true in fact, as to the general requisites of the contract, and substantially accurate in dealing with the amounts,

quantities, and values involved. Good faith should characterize his management of the business entrusted to him. The defendants had the right to believe that the plaintiff possessed all those attributes, that he stood high in his profession, and would use his skill and good judgment in making the plans and specifications, and the contracts for materials, and that the cost of the building would be substantially as agreed upon in the several conferences leading up to the contract. The case discloses that the plaintiff made diligent inquiry as to the financial condition of the town, was well informed as to the money on hand, and the vote providing additional funds for the purpose. He was as well informed as any of the town officers or building committee. Having such knowledge, he knew, or must be held to have known, that any contract or agreement entered into by him with any or all of the committee or town officers having in view a building and equipment to cost in excess of $5,000 would not be valid, and therefore not binding on the town."

A. L. H. STREET.

Meeting of N. J. Master Builders' Association

The annual convention of the Master Builders' Association of New Jersey was held in the Board of Trade rooms in Elizabeth on April 29, when officers for the ensuing year were chosen. The Executive Board met in the forenoon and the business session of the association was held in the afternoon. A number of important topics were discussed, among which was that of "Liability Insurance." The following officers were elected:

President.....James Anderson
Vice-Presidents:
Essex County.....W. W. Schoular of Newark
Union County..H. A. Rath of Elizabeth
Middlesex County..A. B. Friedberg of New Brunswick
Bergen County..H. T. Collins of Hackensack
Mercer County....I. Harper Clayton of Trenton
Somerset County....H. Moosbrugger of Somerville
Secretary ..V. P. Christofferson of Perth Amboy
Treasurer.....A. J. Crowder of Newark

After the business session had been completed a collation was served in the Board of Trade rooms, and in the evening the entire delegation of about 75 attended the theater.

Death of a Noted Architect

Jeremiah O'Rourke, head of the architectural firm of J. O'Rourke & Sons, and supervising architect of the Treasury Department at Washington under President Cleveland, as well as designer of numerous public buildings, died on April 23 at his home in Newark, N. J., at the age of eighty-three years. He went to Newark from Ireland in 1850, at which time it was the custom of carpenters and builders to prepare their own plans for buildings and to execute them. Mr. O'Rourke was employed by Jonathan B. Nichols, a carpenter and drew plans for him. Nine years later he went into business for himself. In 1893 he was appointed supervising architect for the Treasury Department and supervised the building of post offices at Washington, Buffalo and Kansas City and the Appraisers' stores building in New York City.

Officers of Building Material Exchange

At the thirty-fourth annual election for officers and trustees of the Building Material Exchange of the city of New York Thomas D. Miller, of the Builders' Material Supply Company, of Newark, N. J., was chosen president, succeeding J. F. Miller, of the Lawrence Portland Cement Company.

C. J. Curtin, of the Farnham Cheshire Lime Company, New York, was elected vice-president, and William C. Morton, sales manager of the Consolidated Rosendale Cement Company of New York was elected treasurer for the sixth consecutive term.

The exchange now has a membership of 123 and is in a good financial condition.

Summer Course in Architecture

In order to increase the usefulness of the School of Architecture at the University of Texas, Austin, and at the same time to bring it within the reach of those who can leave regular employment for only a short period, a seven-weeks' summer session will be held, beginning June 12 and ending July 29 of the present year. Special attention will be given in this session to architectural design and to free-hand drawing, but descriptive geometry, architectural rendering, shadow and perspective will be taught if there is sufficient demand for them. Each course will be adapted as far as possible to the individual needs of the student, but conducted so that if satisfactorily completed it may be counted toward a University degree.

Model Brick House at Panama Exposition

One of the features of special interest to the builder at the Panama-Pacific International Exposition in San Francisco is the model residence put up by the Panama-Pacific Clay Products Association. We understand that the object of the building is to create a greater interest in the use of brick and other burned clay materials that enter into residence construction. It is a typical American dwelling intended especially for the family of moderate income, the cost of erection in 50 or more different American cities having been estimated to be in the neighborhood of $5000. The house will be open to inspection during the entire period of the Exposition, and will doubtless be visited by thousands of prospective home builders, who will carry away the lessons taught by its clever planing and sane construction to reflect them in countless numbers of the smaller cities and towns.

The statement is made that during the past twelve months several thousand silos have been built in the state of Texas.

Figures of Comparative Building Costs

Typical Examples of Buildings Considered with Special Reference to Dwelling House and Factory Construction

COMPARATIVE figures of cost always appeal to the building contractor, and those given in one of the committee reports presented at the Lumbermen's Mass Meeting recently held under the auspices of the Forest Products Federation in the city of Chicago, cannot fail to prove of more than ordinary interest. The report in question dealt with the comparative prices of building construction and was prepared by J. Norman Jensen, Architectural Engineer of the Building Department of Chicago.

He pointed out the extreme difficulty of giving comparative costs between residences which are built of frame construction and those built of other types, but in order to obtain a comparison between the cost of small frame and brick buildings as built in the city of Chicago, an architect prepared complete plans and specifications of quite a number of one and two-story buildings and then obtained bids. These buildings were typical of the low and medium-priced cottages and small flats actually built in great numbers in Chicago and the bidders were responsible contractors.

In each case in which a frame building was compared with a similar brick building the size of rooms, plumbing, trim, interior finish, etc., were identical. In all cases the frame building had a shingle roof while the brick structure was provided with a non-combustible roof. The average of the bids on these buildings was as follows:

	Frame	Brick
One-story cottage, 22 x 30 ft.	$1,719	$1,823
One-story cottage, 20 x 36 ft.	2,394	2,684
One-story cottage, 21 x 48 ft.	3,419	3,906
Two-story flat, 24 x 34 ft.	4,185	4,564

From these figures it will be seen that the cost of the frame building was about 10 per cent. less than a similar brick building.

Since in making any comparison, the interior finish, plumbing, etc., is assumed to be the same, the final analysis is in the cost of the walls of the building. The cost of labor and materials in place of the walls of these small buildings, exclusive of the plastering of the walls, runs about as follows:

Frame

	Sq. ft.
2 x 4 in., 16 in. centers, yellow pine studding	5c.
1 x 6 in. sheathing, and 1 layer of paper	5c.
Cypress drop siding	6c.
Painting	2c.
Total	18c.

Brick

8 in. common brick side wall	21 to 22c.
4 in. face brick and 8 in. common brick front wall	45 to 50c.

Stucco

2 x 4 in., 16 in. centers, yellow pine studding	5c.
1 x 6 in. sheathing, and 1 layer of paper	5c.
Stucco on galvanized wire cloth	12c.
Total	22c.

In the above analysis common brick is estimated at $16 to $17 per M, material and labor. All the above prices include the contractor's profit. From this analysis it is seen that the cost of the common brick and stucco wall is about the same, and that the walls of a frame building cost about 20 per cent. less than either of them; 4-in. face brick and 8-in. common brick front wall is about two and one-half times as expensive as a frame front wall.

Substitution of Inferior Materials

The substitution of inferior materials, or the using of materials less in quality or quantity than that called for in the specifications is known to the constructor as "skinning the job." This is one of the factors which is helping to legislate against the use of lumber in mill constructed buildings. A specification is drawn up intending to obtain the best grade of material. Some enterprising dealer, or contractor, or other party, deliberately places an order for an inferior lumber. The mill man either does not know or does not care about the deception. The lumber gets on the job, and then the trouble begins. The architect or engineer condemns the sticks sent, but the owner needs his building in a hurry and accepts the lumber under protest. The architect listens more attentively to the concrete man on the next job, and the lumber salesman wonders why he does not get any more orders out of that architect's office. The architect can watch the local materials which go into his concrete building, but he does not intend to stand over the mill man perhaps a thousand miles from his office.

Cost of "Mill" Construction

With regard to the cost of what is known as mill construction as compared with other types of construction it may be stated that one advantage of the former is lower cost. Perhaps the best way to compare costs is to mention a number of actual bids on completed structures. In a certain large architect's office a design was prepared of a building which was to be erected in an old manufacturing district in Chicago. The building was five stories and basement high, 100 by 100 ft., and designed for 280 lbs. live load. The panels in the standard mill design were 14 by 16 ft., and brick bearing walls were used throughout. The concrete building of the same hight and size was designed in the most economical type of flat slab concrete skeleton construction. The actual bid for the mill constructed building was $65,100 and for the concrete type $72,200.

Another building seven stories and basement high, 68 by 75 ft. and designed for 150 lbs. live load. The panels in both designs in this case were 18 by 16 ft. The mill constructed building cost $65,400, and the concrete building $75,300.

If wood floors had been required in these build-

ings, the difference between the mill and the concrete prices would have been greater than ever. In the buildings which were compared the elevators, heating, lighting, sprinkler equipment, etc., were the same.

Rate per Cubic or Square Foot

It is useless to attempt to make a sweeping statement as to how much a mill constructed building should cost per cubic foot, or square foot, or a concrete building on the same basis. Sometimes a mill constructed building of a certain area would have to be divided by a brick wall with fireproof doors, from basement to roof. A similar concrete building would not require this dividing wall, according to building ordinances. The cost of this brick wall alone would offset part of the cost of the concrete building. The best that can be done is to take all the known facts into consideration, and try to arrive at general conclusions, based on a great many comparative designs, and on the experience of the best architects and builders.

The writer has before him a long list of buildings constructed within the last four years in a newly developed manufacturing district in Chicago. The vast majority of these buildings are of the mill constructed type, ranging in cost from $15,000 to $225,000. The cost per cubic foot ranged from 6c. to 11c. and per square foot 80c. to $1.70.

The range of costs is so great that no generalization can be made on them only. The point which the writer wishes to make is that these buildings were built of mill construction in preference to concrete or other type of construction. In a great many cases these buildings were designed in other types of construction besides mill. The same exterior walls, the same mechanical equipment, the same sprinkler system, etc., was used throughout, the only variation being the type of floor construction adopted. By comparing the costs of the different types of construction, the following conclusions were reached:

Conclusions Reached

With column spacing not exceeding 16 ft. mill constructed buildings designed for 100 lbs. live load cost 20 per cent. less than concrete buildings; for 150 lbs. live load 15 per cent. less, and 200 lbs. live load about 10 per cent. less. When the live load was 350 lbs. or over a concrete building was cheaper.

It was stated that the above analysis was based on column spacing of 16 ft. or less. When the required column spacing in any building is greater than 16 ft., the relative economy of mill construction disappears. It has been found, however, that the column spacing of 16 ft. is ample enough for the vast majority of manufacturing and other mercantile businesses. The live load mentioned is the load per square foot which can be safely put on top of the floor. This live load is usually the weight of machinery, or goods placed on the floor. For most light manufacturing buildings a live load of 100 lbs. per sq. ft. is sufficient, and for 75 per cent. of the buildings used for storage purposes 200 lbs. per sq. ft. is all that will ever be placed on the floors. So the column spacing and the loads cover most all the cases which may arise.

Another point which determines the adoption of mill constructed building in preference to concrete is the fact that in ordinary lines of business the rate of insurance on a sprinkled mill constructed building and contents runs about 25c., while the rate on a concrete building and contents, unsprinkled, runs about 45c. The rate on both types of construction, sprinkled, is about the same, but the cost of installing the sprinkler system in the concrete building makes the total cost still higher in comparison with a mill building. A concrete building in which wooden floors are used cannot compete with mill construction.

Styles of Fireplaces

It goes without saying that the fireplace adds a charm to a home which makes it more cheerful and attractive. The number of fireplaces being installed is growing, and many new styles, with and without mantels, in beautiful designs, have been used with artistic effect, says a writer in the *Brick and Clay Record*. This is not only true of city homes, but builders of town, village and country homes, as well as hotels and churches, and other public builders, are making use of decorative fireplaces. The use of cement block in fireplace construction permits the erection of a design which fits in with the general scheme of the room. Any design may be modified to secure a maximum of decorative effect. For instance, a simple fireplace of plain construction would be a suitable one for an office, a large one, in keeping with the size of a rotunda, for a hotel; an inglenook, for a den and a variety of sitting rooms, dining rooms and parlors with pillar effects, square mantel or arch construction built of plain or special faced molded units—block or brick. Fireplaces built of cement brick are not of any particular size, but may be arranged to suit the room for which they are intended. The elasticity of this form of construction allows any size to be easily secured. An experienced workman can easily erect the fireplace. The addition of elaborate decorations does not add very much to the work of construction when brick is the material used. The workman must, of course, have a good knowledge of joints, since sometimes a narrow joint is desirable, and at other times a very heavy joint. The top of a fireplace may be varied to suit the ideas of the builder or the house owner. For instance, decorative top of cement bricks or small blocks may be used, or a wooden shelf, to harmonize with the rest of the fireplace construction. For a den, a bookcase constructed either at the side of or over the fireplace, or both, is often desirable and good. One of the chief objects for the builder to bear in mind in any of these arrangements is symmetry, for with a simple, appropriate, and symmetrical design in keeping with the surroundings, the fireplace becomes a harmonious, attractive and useful piece of house furnishing.

The Master Builders' Association of Perth Amboy, N. J., have decided to erect a "builders' exchange" in accordance with plans prepared by Jensen & Brooks, and estimated to cost about $3000. It will occupy a site 33 x 125 ft. on Maple street, and we understand that much of the material will be donated by manufacturers. The committee having the matter in charge consists of L. W. Smith, C. C. Christensen and A. R. A. Overgaard.

Remodeling a Frame Station Building

An Explanation of the Difference Between This Kind of Work and That of the General Building Contractor

By Hee H. See

IF I were asked to select a position for a young man desirous of thoroughly learning the carpenter's trade in all its various branches, I know just exactly the job I should choose for him. It would be in the "Bridge and Building Department" of a modern railroad. To the workmen in this department comes in the course of time every phase of carpentry work that was ever dreamed of, ranging all the way from driving piles for foundations to making sash and doors by hand. The job about to be described is an illustration on a small scale of the truth of the foregoing.

Referring to the accompanying sketches, Fig. 1 represents plan and cross section of a railroad passenger station which was to be improved by the addition of a waiting room and other changes which may readily be discovered by an inspection of Fig. 2, which is a plan of the building after the alterations were made. The building was also to be re-shingled and the old wooden eaves gutter replaced with a standing gutter of galvanized iron. In order to secure the additional room the building was to be cut in two and spread apart a distance of 15 ft.

Like most railroad work the repairs and alterations were to be carried on while the building was in use, and provision had to be made for the protection of the station staff and the traveling public while this was being done.

When making a line change some three years before the building had been moved over and set on a concrete foundation on a new "fill." This "fill" was some 40 ft. in hight and had settled considerably, the extra weight of the outside walls having caused that portion of the foundation to settle some 2 in. lower than the walls in the center, thus giving the floor a 2 in. crown. It was necessary to correct this defect and also straighten and level up other parts of the building as much as possible.

Among the readers there must be some who are familiar with railroad work and who will understand the conditions under which most of it is done. It may perhaps make the subject of more interest to others if mention is made of one or two points in this class of work, which causes it to differ from that usually encountered by the general building contractor.

Railroad mechanics are seldom paid union wages and as a general thing are compelled to work more than union hours. The work of the "Bridge and Building Department" is carried on by gangs of men who travel from place to place on the division as occasion demands. They live for the most part in what are known as "outfit cars," which are

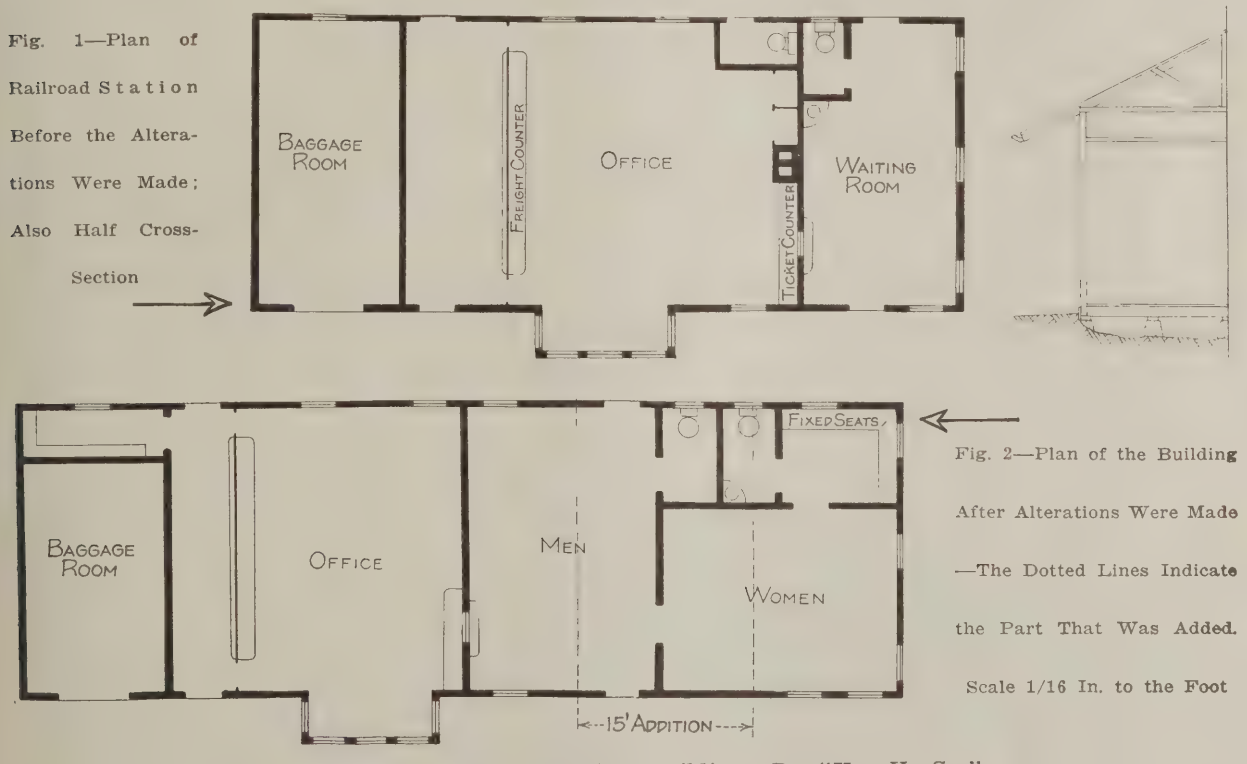


Fig. 1—Plan of Railroad Station Before the Alterations Were Made; Also Half Cross-Section

Fig. 2—Plan of the Building After Alterations Were Made —The Dotted Lines Indicate the Part That Was Added. Scale 1/16 In. to the Foot

Remodeling a Frame Station Building—By "Hee H. See"

usually old passenger coaches that have served their time and passed out of date. They are fitted up with sleeping and dining quarters and the men provide their own bedding and pay a certain fixed sum per month for board.

As a general thing the work is steady, but very few men stay with it long at one time. There are several reasons for this, some of which are the low rate of wages and longer hours, the monthly pay-day, the rough work that all classes of mechanics are sometimes called upon to do, the fact that 90 per cent. or more of the workmen are single men, to whom a steady job means nothing, and the fact that the same sort of a job may at almost any time be obtained for the mere asking.

The wages and hours are such that a really first-class mechanic never takes the job at all except in times of stress. He is usually "flat broke" when he arrives and seldom lasts long enough to draw his money on the regular monthly pay day. The work varies all the way from putting in concrete culverts to building depots, and though an endeavor is made to keep the house carpenter and the bridge carpenter separate, it is not always possible to do so. This arrangement while it gives one gang some house work to do makes it all the harder for the man in charge of that gang when the exigencies require that the other work shall be handled.

As a recompense for the low rate of wages the men secure steady work and do not lose time for any cause except unfavorable weather. The "outfits" are moved from place to place on the local freight trains and sometimes two or three days are used up in this manner for which the men are paid just as if they were working.

The wage scale for an ordinary gang averages $35 per day and as the cost of moving is charged directly to the job it is no uncommon occurrence for the foreman to find himself with a handicap of $40 or $50 on a job before he commences it.

Mention is made of this because it is one thing that makes it so difficult to properly apportion the work. If there is a concrete culvert or a tank foundation to go in at Brighton and the house gang is near or is moving past that point it will be cheaper to have them do the work than it will be to move in some other gang.

The house gang will perhaps consist of eight carpenters and two laborers. If a contractor had to meet a situation of this kind he would simply lay off his carpenters and hire laborers or concrete men in their place. This the B. & B. foreman cannot do for a dozen reasons, and as on his next job he may need all his carpenters again, he exercises a supply of tact and diplomacy sufficient to settle the Mexican question, performs a miracle and in some manner gets his concrete mixed with the men he has.

The reason for the large percentage of single men in the gangs is easily explained. The job is an ideal one for a single man with steady habits. He has his board to pay no matter where he is and he gets cheaper accommodation in the "outfit" than he can get out of it. The men with wives and families, however, do not want work that keeps them from home week by week and which compels them to pay out a good share of their earnings for board.

All this perhaps makes tedious reading, but it was thought advisable to mention these few items in order that the uninitiated reader might realize some of the problems that the B. & B. foreman encounters in a job such as that under discussion.

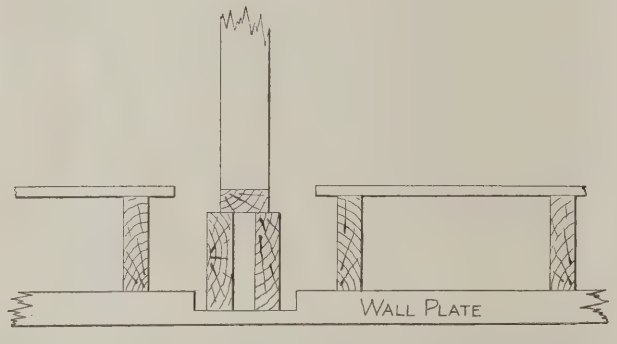


Fig. 3—Method of Putting in New Joists to Carry the Partition

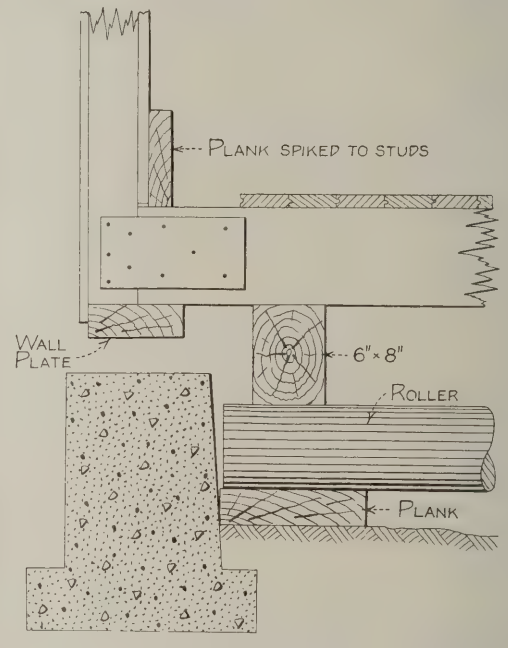


Fig. 4—Showing Arrangement of Timbers and Rollers When Spreading the Building Apart

Remodeling a Frame Station Building—By "Hee H. See"

To sum up briefly, he must have some mechanics who can do really good work and others who, while able to hold their own as carpenters, are not above turning their hands to digging or concrete mixing when occasion demands. His laborers need to have sufficient ability to hold and nail one end of a piece of siding or ceiling and he himself—outside of the mechanical knowledge required to handle and direct every possible phase of the building business—merely needs to possess the ability to gather such a gang of men together and keep them satisfied with their work and with each other in spite of the adverse conditions.

A comparison of Fig. 1 with Fig. 2 will show that the wall between the waiting room and office was to be moved into the office some 6 ft. This wall was the first inside work we did, in order that it might protect the station staff after the building had been cut apart.

For the benefit of the telegraph operator only two men were set to work on this wall, the others

being occupied on the outside of the building until the wall was finished. Two men, of course, would make less noise and confusion than five or six and if necessary could be more easily quieted at some critical point in the receiving of a message by the telegraph operator.

On account of the crown in the floor it was not possible to set the sill of the partition on top of it, and we do not consider this good practice any way, because nearly all of our buildings have single floors and when the partitions are set on top of them it makes the renewing of the floor a somewhat difficult task.

Remodeling a Frame Station Building—Fig. 5—Appearance of the Structure After It Had Been Cut Apart

In the present instance we first cut a slot about 1 ft. wide through the floor the entire width of the room. In this slot we set two joists directly under the point where the partition was to be placed, cutting through the wall plates on the center walls, where they were too high, so as to bring the joists to the correct level. Blocks were also placed between the two joists so as to spread them enough to catch the flooring on each side of the partition sill. A cross section of all this is indicated in Fig. 3 of the sketches.

After this wall was up arrangements were made to handle the ticket business over the freight counter in the office. Seats were provided around the outside walls under the roof overhang and work was commenced on the waiting rooms. The chimney was torn down and then, getting a hand saw belonging to the boss, the building was cut in two by simply starting at the ridge and sawing straight down through wood, nails and everything else that was in the way until the foundation was reached on either side.

In the meantime, the concrete foundation had been extended the necessary distance, and after thoroughly bracing the piece that had been cut off we were ready to raise and move it.

Although the floor joists ran crossways of the building they were not fastened securely to the side walls, but were cut in between. We remedied this by fastening the ends of the joists to the studding with short pieces of 1 x 6 and then spiked a plank along the wall so that it would bear on the joists and carry the weight. We next placed two timbers under the floor joists—one close to each side wall—and after raising this portion of the building some 6 in. put planks and rollers under these timbers and we were then ready to move. This arrangement is shown in the partial cross section, Fig. 4.

Holes had to be cut through the concrete wall at the end of the building for the passage of these timbers and holes were left in the new concrete wall in line with them and for the same purpose. The planks on which the rollers ran were kept a short distance from the concrete wall at the end so that each roller would drop out as it reached the wall and could be fed in again on the other side. The end of the building was run out to its new location by simply prying against it with bars and levers and after carefully adjusting it for line and distance it was lowered on to the new foundation. The end of this piece was then made plumb and braced in position, after which the wall plates and ridge of the new section were cut the correct length and fastened in place. The photographic view, Fig. 5, shows the appearance of the building at this stage.

Fig. 6—The Appearance of the Railroad Station After It Had Been Completed

When cutting the new rafters, studs, etc., in work of this kind, we always measure directly from the old ones. It is no unusual occurrence to find that the former builders had ideas of their own concerning roof pitches and what we thought to be a quarter pitch, or a rise of 6 in 12, may turn out to be a rise of 7 in 12 or 6 in 13. Another thing,

we did not cut the lower ends of the rafters to length, but waited until they were up and then lined them with the old portions of the building. When we took down the partition between the waiting room and office we found the office floor 8 in. higher than that in the waiting room, so that the piece of floor on the outside of the new wall and the concrete foundation under it had to be lowered to suit.

Before this we had also discovered that the person ordering the materials had merely ordered so many windows of a certain size and because he did not specify "with frames and casings" the mill in getting out the order had simply supplied the sash. The small windows for the toilets and the new standard ticket window had been overlooked entirely, and as it takes about six weeks to get an order through the mill we had the sash for the toilet and ticket windows as well as all of the frames to make by hand out of any material available. Some of this work in course of construction can be seen in Fig. 5. We finished all the work in the waiting rooms, putting a new floor all over this portion and then arranged for both freight and passenger business to be handled through the new ticket window while we worked on the office floor.

In this work we first took up two or three strips of flooring directly over the inside walls and removed the wall plates so as to take the crown out of the floor. We also leveled up the building along the outside walls. After we had brought the floor to the correct level we ran the counter out through one of the side doors and all hands set to work laying the office floor so as to get that part of the job cleaned up in as short a time as possible. In the meantime the new cornice, gutter and roof shingles had been applied and after putting in three patent terra cotta chimneys to replace the brick one we had torn down, our job was finished and it had the appearance shown in Fig. 6, which is a reproduction from a photograph taken from the same side of the building as Fig. 5.

It should perhaps be mentioned that the inside of the building was covered with matched and beaded ceiling instead of plaster, which, of course, made the work of cutting and moving a little easier.

Convention of Brick Manufacturers

At the recent convention in Detroit of the National Brick Manufacturers' Association significant action was an agreement upon a national publicity plan involving an expenditure of nearly $200,000 yearly for the purpose of winning back the markets which brick as a building material has lost to frame, concrete and gypsum construction. A committee of 25 was appointed to secure a fund based on 2 cents per thousand on the total building brick production of the country, and from this committee ten were chosen as sub-committee on plan and scope.

Various interesting papers were read and discussions ensued while reports of the president and other officials showed conditions to be of an encouraging nature. One of the special talks was that of Robert Spencer, Jr., of the architectural firm of Spencer & Powers, who discussed "Modern Brick Architecture." This was illustrated by plans and elevations of the model low-cost, fire-resisting residence erected by the clay products industry at the Panama-Pacific Exposition. He explained in detail how it had been made fire-resisting without any appreciable addition to its cost and how the arrangement of rooms was economical and construction costs reduced at various points without detracting from the artistic excellence of the building.

A time-honored custom of the association is that when a president retires the first vice-president is elected to succeed him, and this is followed by the moving up of the second and third vice-presidents respectively and the election of a new third vice-president. The result of this arrangement was that the following officials will serve for the ensuing year:

President.....C. P. Mayer, Bridgeville, Pa.
1st Vice-pres...Chas. J. Deckman, Cleveland, O.
2nd Vice-pres.....Fritz Salmen, Slidell, La.
3rd Vice-pres..Geo. H. Clippert, Detroit, Mich.
Secretary..Theo. A. Randall, Indianapolis, Ind.
Treasurer..John W. Sibley, Birmingham, Ala.

One day of the meeting was devoted to visiting points of interest and one of the evenings was given up to a banquet at the new Hotel Statler.

Strike of Woodworkers Averted

At a meeting of the Greater New York District Council of Carpenters and Joiners of America held in the Borough of Manhattan a short time ago, it was decided not to strike, but to accept the compromise scale of wages and hours that had been offered the men by the Manufacturing Woodworkers' Association. The compromise offered was as follows:

"Employees of the Brooklyn Mills to receive a minimum wage of $17.00 per week commencing with April 1, 1915. All mills included in the Manufacturing Woodworkers' Association to pay a minimum of $18.00 per week commencing with September 1, 1915. Working time to be 48 hours per week until January 1, 1916, when all members of the association shall reduce the hours to 44 per week."

The original demands of the men had been for a minimum wage of $18.00 per week and a working week of 44 hours.

Chicago Sheet Metal Contractors Elect Officers

At a recent meeting of the Allied Sheet Metal Contractors Association of Chicago, Ill., officers for the ensuing year were elected as follows:

President .....J. C. McFarland
Vice-President.....O. M. Bales
Treasurer .....D. M. Haines
Secretary.....Daniel E. Mulvey

A Board of Governors was also elected and during the meeting several interesting talks were given on the benefits of organization.

Schoolhouse with a Moving Picture Theater

Something of a novelty in modern schoolhouse equipment is contemplated at Port Edwards, Wis. A Milwaukee architect is drawing plans for a schoolhouse at that place which will have a classroom with a floor inclined like that of a theater, a stage 16 ft. deep and a proscenium arch 12 ft. high and 18 ft. wide. At the rear of this classroom will be a booth for a moving picture machine.

Erecting Small Concrete Buildings

The Foundations, Walls, Windows and Doors—Mixing and Placing the Concrete—The Roof Construction

By Percy H. Wilson

THE present insistent demand for the substitution of durable, sanitary and fire-resisting materials for those not possessed of these properties has been a pronounced factor in hastening the adoption of concrete. The change means impervious and monolithic structures as opposed to those consisting of the more familiar types of masonry with their attending wooden features of combustible nature, the latter also affording refuge for much that is noxious and unsanitary. This enduring method of construction is now applied to all parts of buildings in order that there may be a practical elimination of maintenance cost.

Small buildings for one purpose or another are always required upon the farm. These structures include poultry houses, hog pens, smoke houses, wagon houses, garages and buildings designed for storage purposes. If they are built of masonry or frame, the services of experienced workmen are usually required unless the structures are of the rudest type. The purpose here is to describe briefly a method of constructing, without the aid of mechanics, small concrete buildings for some of the uses specified. Dimensions may be increased or reduced as occasion requires. Where enlarged upon and supplied with proper conveniences, a building of this character would answer admirably for a small residence. If the natural color of the concrete is objectionable, it may be coated with a wash in any color desired, thus making these small structures a picturesque as well as useful appurtenance to the main buildings of the farm.

Erecting Small Concrete Buildings. Fig. 1—A Poultry House Resting on Concrete Piers and with Walls 4 In. Thick. Floor and Partition Are Also of Concrete

Let it be assumed that the building is to be 8 ft. wide by 12 ft. long with a hight to the eaves of 7 ft., inside dimensions. A building of this size might be suitable for several of the purposes mentioned above. The foundation should be 12 in. wide and 3 ft. deep, which will carry it below frost line. Mark on the ground a rectangle 7½ ft. wide by 11½ ft. long. Outside of this rectangle mark a larger rectangle 9½ ft. wide by 13½ ft. long. This will leave a space of 1 ft. between the lines all round. Dig between these lines to a depth of 3 ft. This forms the foundation trench. The concrete for the foundation should be mixed in the proportion of 1 part Portland cement, 2½ parts sand and 5 parts stone or gravel. Fill in the foundation trench with concrete to ground level, being careful to prevent earth from the trench walls from falling into the concrete. The top of the foundations should be brought to the surface of the ground and made perfectly level. To insure this test it with a carpenter's spirit level.

The walls of a building of this size will need to be only 6 in. thick and they should be erected on the center of the foundation, leaving 3 in. of foundation on both sides. The forms can be made complete, and, if more convenient, can be assembled flat on the ground and then raised into position. The wall forms should be made of 2 x 4-in. studding placed upright and spaced about 2 ft. apart. Upon this studding should be nailed, horizontally, 1-in. boards. These boards will be next to the concrete and must be fitted together, so as to insure a tight joint, and if it is desired to give a very smooth surface to the finished wall, the joints should be carefully matched. The forms, to prevent them from spreading, are tied by means of twisted wire passing between the 1-in. boards and around the upright studding, as shown in Fig. 3. To provide for the window openings a rough frame made of 1-in. boards, 6 in. wide, should be set in the forms at the proper location. Sometimes, after the forms have been filled with concrete to the hight of the windows, the window frame itself is placed in the form and the concrete cast around it.

The openings for doorways should be made in the same manner. As soon as the forms for the walls —both the inside and outside forms—are in place and made plumb, the concrete can be deposited be-

tween them. The top surface of the concrete previously placed in the foundation should be rough but thoroughly clean and very wet in order that a good bond between the concrete in the foundation and the concrete in the wall will result. To prevent the development of cracks in the walls it is a very good practice to reinforce them with fence wire or light rods, running in both directions. This is not absolutely necessary, however, for a very small structure, but in any case it would be well to place in the corners where the walls join, light rods bent in the shape of an "L." These rods should be 2 or 3 ft. long and placed about every 12 in. of hight. The frame for the doorway should be placed in position before the concreting is started. It is sometimes the custom to tack lightly to the door frame a strip of wood tapered so that its larger side is in the concrete. When the rough door frame is removed this strip remains in the side of the door and can be used for fastening the door hinges. Some prefer to dispense with this strip of wood. They drill directly into the concrete wall in providing for hinges.

The concrete for the walls should be mixed mushy wet and in the proportion of 1 part Portland cement, 2 parts sand and 4 parts stone or gravel. In placing the concrete spade it thoroughly with a thin board paddle, thrusting the latter between the concrete is then deposited until the hight of the eaves is reached.

On the top surface of the wall there should be imbedded vertically in the fresh concrete ½-in. bolts with the heads down. These bolts extend about 12 in. into the concrete and about 6 in. above. They can afterwards be used in fastening down the wooden sill to which the rafters are attached, if the roof is to be constructed of wood. Either a flat or a peaked roof can be used. If a flat roof, it is sometimes the practice to arrange for rectangular pockets in the top of the walls, into which the

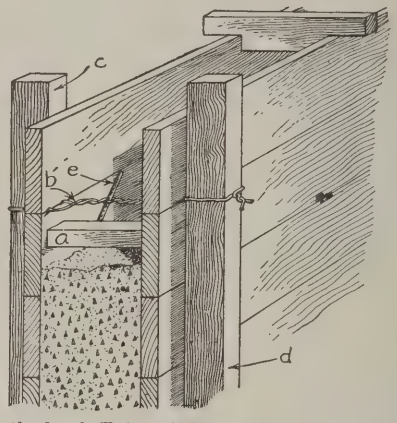


Fig. 3.—Method of Tying "Forms" with Wire to Prevent Them from Spreading

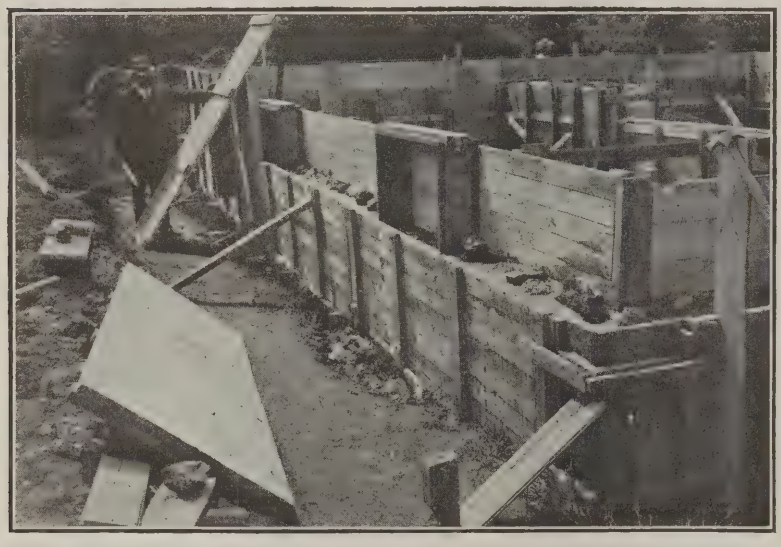


Fig. 2.—Sectional "Form" for Concrete Wall Construction

Erecting Small Concrete Buildings

forms and the concrete in order that the stone or gravel may be forced away from the forms, which will leave a smoother surface than would otherwise result. This not only allows the rich mortar to flow against the forms, but prevents the formation of air pockets and projecting stones at the surface of the wall. It will be found convenient to place the concrete until it reaches the hight of the window-sill. The window frames are then placed and the concreting continued until the hight is about 2 in. above the top of the windows. Then, in order to strengthen the concrete over the window openings, lay two ½-in. steel rods over each window. These rods should be long enough to extend about a foot on each side of the window space. In a similar manner rods should be laid over door openings, these rods to prevent any cracking of the concrete over the openings. The balance of the roof beams can be set. When a flat roof is to be constructed make one side of the building lower to provide sufficient pitch for drainage. The forms for the walls should be left in place about one week and no weight should be placed on the walls for three weeks or one month.

If a concrete floor is desired, proceed as in the case of sidewalk construction, that is to say, put down a layer of cinders or gravel and place over this the concrete pavement. Make this of a 1:2½:5 mixture of Portland cement, sand and stone. To prevent the concrete pavement from cracking divide it into sections or slabs, say 3 or 4 ft. square, being sure that the joints extend entirely through the concrete.

If a wooden floor is preferred, the beams or stringers may rest upon the 3-in. projection of the foundation walls.

Some Concrete Factory Buildings

Among the improvements about being started in Long Island City, N. Y., is a reinforced concrete factory building, a part of which will be two stories in hight and the other portion one story, and covering an area 235 x 265 ft. The architects and engineers are Timmis & Chapman, 315 Fifth avenue, New York, and the contract for the erection is in the hands of the Turner Construction Company, 11 Broadway, New York. The latter concern has also been awarded the contract for the construction of six manufacturing buildings of reinforced concrete for the Vacuum Oil Company at Bayonne, N. J.

Ornamental Tile in Cornice Work

An English Architect Offers Some Further Suggestions with Regard to the Decorative Use of Tile

IN the issue of the paper for July last we presented some interesting comments on the decorative effects which may be given to chimneys of buildings by the judicious use of tile, the matter being contributed to one of our London contemporaries by W. G. Kerby, an English architect. In the present issue we reproduce from the same source his comments on the introduction of ornamental tile in connection with cornice and frieze work, the accompanying illustrations showing some of the results which may be accomplished by the use of this material in the manner indicated

The slight use of the tile as an aid in fining down the somewhat harsh appearance of plain oversailing

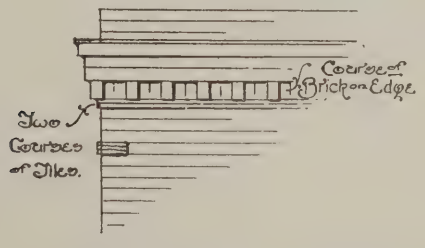


Fig. 1—A Cornice in Which Tile Is Sparingly Used

brickwork is really most valuable. It is, nevertheless, a position where it is very seldom used, although it might be readily introduced in a comparatively inexpensive manner on a great deal of constructive work of a plain character. Merely two or three courses of tile, so used, with one forming the corona, in quite a plain brick cornice, introduces a far greater degree of pleasing finish, such as illustrated by Fig. 1. Utilized in a similar manner, as fillets, but on a more extensive scale, with splayed brick and ovolo courses, quite an elab-

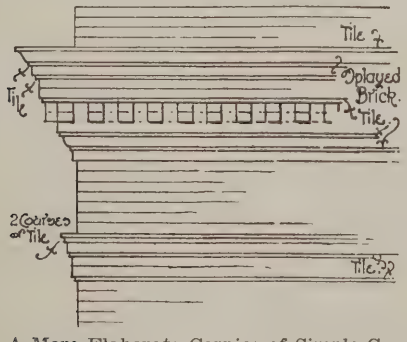


Fig. 2—A More Elaborate Cornice of Simple Construction

orate cornice can be simply constructed, after the nature illustrated by Fig. 2. The use of the tile fillet in the construction of heavier cornices still is shown by the succeeding illustration, Fig. 3. So utilized, in conjunction with brick relief of the simplest character, quite a large amount of decorative effect can be imparted to many structures, as seen by this figure. The simple and inexpensive nature of the main materials would thus often admit the introduction of either a little carved brickwork, as shown, or colored cement plaster modeling. The circular windows are simply con-

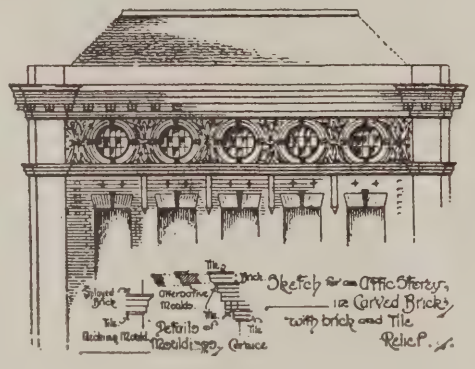


Fig. 3—Use of the Tile Fillet in Cornice of Heavy Construction

structed in plain brick rigs, the outer one being slightly projected, with tile keyblocks. Slight, concentrated work of this character, massed at the top of a building, with a little more disposed in a somewhat similar manner on an entrance, usually has a far better appearance even with plain, broad pilasters, to the main portion of a building than many of the customary systems of architectural decoration generally used. The detail notes on this figure show one or two alternative methods of varying the corona course with simple moulds of brick, such as

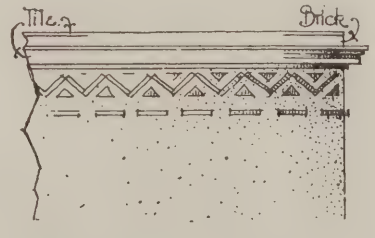


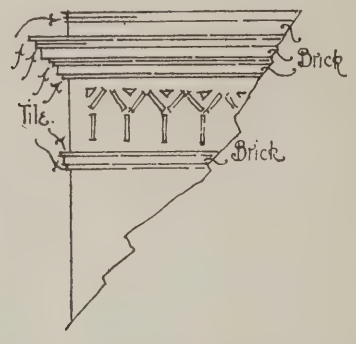
Fig. 4—A Plainer Cornice Constructed Mainly of Tile

are in practically universal use for many purposes. A plainer class of work, constructed mainly in tile, is illustrated by Fig. 4. It consists of a projecting cornice composed wholly of a few courses of tile, with a low blocking course of brick or roughcast cement, capped by a row or two of tiles. Simple work of this character could usually be introduced on most plain work. The chevron-pattern tile frieze, either with or without the pointed bricks shown, in conjunction with the broken necking course, gives a picturesque finish to a wall for many positions.

Of a somewhat similar type, but slightly more elaborated, is the design shown by the succeeding

figure, No. 5; a course or two of plain bricks being used in the necking and cornice. The arcaded tile pattern to the frieze, although simple, affords a very pleasing finish. The two latter examples are such that might be readily introduced with concrete-block construction, involving, really very little work, considering the variation obtained.

Of a more advanced type, constructed mainly in tile, with a course or two of plain and chamfered



Ornamental Tile in Cornice Work—Fig. 5—A Design of Somewhat Similar Type to That Shown in Fig. 4 but Slightly More Elaborated

brick, is that illustrated by Fig. 6. The frieze angles are treated with a tile triglyph, the tiles being laid horizontally between vertical ones. The running-frieze pattern itself is more adapted to the concrete-block construction. When in brick, with a roughcast surface, it would then naturally require various patterns, mainly of a lining character, as they would have to largely follow the brick coursing. The alternative tile design for this class of work illustrates the greater variations which can be introduced with the pantile. The Lute, or Lyre, simply formed in this manner with a few tiles, represents merely one of the many patterns which can

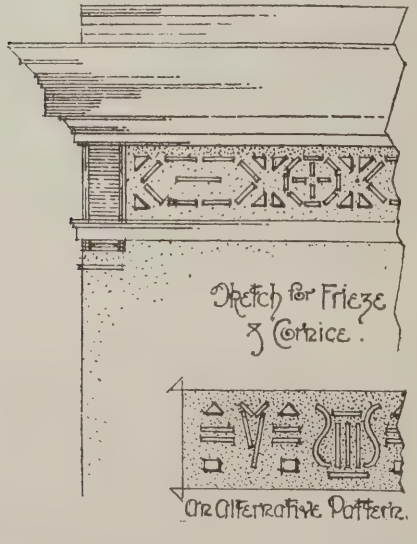


Fig. 6—A More Advanced Type of Cornice Made Principally of Tile and Showing an Alternative Pattern

be so designed to introduce some distinctive symbolism on any particular type of building.

For instance, the one illustrated would be applicable to music-halls, pavilions, or bandstands. The latter class of structure particularly is one needing considerable improvement. They might well be treated in a sound architectural manner. It would form a great improvement also to their general and customary surroundings. The usual types of cast iron—a species of glorified birdcage—which are mainly in use for these purposes are far from satisfactory in general appearance. More often they are uncomfortable-looking, incongruous, spindly structures, invariably out of keeping with their surroundings, and they look it, all over. Something of the open garden pavilion type, if not in stone, could, at any rate, be erected simply in concrete, roughcast and tile-work. This could be so designed to present a really good architectural appearance, something more substantial, yet at the same expenditure involved by the former type of work.

Another class of patterned frieze and cornice is illustrated by Fig. 7. The use of the tile as a fillet to dentil-blocks formed of a projecting header-brick, shown in detail in this figure, although simple, gives a large degree of finish to a cornice. Other types of pantile patterns for frieze-work are illustrated by Fig. 8. The designs which could be formed of

Fig. 7—A Brick and Tile Cornice in "Rough Cast" with Tile Relief to the Frieze

this character, adaptable to such positions, all presenting a good and exceedingly original appearance, are practically innumerable. As shown by the last example, placed in long or short panels, formed by the fluted tile triglyphs, many variations can be formed from that of the continuous frieze pattern.

A different type of pattern which can be adapted to many positions is again illustrated by Fig. 9. The same style also looks well for many kinds of interior work, such as fire-places, for instance. In the latter case tiles on the flat can be substituted for the two pointed bricks in the centres, either in color or patterns. Also, instead of roughcast around, broken color tiles, set as a mosaic in cement, have an excellent appearance. A little mosaic work, such as this, merely in the frieze portion itself, does not entail much expense, either. At the same time, it forms a most effective and somewhat novel form of decoration for such positions.

In Fig. 10 is shown a sketch design somewhat similar in general character, but with a different arrangement and pattern. The irregular setting of the pointed bricks, as shown here, has a far more picturesque appearance. It is less monotonous in effect than the more stiff and regular patterns, of

the nature illustrated by the preceding example. Other patterns of composite tile centres, such as shown on this figure, might be used alternately, or as centrepieces, to give further variation. No. 2 on this sheet illustrates the variation of tiles on edge with pointed bricks, while No. 3—that of tiles

Ornamental Tile in Cornice Work—Fig. 8—An Attractive Pantile Pattern

on edge—with flat tiling. The latter might either be patterned, plain, or in color, with pointed brick angles. The centre can be picked out with four pointed bricks, as shown, or one of the forms of flat tiling can be substituted here, if preferred. In fact, the uses of the tile in these latter respects alone are so many and varied it would be quite impossible to illustrate them adequately for such position in the pages. Anyone giving the matter a little study will recognize the possibility of numberless designs, excellent both in line composition and color.

It is as well, perhaps, to note in this section more particularly the practical possibilities of the tile, both for a great deal of lining pattern-work, and also its uses as a fillet for string-courses or cornices, when in brickwork. The 10½ in. by 8¾ in. size can be readily adapted to 9-in. work, especially when used as an alternate raised- and sunk-lining pattern,

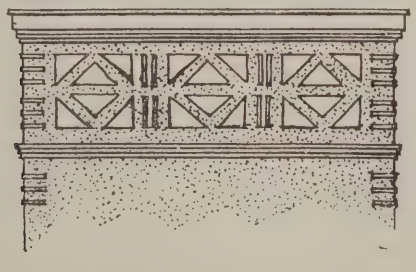


Fig. 9—A Pattern Which May Be Adapted to Many Positions

or a flush-face relief. Even when slightly projected the slight discrepancy in thickness, made up in good cement compo, would form perfectly sound work. Used lengthways, in the thickness of the wall, it gives a projection of 1½ in., about the exact projection required for many string or cornice designs. A slight projection allowed inside, to reduce that on the face, is no drawback, either; it merely provides a slightly better occasional key for plastering in 13½ in. work either the 10½ in. or 8 in. by 6½ in. size will work in, with a slightly wider cement joint in the centre. If the 8¾ in. by 6½ in. are used together, giving a total width of 15¼ in., this will often give again the projection required. The 14-in. wall is the usual size for many purposes.

Rough cutting to a tile, if necessary for commencing fillets or filling purposes, is not an expensive item; such rough-edge work, turned to the interior wall, really forms a much better bond, and merely occurs occasionally. With 18-in. or larger size walls, it will be found that the tile can be readily adapted in a constructive capacity, either without or with very little cutting. It would nevertheless prove a greater convenience if we had a few more reasonable sizes, both in bricks and tiles.

The ready-made Queen closer or half-bricks, as it stands, is extremely useful in ornamental brick- and tile-work generally. Also for strings and cornices, where it can be used on its narrow face for slightly fining oversailing courses, etc., and introducing a certain amount of variation.

What is also really required are half-bricks the other ways as well—viz., 9-in. by 4½ in. by 1½ in.

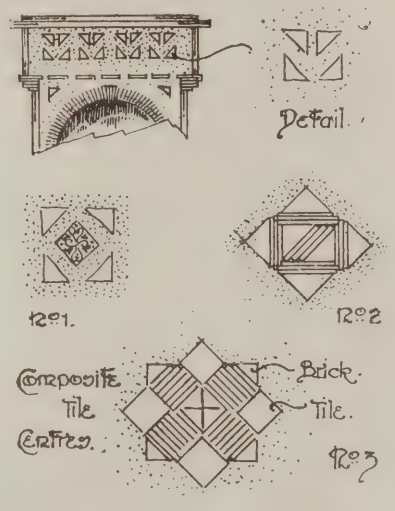


Fig. 10—Details of Composite Tile Centers

(really a thick tile), also 4½ in. by 4½ in. by 3-in. Such sizes would facilitate work considerably, obviate a great deal of cutting and wastage generally, and provide a long felt want. Another size tile would be a 10½ in. by 9½ in., thus allowing the ½ in. projection for fillet coursing ready to hand for a greater work. A couple of narrow tiles, in a brick width—viz., 4½ in.—and another of 5½ in., would prove a decided advantage for filling and projecting purposes, made also in the extra thickness of ¾ in. and 1-in. The average tile is often too thin of itself, and then has to be used in pairs or threes.

When tiles and bricks are being moulded there is really no more trouble in forming them from a few different-shaped moulds than keeping to practically one stock-patterned size. Any firms, sufficiently progressive to give these points proper attention in manufacture would, without doubt, ultimately derive considerable added benefit from the business point of view by so doing.

A Stone Dwelling for the Suburbs

A Well-Managed Design Combining Masonry Walls with a Gambrel Roof Pierced with Dormers

WE have taken as the basis of our colored supplemental plate this month a suburban residence of stone construction and having a shingle roof. The entrance to the house is through a small hall, on the left of which is a large living room and at the right a library. The special features of the living room are found in the massive stone fireplace and the French casements that open to the private porch. In the dining room is a large built-in buffet.

The stairway to the second floor rises from the main hall and is hidden from view as indicated in the detail. A large coat closet is conveniently placed near the foot of the stairs.

The Main Floor

The arrangement of the main floor is such as to give easy communication between the kitchen and the front door as well as ready access to the stairs to the cellar and exit to the outside.

On the second floor are five bed rooms of good size, each room containing two clothes closets. A large bath room is located on this floor and is provided with a linen closet and built-in cabinet. The closet door is set with a full length mirror.

According to the specifications of the architect the footings are to be of concrete and mixed in the proportions of 1 part Portland cement to 3 parts sand and 5 parts broken stone. They are to be 10 in. thick and to project 6 in. on both sides of the wall above.

The foundation walls are to be rubble masonry or cobblestone and 20 in. in thickness. The first story walls are also to be 20 in. thick, while the second story walls are to be 18 in. thick. The walls above grade are to be laid up with a heavy mortar joint in first-class style.

The roof is to be covered with cypress shingles laid 5½ in. to the weather.

The chimneys are to be of the same construction as the exterior walls, lined with vitrified flue lining and topped with a blue stone cap.

All porch floors are to be of concrete laid on a bed of cinders and finished with 6 x 6 in. dark green tiles.

The Framing Timbers

Spruce is to be used for all timbers, the first floor beams to be 3 x 10 in.; the second floor beams 2 x 10 in., and the attic floor beams 2 x 8 in., all spaced 16 in. on centers and strengthened with rows of cross bridging set 4 ft. apart. All beams are to be well anchored and set in the stone walls. The studs are to be 2 x 4 in. doubled at all openings and the rafters are to be 2 x 6 in., also placed 16 in. on centers.

The floors of the first story rooms are to be doubled, the rough flooring being of tongued and grooved 1 x 9 in. North Carolina pine and the finish floor to be of ⅞ x 2½ in. oak. The rooms of the second story are to have ⅞ x 2½ in. maple floors, while the rooms in the attic are to have pine floors.

The Exterior Trim

The exterior trim, cornice, rails, columns, etc., are to be of white pine. All interior trim on the first floor except the kitchen is to be of birch. The kitchen and bed room trim is to be of white pine and the bed room doors to be of birch.

The masonry walls are to be furred to receive lath to which shall be applied three-coat plaster work. All the rooms are to have a sand finish except the kitchen, the pantry and the bath room.

The bath room floor is to be of white mosaic tile laid in cement upon 4 in. of concrete. The side walls are to be wainscoted to a hight of 3 ft. 6 in. with 4 x 4 in. white glazed tile starting from a cement sanitary base. The fixtures of the bath room are to be of a standard porcelain make and all exposed pipes are to have a nickel plated finish.

The kitchen and pantry are to have earthenware sinks with brass fittings and all exposed pipes to be nickel plated. The laundry is located in the cellar below the kitchen and is to be fitted with two soapstone trays and an enameled iron sink.

The house is to be heated by a hot water system with radiators located in all rooms except the pantry and kitchen. The radiators are to be finished so as to match the hardware in the rooms in which they are placed.

All exterior trim is to be painted with three coats of pure white lead and linseed oil and the roof shingles are to be dipped two-thirds their length in Cabot's shingle stain.

The Interior Trim

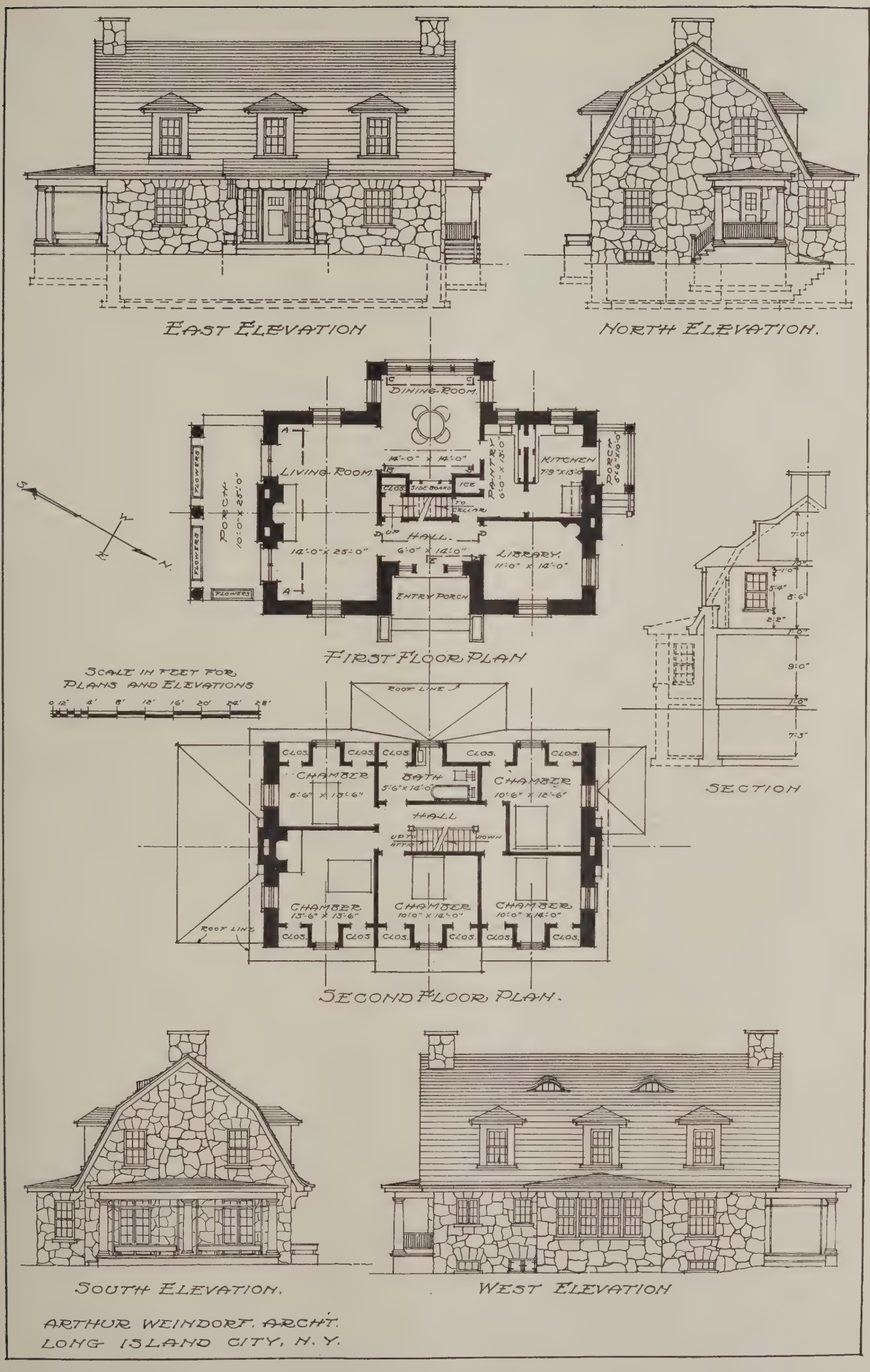
The interior trim is to be treated with a wood filler, then stained a mahogany brown and have a Mission finish. The kitchen, the pantry and the bed rooms are to have the trim enameled with three coats. The doors of all bed rooms are to be stained mahogany. All interior knobs for doors, closets, etc., are to be of glass except the kitchen hardware.

The entire house is to be piped for gas and wired for electricity with outlets provided in all rooms for combination lighting fixtures of a dull brass finish, mission type.

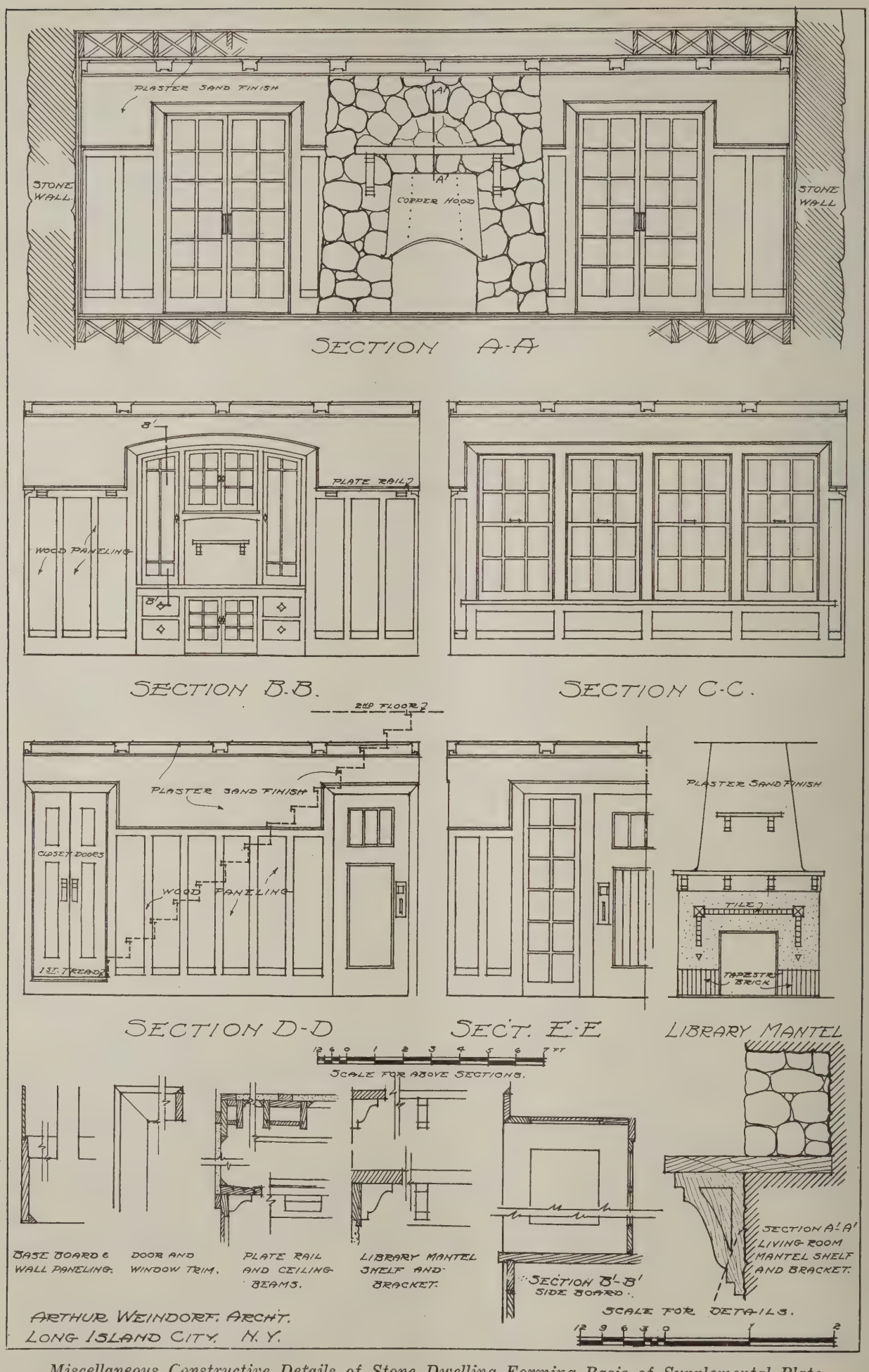
Estimate of Cost

The architect states that the estimate of cost is based on a cubic contents of 48,250 cu. ft. at a unit


ARTHUR WEINDORF.
-1914-



Plans and Elevations of Stone Dwelling Forming Basis of Our Colored Supplemental Plate



Miscellaneous Constructive Details of Stone Dwelling Forming Basis of Supplemental Plate

price of 22c. per cu. ft. and is distributed according to the following classification:

Excavating and grading	$175.00
Masonry work, including stone walls, chimneys, etc.	3,350.00
Concrete work	300.00
Cement work	175.00
Interior plastering	375.00
Tile work	150.00
Lumber, mill work and carpenter labor	3,900.00
Hardware rough and finish	330.00
Painting, staining and tinting	350.00
Metal work	300.00
Plumbing and gas fitting	420.00
Heating, hot water	575.00
Electric wiring and bellwork	100.00
Combination lighting fixtures	75.00
Extras	40.00
	$10,615.00

The above figures include the contractor's 10 per cent. profit, but the architect points out that the total cost will vary, depending upon labor conditions and the locality in which the house is built. In some sections it is probable that the work can be done for considerably less than the sum above stated. If the exterior walls are of frame construction and covered with clapboards the architect states that the house can probably be built for $7500, substituting a hot air system for the hot water heating.

The design here shown has been prepared by architect Arthur Weindorf, Long Island City, N. Y., or care of *The Building Age*, 239 West Thirty-ninth street, New York City.

Contradicting Written Agreements

Building Contracts May Be Explained, but Not Varied, by Preceding Oral Negotiations—Some Notable Cases

BY A. L. H. STREET

AFTER a building contract has been signed by both parties and has been delivered, the law declares that neither shall be permitted to deny that the agreement embodies the mutual understanding reached when the contract was entered into, except upon the ground of fraud practiced by the adverse party, or mutual mistake. As has been said by the Utah Supreme Court, "written contracts are to be regarded with some gravity, and the presumption is indulged that all prior and contemporaneous conversations and understandings are merged and embodied with them." Applying the general rule stated, the Utah court decided that where a building subcontract did not require use of materials manufactured by any particular concern, it could not be shown that there was a verbal understanding to that effect.

Written Evidence More Reliable Than Oral

The main reason for the rule lies in long experience that written evidence is much more reliable than that which rests upon fleeting memory.

The principle, however, does not prevent showing a verbal understanding on an essential term of a contract which has been omitted from the written agreement, nor oral proof that a written provision was modified by the parties after the contract was signed. Nor does it forbid recourse to verbal statements for the purpose of explaining an ambiguous or uncertain written clause. But when a feature of a contract is clear on its face, it cannot be restricted or extended by showing any verbal understanding reached before or at the time the agreement was signed. For instance, the New York Supreme Court decided that a contract to lay an "asbestos-granite" floor could not be modified by the owner setting up a claimed verbal understanding that the contractor would polish the floor and warrant the permanency of colors in it. The court said: "The writing appears, upon inspection, to be a complete contract containing all the particulars necessary to make a perfect agreement, designed to express the whole arrangement between the parties, which excludes it from the operation of the rule permitting parol evidence consistent with and not contradictory of the written instrument, where the contract rests partly in writing and partly in parol."

Some Interesting Cases

The St. Louis Court of Appeals held that a contractor who agreed to do certain excavating according to fixed specifications was not entitled to show that, in the negotiations leading up to the contract, it was orally understood that some of the requirements of the specifications were to be omitted. And, since this rule works both ways, the United States Circuit Court of Appeals for the Eighth Circuit very recently decided that an owner of a building could not assert a verbal agreement for a larger quantity of work than was called for by the written contract between him and the contractor. In a California case, the District Court of Appeals adjudged that where a building contract clearly identified the plans and specifications intended to be made a part of the agreement, it could not be shown that there was an oral understanding that another set should be used. And the same court has held that where a written agreement called for a tile roof to be constructed of "No. 2 Mission Tile," the owner could not claim a collateral verbal agreement that the tile would be of a particular shade of red, and that the material would be replaced by the builder if the owner should be dissatisfied with the color. In Massachusetts, the Supreme Judicial Court declared that where a builder was not bound under his written contract to paper a house, the owner could not rely upon an asserted oral understanding that he might deduct from the agreed price of the building

$50 to cover the cost of papering it. In a Texas case it appeared that a written contract for construction of a house provided on its face that the owner should pay $990, but it was verbally understood that the real price should be $1078. This arrangement was made because the owner's father, who was providing the necessary funds, had refused to pay more than $990. In denying the builder's right to recover the extra $88, the Texas Court of Civil Appeals said: "No one could rely upon written contracts if they could be contradicted and destroyed by the oral testimony of the parties thereto."

Improvements to Facilitate Heating

A Michigan contract for installation of a hot-water heating apparatus contained a clause in which the contractor warranted that the plant would warm rooms to a temperature of seventy degrees in zero weather, and nothing was said about any improvements to be made by the owner to facilitate heating. It was therefore decided by the Michigan Supreme Court that the contractor could not establish a verbal qualification of the warranty by setting up a claimed understanding with the owner that the latter would build a stone foundation under the house.

An Illinois builder, who bound himself in writing to construct ornamental coping on a building, was denied the right to set up an oral understanding before the contract was signed that cornice molding might be substituted. In another similar case, the Supreme Court of Illinois said: "If the specifications were attached to the contract at the time appellees executed it, then it matters not what previous understanding or arrangement existed; all prior or contemporaneous agreements were merged in the contract as executed."

An examination of specifications covering a house having disclosed a distinct requirement that a contractor who constructed the brickwork should make a fireplace, the Supreme Judicial Court of Massachusetts held that he could not show an oral understanding to the contrary. On the other hand, the Court of Appeals of Kentucky said that where a builder constructed a house according to his written agreement, the owner could not establish a verbal contract that the stairway should be wide enough to admit the passage of a piano and a bookcase.

When Builder Cannot Demand Extra Pay

In another Massachusetts case, the Supreme Judicial Court adjudged that a builder could not demand extra compensation for furnishing certain ornamental balconies called for by the plans and specifications which were made a part of his written contract, by relying upon a claimed oral understanding that the contract price should not include the balconies. And a Missouri builder was denied recovery of interest on a deposit made to secure performance of his contract, because there was no written stipulation for interest, although he sought to show that there was a verbal understanding to that effect. On the other hand where it appeared under a Connecticut contract that a building was to be constructed for a lump sum, the Supreme Court of Errors held that the owner could not show an oral contract that the price should cover a verbal guaranty that the architect's plans would prove satisfactory to the owner.

Trade customs known to both parties, or so generally known that they will be presumed to have known thereof, may be relied upon by either party on points not expressly covered by the contract, but can never be shown to contradict plain written provisions. This rule has been declared repeatedly by the highest courts of the country, including the Court of Appeals of New York. But the Supreme Court of Michigan has decided that where a contract required a builder to install doors 1¼ in. thick, he could not defend use of doors 1⅛ in. thick on the ground of any custom among builders to disregard the one-eighth inch loss in the thickness of lumber in dressing.

When the General Rule Does Not Apply

It is to be borne in mind, however, that the general rule here discussed does not apply to verbal modifications agreed upon after a written contract has been entered into. This seems to be true even where the written contract provides that any changes must be agreed upon in writing. Thus the New York Supreme Court has decided that the customary clause in a contract providing that there should be no allowance for extra work unless the same should be agreed upon in writing did not bar the contractor's right to recover for extra work verbally agreed upon between the parties.

When a written contract contains provisions which have found their way into the agreement through fraud or mutual mistake, the aggrieved party is entitled to sue to have the contract reformed to state the true agreement, if the adverse party refuses to consent to a proper modification of the terms.

Death of Miss A. P. Schenck, Architect

Miss Anna Pendleton Schenck, a partner of the firm of Schenck & Mead, said to be the first firm of women architects established in New York City, died April 29 at the New York Hospital. She was among the first women to receive diplomas at the Columbia University and she studied architecture in New York and Paris. With Miss Marcia Mead she, in March, 1914, established the firm of Schenck & Mead, of 105 West Fortieth street. The two women were successful from the start, specializing in the drawing of plans for private homes, model tenements, and even communities. In the issue of *The Building Age* for April announcement was made of the award to this firm of first prize, offered by the City Club of Chicago, for the best architectural plans for a "neighborhood center." A section of the Bronx was selected as the base of their plans. Miss Schenck and her partner also drew the plans for the Ellen Wilson Memorial Home, which is to be erected in Washington, D. C., in memory of the wife of President Wilson, the home being for workingmen and their families.

Building Inspector C. C. Knox of Youngstown, O., claims that great precautions should be taken in the construction of chimneys, as he maintains that 25 per cent. of all fires in the city are caused by defective chimneys.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

THE two standard steel handbooks are the Carnegie Pocket Companion and the Cambria Steel Manual. The designer should have one or both of these books. The Bethlehem Steel Company issues a handbook which the designer should also possess, owing to the differences in shape and carrying capacity of the Bethlehem and standard beams.

For a uniformly distributed load the size of a beam is easily obtained. Tables give the uniformly distributed loads in pounds for all spans, varying by single feet, which the different beams can carry. By reducing concentrated loads to their equivalents in uniformly distributed loads these tables may be used for any system of loading without first ascertaining the bending moment.

When concentrated loads are dealt with as such and the bending moments found the proper size beam may be found by looking up the bending moment in foot-pounds, opposite which, on the same line, is found the size and weight of the beam.

The Carnegie book formerly gave a factor of strength, C, to use when the bending moment was used. It is designated as C in the Bethlehem book and as F in the Cambria book. In the 1913 edition of Carnegie this factor is not given, the bending moment in foot-pounds being shown on the page containing the other properties of beams.

The factor of strength is obtained as follows:

Let S = section modulus in inches.

f = maximum fiber stress.

Then $C = F = 2/3fS$.

Let M = bending moment in foot-pounds.

Then $C = F = 8M$.

Having computed the bending moment in foot-pounds, multiply by 8 and in the table of properties of beams look for this value, or the nearest higher value, of F (or of C) in the Cambria or Bethlehem book. Following the line to the right the beam is found which has this factor of strength. Each of the books mentioned contains a separate table of bending moments in foot-pounds for each beam, so the designer has his choice of methods to use in obtaining a beam size when he has the bending moment instead of the uniformly distributed load.

Example.—A beam carrying several concentrated loads must resist a bending moment of 46,680 ft.-lb. What is the best size and weight of beam to use?

Carnegie (1913 edition): On page 184 it is shown that the resisting moment of a 12-in. I-beam weighing 31.5 lb. per lin.-ft. = 47,960 lb., so this beam will be used.

Page 181 contains a description of all the factors shown on page 184, relating to the properties of beams. The student is now prepared to study pages 133, 140, 141, 164, 167 to 171 inclusive, 176 to 182 inclusive.

Cambria (1913 edition): On page 118 it is shown that a 12-in. I-beam weighing 31.5 lb. per lin.-ft. has a resisting moment of 48,000 ft.-lb.

The following pages should be studied by the student, 76, 77, 80 to 89 inclusive, 142 to 147 inclusive, 158 to 163 inclusive.

Bethlehem (1911 edition): On page 38 a 9-in. girder-beam weighing 38 lb. per lin.-ft. has a resisting moment of 50,630 lb. On page 39 a 12-in. Bethlehem I-beam weighing 28.5 lb. per lin.-ft. has a resisting moment of 48,050 ft.-lb.

To understand why the Bethlehem beams are stronger than standard I-beams of equal depth read pages 3 to 9 inclusive. Then study pages 30, 31, 56, 66, 68, 99 to 103 inclusive.

In studying the pages mentioned the student should work examples in order to become familiar with the use of the tables. The tables of deflection factors should be thoroughly understood, which is not a difficult matter if the remarks on deflection in this chapter have been given proper attention.

After thoroughly mastering the subject matter on the pages enumerated the student should study pages 283 to 292 inclusive in Carnegie; 56 to 71 inclusive in Cambria; 104 to 107 in Bethlehem. The pages mentioned in each book cover the same subjects, so it is not necessary to use the three books, one giving all that is necessary. Should the student, however, possess the three books it will be good to study the subjects thoroughly in one and then become familiar with the similar matter presented in the others.

Only rolled shapes have been considered so far. Compound shapes, i. e., plate girders and trusses, will be taken up later.

Practical Problems in Design

1.—Find the resisting moment of flooring $\frac{5}{8}$ in. thick; $\frac{7}{8}$ in. thick; $1\frac{1}{8}$ in. thick; $1\frac{3}{4}$ in. thick.

Answer.—$\frac{5}{8}$ in. = 0.625 in.; $\frac{7}{8}$ in. = 0.875 in.; $1\frac{1}{8}$ in. = 1.125 in.; $1\frac{3}{4}$ in. = 1.75 in. The width will be taken as 12 in., as floor loads are generally given in pounds per square foot. The flooring is white pine having a fiber stress of 800 lb. per square inch. [In all problems it is understood that by fiber

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 50 of the May issue.

stress is meant the maximum (skin) stress.] The unit moment of resistance = 800 ÷ 6 = 133.33.

$M_r = 133.33 \times 12 \times 0.625^2 = 625$ in.-lb.
$M_r = 133.33 \times 12 \times 0.875^2 = 1225$ in.-lb.
$M_r = 133.33 \times 12 \times 1.125^2 = 2025$ in.-lb.
$M_r = 133.33 \times 12 \times 1.75^2 = 4900$ in.-lb.

2.—What is the greatest spacing permissible between joists if the deflection is to be limited the usual amount?

Flooring comes in long pieces and thus extending over a number of supports, to each of which it is nailed, the thickness can be equal in inches to one-half the span in feet. This gives a maximum span for the ⅝-in. of $2 \times 0.625 = 1.25$ ft. (15 in.); ⅞-in., $2 \times 0.875 = 1.75$ ft. (21 in.); 1⅛-in., $2 \times 1.125 = 2.25$ ft. (27 in.); 1¾-in., $2 \times 1.75 = 3.5$ ft. (42 in.).

Floors generally have greater stiffness than is here shown because of the tongue and groove along the edges, but this is frequently nullified by the fact that the loads brought on floors are more often concentrated than uniformly distributed. The above rule for deflection is arbitrary and if the spans mentioned are actually used it will be well to check the deflection by a proper formula. Refer to the table of relative strength and stiffness of beams. The deflection formula gives deflection for uniform loads on beams resting freely on two end supports. First find the deflection by the formula and multiply it by the constant found in the column of relative deflections, opposite the condition of loading to which the case under consideration may apply.

3.—Neglecting deflection, what is the greatest permissible spacing of joists for the following loads per square foot (including the weight of the flooring): 42 lb.; 78 lb.; 103 lb.; 129 lb.?

Flooring extends over several supports, so we may assume a condition of restraint and use the formula

$$M = \frac{wL^2}{12}, \text{ in foot pounds.}$$

The load is given in pounds per square foot so the span should be in feet. The formula then becomes

$$M = \frac{wL^2 12}{12} \text{ in.-lb.}$$

which reduces to $M = wL^2$ in.-lb.

Similarly for $M = \frac{wL^2 12}{8}$ in.-lb.

we obtain $M = 1.5wL^2$ in.-lb.

Another condition sometimes met with in wood and steel design and frequently used in reinforced concrete design is a partially restrained condition in which the beam rests freely on one end support and is fully restrained at the other support. For this condition the coefficient is 10 and

$$M = \frac{wL^2 12}{10} \text{ in.-lb., or } M = 1.2wL^2.$$

Using the expression $M = wL^2$ the spans for the various floor thicknesses are found as follows:

$$L^2 = \frac{M}{w}, \text{ or } L = \sqrt{\frac{M}{w}}$$

Using the resisting moments in inch-pounds obtained for each thickness.

⅝-in. flooring: $L = \sqrt{\frac{625}{42}} = 3.85$ ft.

$$L = \sqrt{\frac{625}{78}} = 2.83 \text{ ft.}$$

The rest of the examples are left to the student as a useful exercise.

4.—A floor is constructed of 2-in. (1.75-in.) planking laid over beams spaced 4 ft. 6 in. center to center, the span of the beam from wall to girder being 18 ft. Find size of beam when the total load per square foot, including weight of beam and floor, is 132 lb. per square foot. Material yellow pine with an allowable fiber stress of 1300 lb. per square inch. Deflection ignored.

Answer.—The total load on the panel is $132 \times 4.5 \times 18 = 10{,}700$ lb.

$M = 1.5 \times 10{,}700 \times 18 = 288{,}900$ in.-lb.

Try an 8-in. × 14-in. beam (7.5 in. × 13.5 in.)

$$M_r = \frac{1300 \times 7.5 \times 13.5^2}{6} = 296{,}156 \text{ in.-lb.}$$

Try for shear

$$W = \frac{4bhs}{3} = \frac{4 \times 7.5 \times 13.5 \times 130}{3} = 18{,}550 \text{ lb.}$$

(*To be continued*)

Death of W. A. Conover

One of the best-known builders in New York City and formerly a member of the Board of Examiners was Warren Archer Conover who died on April 20 at his home in Brooklyn, N. Y. He grew up in the building business under his father, the late John T. Conover of the well-known firm of G. A. & T. J. Conover, constructors of many of the largest banking, hotel and other buildings of old New York. He was born in the old Eighth Ward on King Street, on April 3, 1848, and was educated in the public schools.

His firm, W. A. & F. E. Conover was the first to make use of caisson work in the construction of large buildings. He erected the Commercial Cable Company's building at 20 Broad Street, in the construction of which caissons were first used; the Postal Telegraph building on Broadway, the R. G. Dun building, the Casino and other well-known buildings in Manhattan. He remodeled and reconstructed Booth's Theater and built the handsome residence and stables of Clarence H. Mackay at Harbor Hills, L. I. Mr. Conover retired from active business about twenty years ago and had been a resident of Brooklyn since 1903. He was for many years a member of the Library Committee of the General Society of Mechanics and Tradesmen of New York.

The Northern Hemlock and Hardwood Manufacturers Association has moved its headquarters from Wausau to Oshkosh, Wis., in order that the offices may be more centrally located.

The Modern Sliding Parlor Door

Advantages as Compared with Swinging Doors—Mechanical Features of the Hanger—The Partition

By C. J. G. Phillips*

THE planning of a modern home to secure satisfactory results, requires not only that sufficient floor space and shelter be provided, but also demands the intelligent investigation of many details. Much of the comfort, convenience, economy of maintenance and saving of household labor depends upon the incorporation in our plans of such details as have been proven successful. One of these improvements for which a great many claims can justly be made, is the sliding door,—not the old-fashioned ones that caused so much trouble by sticking, binding and jumping the track that poor Mrs. Housekeeper never used them except in cases of extreme necessity, but the modern fool-proof ball-bearing, easy running kind that respond to the slightest touch.

That architects and home builders are realizing this fact, is quite noticeable from the increasing number of sliding doors which are being used in new houses, especially the better class of residences, as well as in houses which are being remodelled. This is a decided reaction from the practice of a few years ago, when plain cased openings were carried to extremes, and indicates that the value of the sliding house door is beginning to be recognized more fully.

The fact that there are times when large openings between different rooms of the house are desirable needs no argument, but unless a satisfactory means of closing or partly closing these openings is provided, the designer has in many cases come short of the mark.

It may be comfortable in warm or moderate weather to have all the rooms open, but when the thermometer drops to 20 below zero and the northwest wind sweeps by at a 40-mile gait taxing the furnace to the limit, Mrs. Housekeeper will find it much more cosy if she can shut off one or two of the rooms having north exposure (especially the reception hall and open stairway with the accompanying drafts) and Mr. Housekeeper may be as much interested in economizing on his fuel bill.

Large openings between principal rooms may afford that "airy effect" of which we hear so much; will make the interior of a house look larger and present a general appearance of spaciousness,

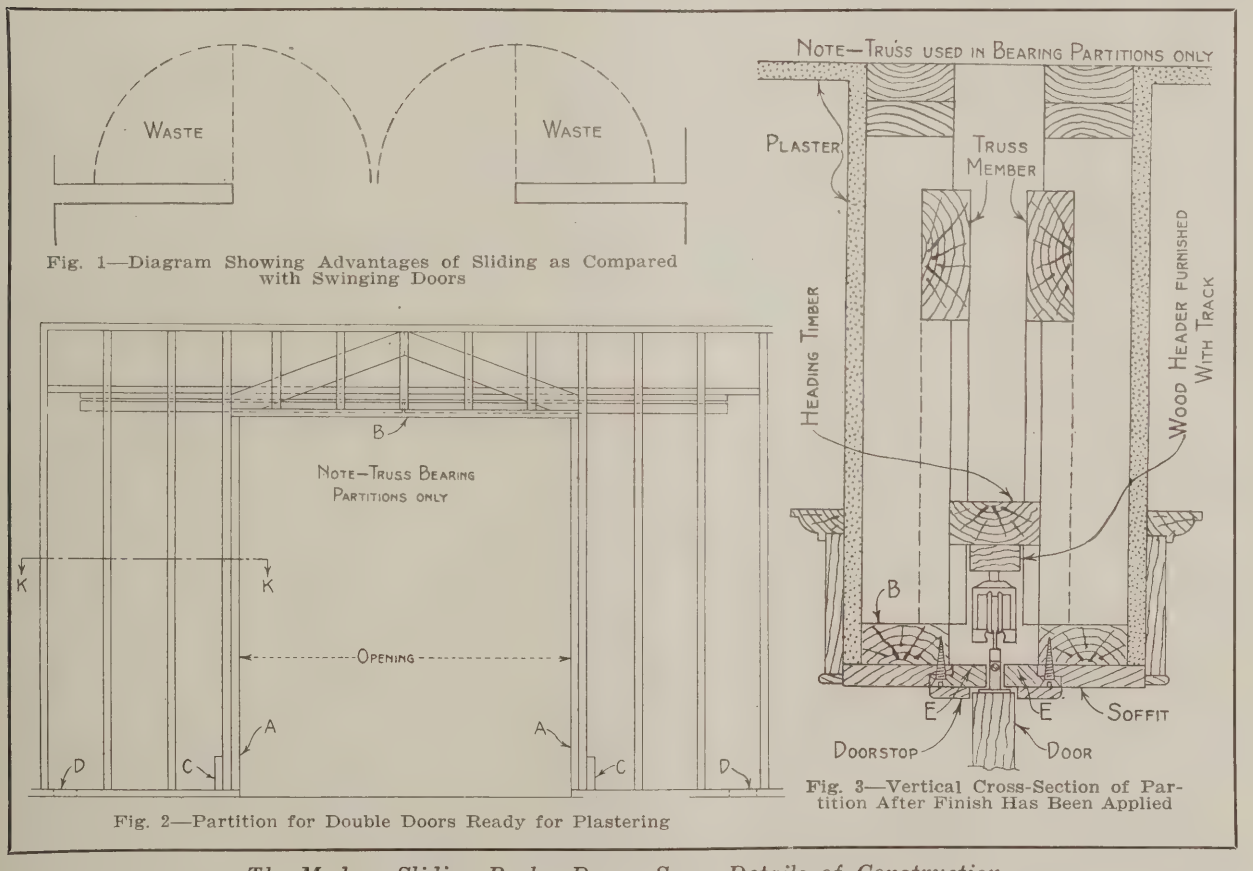


Fig. 1—Diagram Showing Advantages of Sliding as Compared with Swinging Doors

Fig. 2—Partition for Double Doors Ready for Plastering

Fig. 3—Vertical Cross-Section of Partition After Finish Has Been Applied

The Modern Sliding Parlor Door—Some Details of Construction

*Engineer with Richards-Wilcox Mfg. Co.

but when Mrs. Housekeeper is sweeping or dusting she will be able to save herself a good deal of extra work by closing the openings and preventing the dust passing from one room to the other.

Advantages Over Swinging Doors

Curtains or portières, while beautiful to look upon, do not form an effective means of closing an opening. Swinging doors in pairs and folding doors have been tried, but it remained for the modern sliding door to solve the problem in all its details and to overcome the many objections to the first mentioned doors. Swinging doors, of course, have their place and probably always will be used, but for large openings between rooms they are a back number.

In the first place, too much space is required in which to operate the doors. A pair of swinging doors for a six-foot opening requires about 28 square feet of floor space in which to operate, and deducting the space which is immediately in front of the opening, would leave 14 feet as the net amount of floor space actually taken from the room. An average narrow partition for the same opening would require only about 3 square feet more floor space than the swinging door partition, leaving a margin of 11 square feet in favor of the sliding door, as shown in Fig. 1. This extra space Mrs. Housekeeper will surely be able to use for some piece of furniture and she will also appreciate the extra wall space where pictures can be hung without being obscured by an open door.

For large openings, swinging doors, and especially the hinged folding doors, are likely to sag, lose their shape and drag on the floor or rugs because of the method of supporting from the side. In sliding doors the supporting members are at the top and the load is applied directly beneath the hangers without causing distortion of the floor.

Sliding doors require no unsightly bumpers, holders, checks or projecting knobs, all the fittings being invisible except the flush pulls of the lock and these cannot possibly interfere with anything or catch on anyone's clothing. The doors cannot be slammed shut by the wind but can be opened any desired distance and will always remain just where they are put.

Then again, when particular color schemes are being used in different rooms, each side of the sliding door can be given a different finish and the door never swings into either room to interfere with the decorative effect by showing the different trim.

The Matter of Adjustment

A consideration of importance is the matter of adjusting. As previously stated, hinged doors are more likely to sag and warp and therefore to require adjusting than sliding doors. If the sliding doors should need a little adjusting (and that is very rare) all that is necessary is a screw driver, but with the swinging door it means a call for a carpenter to dress down the troublesome corner of the door and then it will often be necessary to treset the lock plate in the jamb.

When thinking about sliding doors, we should not confine our thoughts to large openings only, for a great many peopie are coming to see the advantage of sliding doors for openings from bedrooms to closets, for doors opening into halls and other smaller doors. A sliding door in such cases does not stand out in the adjoining room to occupy valuable space, obstruct passage, shut out the light from either side of the opening or interfere with other nearby doors.

A brief review of a few of the mechanical features of the modern sliding house door hanger may be of interest. All first-class house door hangers have special points of merit but the main lines of general development have been: 1st, noiselessness; 2nd, ease of operation; 3rd, durability and uninterrupted service, and 4th, convenient and positive adjustments.

1st.—The first point, *i. e.*, the elimination of noise, which has been the subject of a great deal of study and experiment, has been attained to a high degree and now the leading hangers use one of the following combinations to overcome the principal cause of noise which is caused by the rolling of the hanger wheels on the track; metal wheels rolling on wood or wood-lined tracks, fiber wheels or wheels with fiber treads rolling on metal tracks, or fiber tread wheels rolling on wood or wood-lined tracks. Other causes of noise have also been remedied.

The Door Hanger

2nd.—To produce a door hanger which will at all times and under all circumstances operate easily, almost all kinds of bearings have been used, from the older type anti-friction bearing to roller, brass bushed and ball-bearings. Considering the fact that a house door hanger is probably never oiled or greased after the door is hung, it will be seen that one of the essentials on this line is to produce a bearing which will stand up under continuous service without appreciable wear which might increase the friction or destroy the alignment of the bearing members. Arguments could, of course, be offered in favor of all the different types of bearings, but their relative value depends as much upon the details of design and careful workmanship as upon the type of bearing itself. For instance, all manner of ball bearings are produced, but the greatest efficiency and longest service comes from hangers in which all the parts of the bearings are accurately formed and hardened and in which all the balls are of uniform diameter.

3rd.—The best house door hangers are built largely of steel and are so constructed that the wheels cannot jump the track. By providing a slightly flexible center hung pendant connection, the load is at all times equally distributed over all the wheels. Another feature which adds to the durability of the hangers, is the enclosed or box-shaped trolley track which protects the bearings from dust and grit and also prevents falling plaster from damaging or obstructing the runways or interfering with the operation of the hanger. Provision is also made for removing the track from the partition without damaging the walls.

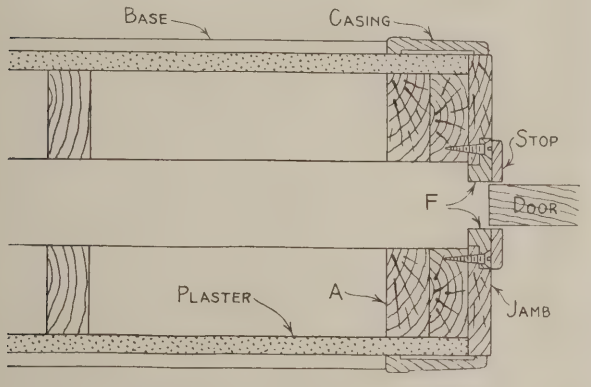
4th.—Adjustment in both hanger and track is very essential to perfect operation. These adjustments are all accessible from the opening. Vertical adjustment in the hanger provides for proper clearance between the bottom of the door and the floor, while adjustment in the track permits the door to slide parallel with the floor, to overcome

any possible errors in erecting the track or changes in alignment due to settling of the building or other causes.

The Partition

A few suggestions concerning the proper installation of sliding doors should be of interest to the carpenter-contractor and the builder. The partition which really consists of two parallel partitions with a space between called a pocket, is, of course, the first thing to consider. Though it may be looked upon primarily as a dividing wall, it must often perform other functions in a building and these must be taken into account. The illustration Fig. 2 shows a partition for double doors ready for plastering. Figs. 3 and 4 are vertical and horizontal cross sections of the partition after the finish has been applied, taken through the point "A" of Fig. 2. Similar letters apply to the same parts in all the illustrations.

The opening or doorway in each partition is framed in with a double stud, "A," on each side



The Modern Sliding Parlor Door—Fig. 4—Horizontal Cross-Section on Line K—K of Fig. 2

and a 2 x 4-in. trimmer above. Special care in selecting good, straight stock, free from twist or wind, and even a little extra time spent in dressing up these members true and square, will save a good deal of trouble when applying the trim. Line up the double studs in the two sides of the partition with a square, allowing sufficient space between and be careful to set them plumb. It is customary to allow about 3¾ in., but the minimum width for the track shown is 2¼ in. The width of the framed opening equals the width of both doors plus the thickness of two jambs. For a single door, the width would, of course, be equal to the width of the door plus the thickness of two jambs. From the finished floor to trimmer "B" equals the height of the door plus the thickness of the soffit plus ⅝ inch for clearance. When double floors are used, one should figure from the finished floor.

(To be continued)

Dry Rot in Factory Timbers

Under the above title a pamphlet has just been issued by the Associated Factory Mutual Fire Insurance Companies, Milk Street, Boston, Mass., calling attention to the losses caused by dry rot in structural timbers and suggesting methods of combating this disease. The fact that the "commercial longleaf pine" in the market is composed of a variety of grades of pine, some very susceptible to dry rot fungi, has complicated the problem for factory owners. Where it is impossible for a firm to have its timber selected by a personal representative, it is suggested that the building be thoroughly heated after its completion, moisture and temperature being controlling factors in the life and spread of dry rot fungi.

Of the artificial antiseptics in use, soaking timber in a weak solution of corrosive sublimate is most widely indorsed.

The Associated Companies are working for standard specifications in the grading of longleaf pine as a means of protection to owners and builders. At present, expensive experiments are being conducted by the Department of Agriculture and the University of Wisconsin to determine causes of fungi and new preservative processes for timber.

Officers of Master House Painters' Association

At the thirty-first annual meeting of the International Association of Master House Painters and Decorators of the United States and Canada recently held in Washington, D. C., the following officers were elected to serve for the ensuing year:

President....A. M. McKenzie, Hamilton, Ont., Canada.
Vice-Pres...W. J. Albrecht, Toledo, Ohio.
Sec.-Treas..Joel Kennedy, Cincinnati, Ohio.
Chief Organizer..Alexander Peters, Boston, Mass.

There were 22 members representing various sections elected to the Executive Board and the city of Cincinnati, Ohio, was selected by an overwhelming vote as the place for holding the next meeting of the association.

Rules for National Forest Summer Homes

The secretary of agriculture has promulgated a set of regulations for administering the new law which provides that national forest land may be leased for summer home sites and other recreational purposes in tracts of five acres or less for periods not to exceed thirty years. This law supplements the revocable permit system under which recreational use of the forests already had developed considerably. Many users have been unwilling to make substantial improvements because of the uncertainty of tenure involved in the old form of permit, which, however, is still expected to meet the requirements of persons who are not likely to occupy the land for more than a few years, or to make elaborate improvements.

The primary object of the "term permits," as the leases are called, is not to obtain revenue but to promote the use of national forest land for recreational purposes, say the regulations. At the same time, since permittees receive special benefits, it is regarded as only fair that they should reimburse the government for the expenditure incurred in administering the forests. The rates range from $5 a year up, in accordance with the location of the land, the demand for it, and the use to which it will be put. The district foresters are authorized to grant permits to applicants who intend to

make improvements costing less than $1,000 and to use the land for a period not longer than fifteen years. All other permits will be approved by the forester at Washington.

Applications must be filed with the supervisor of the forest affected, designating the location of the land desired, the use to be made of it, and the approximate cost of contemplated improvements. Examination and survey of the land will be made by the forest service free of charge. An application for a hotel or summer resort site must be accompanied by plans and specifications of proposed structures and a statement as to their probable cost. The law stipulates five acres as the maximum, and it is believed that much less than this will suffice for most persons, but permittees will not be placed close together except when it is necessitated by heavy demand for land in a particular locality.

The regulations provide among other things that permittees shall comply with state laws and the rules of the department of agriculture; that premises be kept neat and sanitary; that all reasonable precautions be taken to prevent forest fires; and that in the case of a hotel or resort the permittee shall conduct his business in a legal and orderly manner.

The New Builders' Contract in Louisville

At a joint meeting of the Builders' Exchange of Louisville, Ky., and the Association of Master Builders, both organization being members of the National Association of Builders' Exchanges, a strong stand was taken in favor of enforcing the adoption of the new builders' contract which was recently ratified by the national body and by the American Institute of Architects. As showing the favor with which the new form of contract is being received by builders and contractors in the city named it is interesting to note that a short time ago they received specifications for a schoolhouse to be erected in West Virginia and drawn by a Columbus architect in accordance with the old form of contract.

The Louisville builders and contractors declined to bid upon the work, and the joint meeting in question was called to consider the matter. The result was the adoption of the following resolutions:

"*Whereas*, The plans and specifications for the new school building for the Board of Education, of Grafton, W. Va., as prepared by Frank L. Packard, Architect, Columbus, O., are not based upon the new equitable contract documents as covered by the agreement of the American Institute of Architects and the National Association of Builders' Exchanges.

"*Whereas*, The members of the Builders' Exchange of Louisville and Association of Master Builders do not believe the best interests of owner, architect, contractor, material men or investor can be served by the use of this objectionable type of specifications, be it

"*Resolved*, That the members of the Builders' Exchange and Association of Master Builders decline to submit proposals on the said buildings under the uncertain and hazardous conditions of the specifications as submitted:

"That we urge builders and others financially interested in building construction to use their earnest effort to get into general use the wise and equitable principles of the new contract documents."

A letter was sent to the architect of the schoolhouse enclosing a copy of the resolutions and stating:

"In adopting this resolution it is not the intention of these organizations or the members thereof, to enter into controversies, or antagonize any architects who have not followed the recommendations of the American Institute of Architects, but by some means of enlightenment and education to acquaint the public with the justice of our cause, and the broad and equitable principles upon which it is based, believing that in the end the owner of the proposed building improvement will be greatest benefited. We trust that you will have your specifications revised in accordance with the new documents, under which conditions our members will be glad to submit proposals."

The new contract documents have just been put into practical use by the city of Louisville, where Chief Building Inspector William J. O'Sullivan has issued plans and specifications for a large engine house in which he plainly stipulates that the form of contract and conditions signed must comply with those recently adopted by the associations above named. Past conditions have been so unsatisfactory to the building public that it would seem that this innovation has struck a popular chord, and with a fair trial the new documents should bring about a vast improvement over old conditions.

The New York County Court House

The modified and approved plans of the new court house for New York County and designed by Guy Lowell were filed by him with the Manhattan Bureau of Buildings on May 11. As already stated in these columns the building will be circular in plan, about 450 ft. in diameter with four porticos projecting from it, and the total cost is estimated at $10,000,000. There will be 42 sets of chambers for the judges and 54 court rooms. The justices will have their chambers at the top of the building and they will have a dining room and library distinct from the large library for the use of counsel. On the second floor will be a large auditorium for the hearing of important cases or for meetings of the bar.

In the sub-basement are to be fireproof vaults for the storage of records and in the west section of the first floor or basement will be a room where jurors can wait until they have been assigned to a particular court; an emergency hospital, police station, a reporters' room, a barber shop, etc.

Estimating Plaster Work

According to the standard rules for measuring plastering adopted by the Employing Plasterers Association of Chicago, Ill., no deductions are to be made for openings of 2 ft. or less in width. One-half of the area is to be deducted for openings more than 2 ft. in width and all openings are to be measured between grounds.

The area of all store front openings is to be deducted and the contractor to be allowed 1 ft. 6 in. for each jamb by the hight.

Other rules for measurement allow one-half the area of openings for ordinary doors and windows, while some make no allowance for openings of less than 7 sq. yd.

CORRESPONDENCE

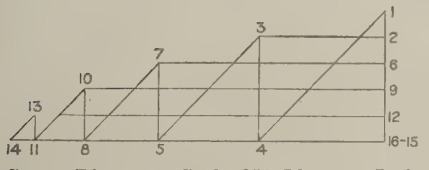
A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

Patterns for Hardwood Floors

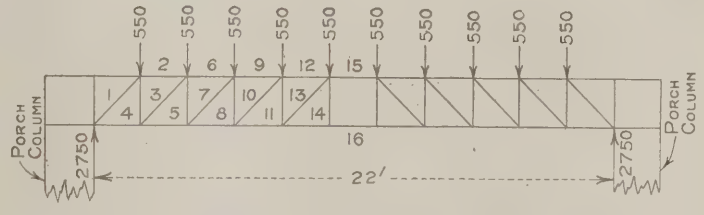
From C. D. K., Christiana, Pa.—Will some of the readers who have had experience in laying hardwood floors give, through the Correspondence columns, some patterns or designs for borders around the rooms, as well as for the main body of the area? Any suggestions will be greatly appreciated.

A Problem in Truss Construction

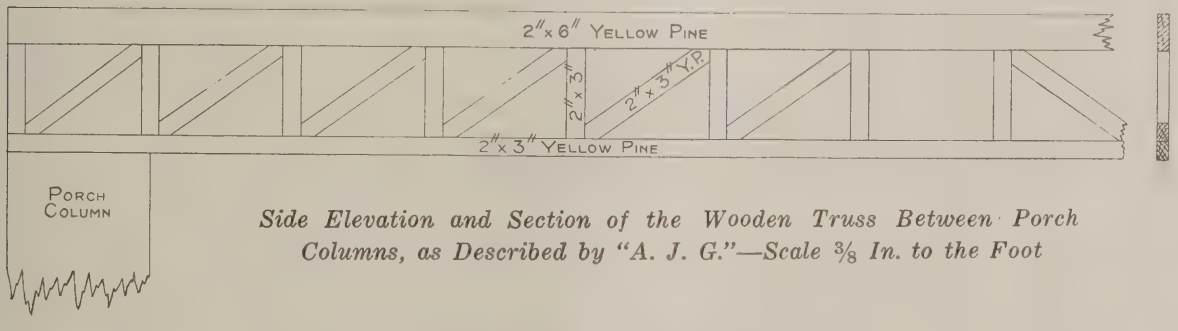
From A. J. G., Chester, Pa.—I am about to build a house in the suburbs, and would like to have a clear span of 22 ft. between the front porch columns making use of a truss, the maximum depth of which will be 2 ft. I am sending a drawing showing some of the details and shall be glad to have readers of *The Building Age* criticise the construction indicated.



Stress Diagram—Scale 250 Lbs. per Inch



Frame Diagram—Scale ⅛ In. to the Foot



Side Elevation and Section of the Wooden Truss Between Porch Columns, as Described by "A. J. G."—Scale ⅜ In. to the Foot

Compression on the upper chord, member 15-14 of the sketch, has its greatest stress = 7900 lbs.

$$\frac{W\,L}{8} = \frac{7900\ x\ 2\ ft.\ x\ 12\ in.}{8\ x\ 1600} = 14.8\ \text{res. in.}$$

Use 2 x 16-in. yellow pine = 12 res. in.

In regard to compression on the diagonals the member 1-4 has its greatest stress = 3900 lbs.

3900 ÷ (1100 lbs. safe load yellow pine will carry sq. in.) = $\sqrt{35}$ sq. in. = 1.87 in. thickness. Use 2 x 3-in. yellow pine.

Tensile stress on the lower chord: member 14-16 has its greatest stress = 7900 lbs.

7900 ÷ (1800 lbs. tensile stress per sq. in.) = 4.4 sq. in. Use 2 x 3-in. = 6 sq. in.

Tensile stress on verticals: member 3-4 has greatest stress = 2200 lbs.

2200 lbs. ÷ (1800 lbs. safe tensile stress for yellow pine) = $\sqrt{1.2}$ sq. in. = 1.1 in. Use 2 x 3-in. yellow pine.

Deflection figured as for a rectangular beam.

$$I = \frac{b\,d^3}{12} = \frac{2 \times 24^3}{12} = 2304$$

$$\text{Formula} = \frac{5\ W\ L^3}{384\ E\ I} = \frac{5 \times 5500 \times 18{,}339{,}774}{384 \times 1{,}700{,}000 \times 2304} = .34$$

in.; say about 1/3 in. deflection.

Is the above the proper way to figure the upper chord and also the deflection? If not, will some reader who has had practical experience in this line put me on the right track. I would like especially to hear from Ernest McCullough on this subject. Any information will be appreciated.

Figuring Strength of Concrete Roof Slab

From J. L. S., La Grande, Ore.—I have been reading with much interest the articles on reinforced concrete and beam design published in *The Building Age*, and would like to ask if the solution of the problem from "C. H. B." on page 55 of the April issue, as given by Mr. McCullough, is correct where he states that a 24 x 25-in. beam is the most

economical one that can be designed for the given load? As I understand the formulæ and calculations, a 15 x 30-in. beam would meet all the requirements of the case and yet contain less concrete and less steel. I would be glad if Mr. McCullough would set me right in this matter.

Answer—In reply to the above Mr. McCullough furnishes the following comments:

The correspondent is right in assuming that the beam was not the most economical possible from the standpoint of economy of concrete and steel. The size of the beam might first have been fixed by considering shear. That is, a certain depth would have been assumed which would be the effective depth to the center of the steel. Call this d and multiply it by $\frac{7}{8}$, thus obtaining the moment arm. (This is not exact, but it is used as being very close to the exact value and is safe.) Multiply this moment arm by the safe shear in pounds per square inch. One-half the total load is equal to the maximum shear. This we call V. Then

$$b = \frac{V}{jdv} = \frac{maximum\ shear}{mom.\ arm \times unit\ shear}$$

The depth and breadth having thus found the resisting moment $= Rbd^2$. If it does not equal or is not greater than the bending moment, increase the width by trial until a beam strong enough is found. Or instead of increasing the width the depth may be increased, remembering the resisting moment varies as the square of the depth. Having obtained a beam with a sufficiently large resisting moment the steel area may be found by the formula

Steel area = 0.0077bd for the assumed fiber stresses, steel = 16,000 lbs. per sq. in. and concrete = 650 lbs. per sq. in.

The correspondent, whose inquiry was answered by me in the April issue, asked how the beam and slab and steel reinforcement was figured. My reply gave the desired information, but I did not go into the matter further and give details on how to find the most economical size, considering amounts of steel and concrete. My reason for adopting the beam size given in that reply was that I knew nothing of the conditions other than those presented in the inquiry. The beam was to be above the roof and the roof slab was to be suspended at the bottom of the beam. I might have gone into more detail and shown how a narrower and higher beam could have been designed, but refrained, as it would have taken more space and would have required a warning against the use of a very narrow beam in such a situation.

A few years ago I designed such a roof with a high narrow beam and it was constructed early in a bad winter. Alternate snow and rain storms with intervals of very cold weather came along so that in the spring the resulting masses of frozen snow and clear ice in expanding sheared some of the beams at the bottom.

It seemed best, therefore, for me in replying to the inquiry to give a somewhat heavy beam which I was sure would be perfectly safe. By designing the beam as described in this present reply the designer should be able to figure a number of beams and finally obtain that which is most economical. The deeper the beam the less steel and concrete, and herein lies the great economy of reinforced concrete as compared with rolled steel sections. In using rolled steel only standard sizes may be used, the selected size often being much stronger than is actually required.

When reinforced concrete is used the size may be accurately determined without waste of material, provided danger from other causes than direct loading is guarded against.

Plan for a Small Woodworking Shop

From D. E. McD., Calgary, Alta.—I would like very much to have some of the readers of the correspondence columns of *The Building Age* furnish for publication the plan for a small woodworking shop, to be equipped with moulder and sticker, planer, cut-off saw, rip saw, jointer, shaper, band saw, chain mortise and sander. I also want space for glue room and dry kiln and will employ about eight bench hands.

The class of work is practically all detail woodwork of a varied character and no stock stuff is carried.

Construction of Concrete Chimneys

From D. P. B., Redford, N. Y.—Having read the contribution of Percy H. Wilson, which appeared some time ago on the above subject, I am disposed to give the readers my experience with concrete chimneys. The first one I ever built I used an inside "form" of wood and made it a little tapered. I whitewashed it so the cement would not stick to it. When I took it out it was very tight, but when the chimney began to dry vertical checks appeared. I decided they would never amount to anything and went ahead with the top. I wrapped the inside "form" with paper to prevent it from becoming tight, but to no avail, for it was tight. Vertical checks appeared at the top, and looked as though they would amount to nothing, but after a winter or two the chimney became a menace and there was no remedy except to knock it to pieces.

The next one I built I used 7-in. stove pipe for the inside "form" for the first 17 feet and 8 x 8-in. flue tile for the top 18 feet. From the stove pipe up are horizontal and vertical checks which permitted creosote to come through. At every joint in the tile the cracks run all the way around, but from the tile down no checks could be found. For the last chimney I built I used stove pipe for the inside "forms" throughout."

In order to avoid a square chimney I used 8 x 8-in. pipe and pressed it until the major axis becomes about 2 in. longer than the minor axis. The top is panelled, painted green and trimmed red.

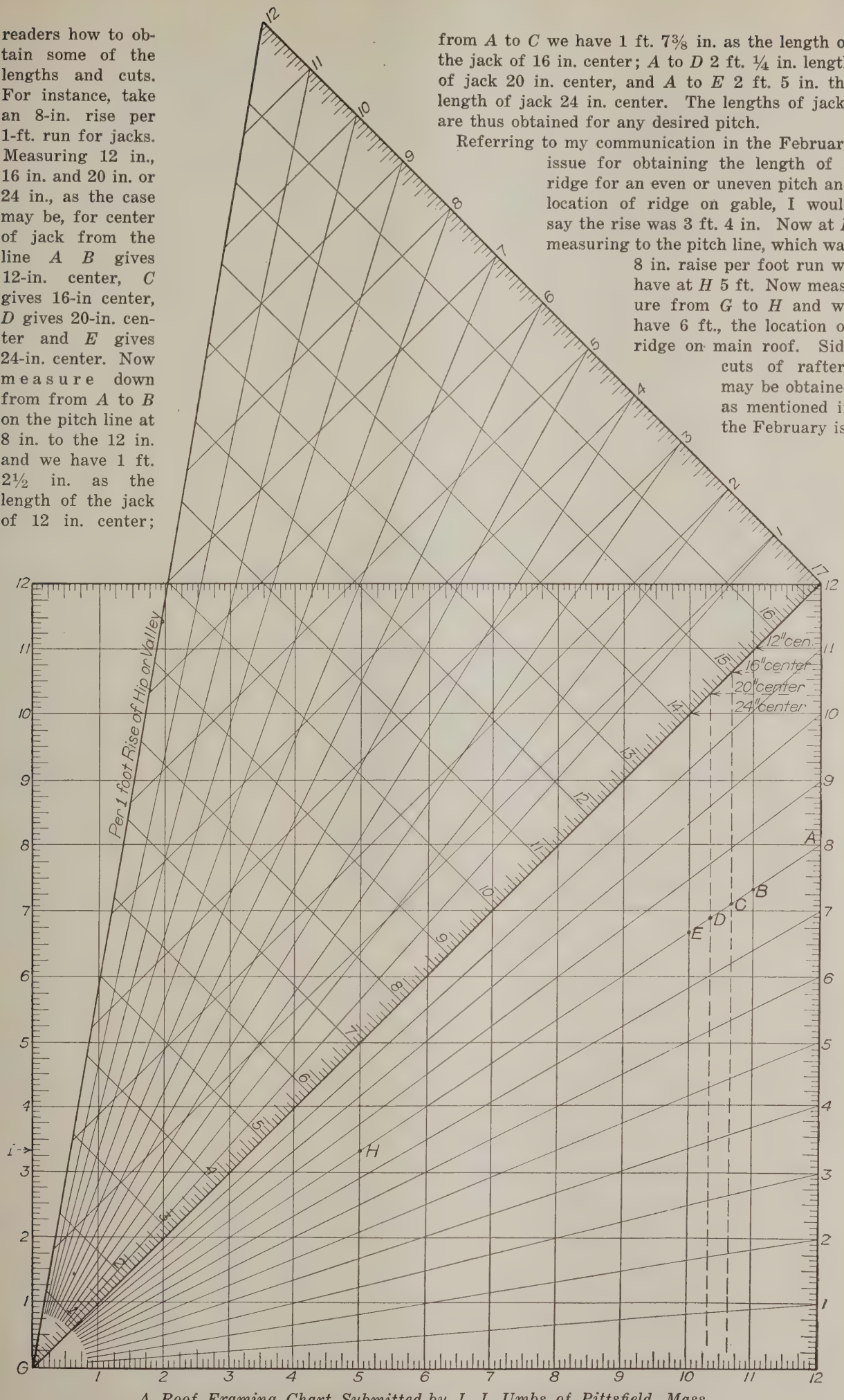
A Roof Framing Chart

From J. J. Umbs, Pittsfield, Mass.—I am enclosing what I should call a framing chart that may possibly be of some use to readers of *The Building Age*. It contains about everything in the line of framing from a flat roof to a church spire, common rafters, hips, valleys, jacks, dormers, gables, in fact, everything that can be put up on a roof to make it attractive.

In this connection I will endeavor to show the

readers how to obtain some of the lengths and cuts. For instance, take an 8-in. rise per 1-ft. run for jacks. Measuring 12 in., 16 in. and 20 in. or 24 in., as the case may be, for center of jack from the line *A B* gives 12-in. center, *C* gives 16-in center, *D* gives 20-in. center and *E* gives 24-in. center. Now measure down from from *A* to *B* on the pitch line at 8 in. to the 12 in. and we have 1 ft. 2½ in. as the length of the jack of 12 in. center; from *A* to *C* we have 1 ft. 7⅜ in. as the length of the jack of 16 in. center; *A* to *D* 2 ft. ¼ in. length of jack 20 in. center, and *A* to *E* 2 ft. 5 in. the length of jack 24 in. center. The lengths of jacks are thus obtained for any desired pitch.

Referring to my communication in the February issue for obtaining the length of a ridge for an even or uneven pitch and location of ridge on gable, I would say the rise was 3 ft. 4 in. Now at *I*, measuring to the pitch line, which was 8 in. raise per foot run we have at *H* 5 ft. Now measure from *G* to *H* and we have 6 ft., the location of ridge on main roof. Side cuts of rafters may be obtained as mentioned in the February is-



A Roof Framing Chart Submitted by J. J. Umbs of Pittsfield, Mass.

sue. The measurements there are not exact but are near enough for all practical purposes. Every length, location, cut and bevel may thus be obtained from the chart here shown.

On page 27 of the November issue of the paper there appeared a plan of a house to be roofed. One end was 4 ft. 3 in. out of square and the two hips were of different lengths. All the jacks thereon may be taken from this chart without the aid of drafting. In order to obtain better results this chart should be drawn to a scale of 3 in. to the inch.

Some Questions in Building Construction

From V. H., Salado, Ore.—I am thinking of building a country home the coming fall and would like very much to obtain practical ideas regarding the construction of chimneys, the laying of terra cotta and the making of concrete walks on the farm.

We were burned out once by not having proper flues around our stove pipes and a neighbor has just fared likewise, so when we build this fall we want to do it in a way which will be fully up to date and in accordance with the best building practice.

The new home will be lighted by electricity and any information on this phase of the work will also be greatly appreciated.

Novel Fire Escape for School House

Novel Fire Escape for Schoolhouse

From L. R. W. Allison, Newark, N. J.—While a resident of Los Angeles, Cal., I noticed in connection with a plan to diminish the fire hazard of present frame schoolhouses in Tropico, which is near the city named, the installation of a somewhat novel fire escape at the local grammar school, and as being of possible interest to readers of *The Building Age* I am sending herewith a photograph of the device. The schoolhouse in question is a 2½-story structure, and the type of fire escape shown not only affords rapid exit of the pupils, but has particular features to commend it for added security against panic and mishap in case of fire.

Known as a "Fire Slide," this fire escape comprises an iron exit balcony, similar to that regularly used in fire escape construction; this is hung from the second story at the center of the building, as shown in the accompanying illustration.

At each side of the balcony is attached the upper terminus of a concave, smooth surface metal chute, the lower ends sloping to the ground. This chute is of galvanized iron, reinforced along the edges by small channels and is set at a 45-degree angle of descent, terminating at a point 3 ft. above the ground. This latter end is supported by steel uprights, with horizontal strut and diagonal bracing, bolted to timbers embedded in the ground.

To effect a check in the force of descent, the chute at its lower terminus is turned outwards, then upwards, for a distance of about 4 ft., as will be noted in the photograph, thus throwing the occupant easily to the ground with minimized jar, and squarely upon the feet.

In operation, during fire drills, the children quickly entering the chute, slide to the ground. The possibility of clogging or congestion is eliminated, as the chute is open the entire distance and the rapidity of descent is such that no more than two persons can be on the chute at the same time. The first person is on the ground by the time the second has assumed position at the top.

Time tests at the Tropico school show that the double chute, one on either side as installed, is capable of effecting the adequate removal of 100 children per minute from the second floor, a record for fast time.

A further advantage of this type of fire escape is evidenced in its complete safety; the person once on the chute cannot fall, go back, stop or crowd others, but is carried swiftly to the ground. Additionally, there is no resulting dizziness, as in the case of the spiral chute frequently employed on frame school buildings.

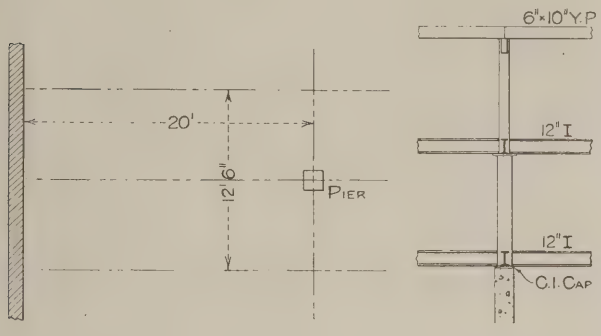
This fire escape or slide, the invention of F. V. Ashton, city engineer of Tropico, and to whom the writer is indebted for the foregoing data, costs about $150, completely installed. Being of steel and iron construction, it is particularly durable and affords low cost of maintenance.

A Question in Concrete Pier Construction

From H. S. B., Philadelphia, Pa.—I have a problem concerning which I should like an expert opinion. I have a contract to build a small addition to a factory and in the basement are three concrete piers each 8 ft. high and 16 in. square. The pier carries a load of 42 tons, made up of two floors and roof. Our building laws say concrete will bear a load of 15 tons per sq. ft. The drawings and specifications do not call for any reinforcement. The old building, probably 10 or 15

years of age, is of this same construction and seems to be O.K. The owner tells me the columns were reinforced.

As I am ignorant of the right way to determine whether or not these piers need reinforcement and how much, I would appreciate it if Mr. McCullough or some other expert in concrete work would explain through the Correspondence Department



A Question in Concrete Pier Construction

what may be the proper method of procedure. The sketches which I enclose indicate the location of one of the piers and the construction which it is intended to carry.

Answer.—In reply to the above query Mr. McCullough furnishes the following comments: In the city of Chicago the building ordinance permits the unit load on concrete, brick and stone to be used on isolated piers in which the hight is not more than six times the least thickness. The pier is 8 ft. high and 16 in. square, which makes the pier just six times the thickness so the unit load can be used. When the pier exceeds six times the thickness the unit load must be reduced according to a formula given in the ordinance. I would advise the correspondent to find what the requirements are in Philadelphia.

Assuming, however, that the same ratio of hight to thickness obtains in Philadelphia then the correspondent can use his unit loading which is, according to his letter, 15 tons per sq. ft. The area of the top of his pier is $1.333 \times 1.333 = 1.778$ sq. ft. Therefore it can carry only $1.778 \times 15 = 26.67$ tons.

The correspondent states the load is 42 tons; therefore the pier is too small. The allowable pressure on the concrete is very low. If it is good concrete it should be able to carry at least 25 tons per sq. ft. My advice is to find out just what the law will allow in Philadelphia for different grades of concrete in isolated piers, plain or reinforced. If the pier was reinforced it can be cut into at the corners, without weakening it, and determine just how much reinforcement was used, the sizes of the bars and their location. If the correspondent will send me this data I will figure the strength of the pier. If it is not reinforced I will send plans for strengthening it.

In cutting into the pier to discover the reinforcing cut as close to the top as possible. The cut need be no more than an inch wide and may extend clear around the column if necessary and it will not weaken it. The concrete on the outside of the reinforcing is not counted on for strength. The holes may be filled with mortar afterwards to protect the steel. The correspondent should get around the steel rods when found in order to accurately determine their size.

Construction of Cold Storage Room

From A. T. S., Fargo, N. D.—I would like the practical readers to give me some information in regard to the construction and ventilation of a cold storage room to occupy a floor space of 6 x 7 ft. in the cellar of a residence. I wish to install and run a dumb waiter from the kitchen or floor above to this room and also to reach this room by a door from the cellar proper so as to take advantage of the remaining space not occupied by the dumb waiter.

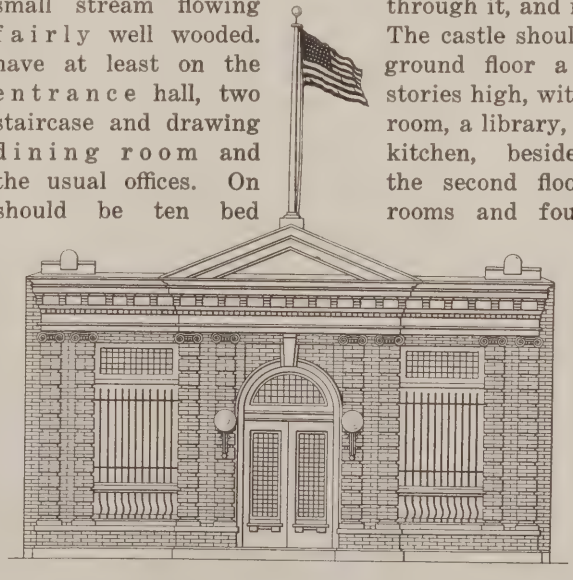
Note.—With no desire to anticipate the valuable comments which we hope to receive from some of our many friends in the trade, we would suggest to the correspondent above that he read the very excellent articles on the subject of "Constructing a Cold Storage Room" which he will find in the issues of *The Building Age* for June and July, 1911. There is also an article dealing with wall construction for cold storage rooms in the issue for January, 1911, and for June, 1909.

Front Elevation for Small Bank Building

From D. S., Brooklyn, N. Y.—I am sending a sketch of the front elevation of a 35-ft. bank building which may be of interest to "A. B.," whose inquiry appeared in a recent issue of the paper.

Plan and Elevation for a Castle

From M. P., Wilkes-Barre, Pa.—I would like to have some of the architectural readers of *The Building Age* give their ideas of a castle in both plan and elevation. The site is level ground, with a small stream flowing through it, and is fairly well wooded. The castle should have at least on the ground floor an entrance hall, two stories high, with staircase and drawing room, a library, a dining room and kitchen, besides the usual offices. On the second floor should be ten bed rooms and four bath rooms. The servants' rooms may be on the third floor. The style of architecture must be English, Tudor, Elizabethan, or in fact any historical style before the Georgian era, although part of it may be in half-timber.



Front Elevation for Small Bank Building

The Falling Line System of Hand Railing

Some Interesting Details Regarding the Methods for Finding the Bevels, Laying Out the Wreath, Etc.

By Morris Williams

IN Fig. 4 of the sketches is clearly indicated the manner in which a wreath under the same plan conditions is laid out, according to the falling-line method. The winders in this figure have been developed from the plan curve so that the relation of the nosings to the falling line may be determined. In Fig. 1 they were developed from the tangents.

Proceed in Fig. 4 by drawing the diagonal plan line from *B* through *O* continued. Draw the directing ordinate as shown through the joint *A* to *H* and draw the seat line *H-O-S'* square to the ordinate. Make *S'-E* equal in length to *S-E* in the elevation, and 1-5, 1-4, 1-3, 1-2 and 1-1 equal in length to the distances shown in the elevation reaching from the line *X-Y* up to touch the falling line and represented by the same reference figures. The points 1, 2, 3, 4, 5 and *E* thus found define the projection of the falling line.

Now to represent the plank pitch or plane in Fig. 4 draw a straight line from *H* through 3 to *C''*. From all the points upon the projected falling line draw perpendiculars to the plank pitch. Make 3-*B''* equal to the diagonal *O-B* on the plan and *C''* and *C'''* equal *S'-C* on the plan.

From *C'''* square over as shown to *N* and connect *N-B''* and *B''-M* which will be the tangents of the face mold. The joints at *N* and *M* are made square to the guide line.

To draw the contour curves of the mold proceed as follows: The centers *X*, *X*, *X*, etc., of the circles show are determined by making the distances from the plank plane to each center equal in length to the relative ordinates on the plan, extending from the seat line *H-S'* to the plan center line of the rail; for instance, the center *X* upon the minor axis is at a distance from 3 equal to the distance upon the plan from *O* upon the seat to *X* upon the plan center line. The distances from all the other points as 1, 2, 3, 4, 5 and *E* are similarly determined.

The diameter of each circle is determined by the bevels which in the falling-line system are found not alone for the joints, as in the tangent system, but also for various intermediate sections. The method of finding them for the intermediate sections is shown in Fig. 5, which is a reproduction of the

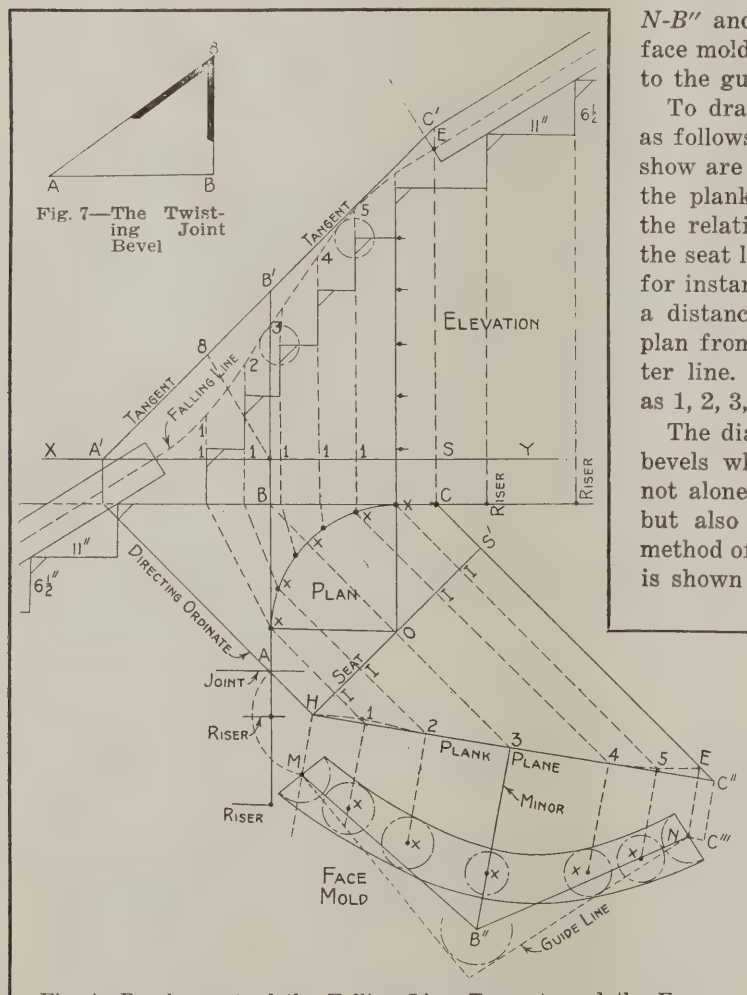


Fig. 4—Development of the Falling Line, Tangents and the Face Mold According to the Falling Line System

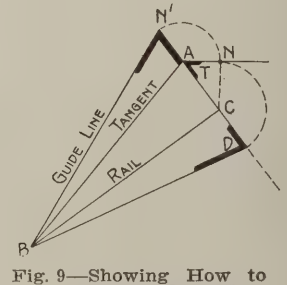


Fig. 9—Showing How to Find the Butt Joint Bevels and the Guide Lines

Fig. 7—The Twisting Joint Bevel

The Falling Line System of Hand Railing—By Morris Williams

from *O* as shown at 1, 2 and 5 of the diagram.

This method of finding the bevels is applicable to the tangent system also. They are used in the falling-line method as shown in Fig. 6 to form the various sections. The line 3-4 in Fig. 6 represents the center plane of the wreath. The section 3 being upon the minor axis is drawn as shown, half each side of the line 3-4. The position and inclinations of the intermediate sections 1, 2, 4, 5 is determined as indicated upon the various bevels found in Fig. 5 at 1, 2 and 5.

The end section bevels shown at *H* and *E* owing to the wreath being ramped are found by a different method from those shown in Fig. 5.

Referring now to Fig. 7 make *A-B* equal to the distance from the joint *A* to *B* in Figs. 4 and 5 and make *B*-8 of Fig. 7 equal to the line drawn from 8 upon the tangent to the corner at *I* upon *X-Y* in Figs. 4 and 5. Connect 8 with *A* for the bevel. It is the same bevel as the one shown at *T* in Fig. 5. Note that the hight *B*-8 in this bevel as shown in Figs. 4 and 5 is drawn parallel to the top joint shown at *C'*, or, which is the same thing, is made square to the top straight rail, differing from the method applied in the tangent system which in all cases makes it square to the pitch of the tangents as shown in Fig. 1.

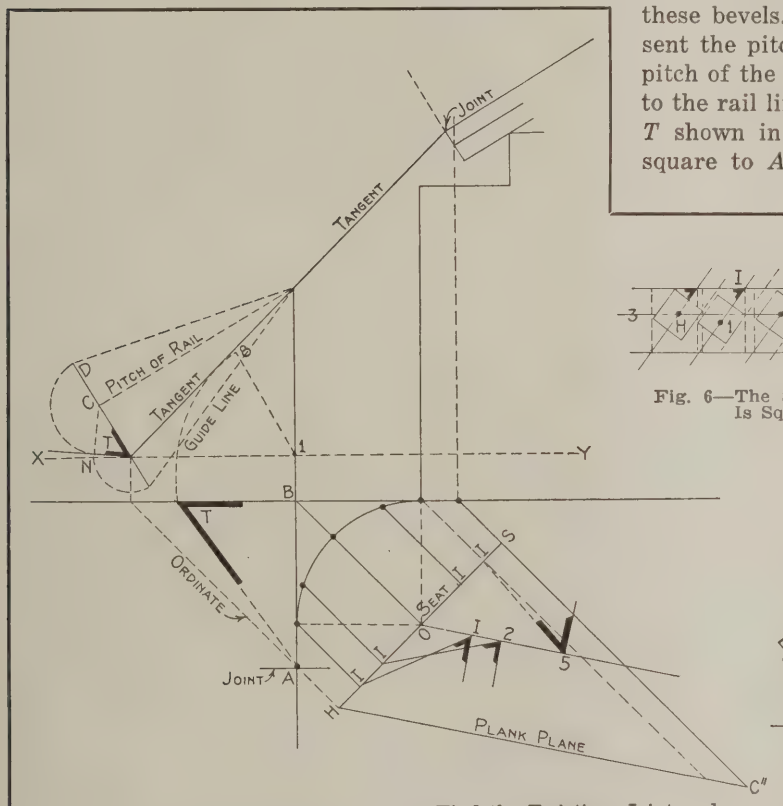


Fig. 5—Diagrams Showing How to Find the Twisting, Joint and Intermediate Section Bevels

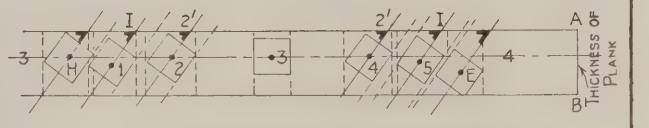


Fig. 6—The Section Board Showing How the Wreath Is Squared

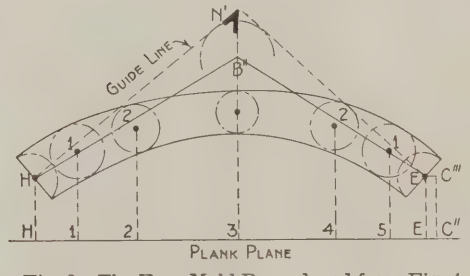


Fig. 8—The Face Mold Reproduced from Fig. 4

The Falling Line System of Hand Railing—By Morris Williams

Because the tangents are equal the bevel in Fig. 7 applies to both ends of the wreath as shown at *H* and *E* in Fig. 6. At the end *E* in Fig. 6 the section is shown below the line 3-4, a distance equal to the offset of the projected falling line from the plank plane as shown at *E* in Fig. 4. The position of all the other sections as shown in Fig. 6 are similarly fixed, from the respective offsets in Fig. 4 of the projected failling line from the plank plane as there shown at 1, 2, 3, 4, 5 and *E*.

The diagonal width of the sections in Fig. 6 shown by the dotted perpendicular lines determines the diametrical width of the circles upon the face mold shown in Figs. 4 and 8 and the contour of the face-mold curves are described by tracing along the circumferences of the circles.

In addition to the bevels under consideration which are primary for the purpose of twisting the wreath, the falling-line system provides an ingenious solution of the bevels necessary to produce a true butt joint with the square ends of the connecting straight rails. The tangent system method for this purpose as shown in Figs. 1 to 3 is far from being satisfactory, as it depends more upon the skill of the workman than upon a truly scientific solution.

In. Fig. 9 is shown the falling-line method to find these bevels. From *B* draw the line *B-C* to represent the pitch of the top rail and the line *B-A* the pitch of the tangents. Draw the line *C-A-N'* square to the rail line *B-C*. Now at *A* place the joint-bevel *T* shown in Figs. 5 and 7. From *C* draw a line square to *A-N*, cutting the bevel in the point *N*. Revolve the point *N* to *D* and join *D-B*. Revolve it again to *N'* and join *N'-B*.

At *N'* is shown the bevel to apply to the face of the joint as shown at *N'* upon the face mold in Fig. 8. The joints are made square to the guide line instead of to the tangents, as in the tangent system.

The bevel shown at *D* in Fig. 9 is to be applied to the face of and through the plank, indicating the dihedral angle between the face of the plank and the face of the joint. The application of the two to the wreath produces a true butt with the square end of the straight rail.

The process for finding these bevels is also shown at the bottom joint in Fig. 5.

The section board illustrated in Fig. 6 in addition to indicating the diametrical width of the face-mold circles, is also utilized in squaring the wreath. The method is to find on each side of the band-saw sur-

face of the wreath wood where the corners of the rail come through, as shown upon the section board, and connect the points by penciling, and on the top and bottom surface of the wood find where the sides of rail come through, then curve in the points with the corresponding part of the face-mold curve.

Now proceed to remove the waste wood to these lines so as to first obtain the sides of the finished squared wreath. Having carefully worked off the sides then remove the top waste wood to points agreeing with the corners which have already been worked and to the section lines coming through to the upper surface. The depth of the wreath is gauged from the top surface and the bottom waste wood removed to the gauging.

This method of squaring produces a wreath agreeing with the failing line in contradistinction with the tangent method which produces a wreath agreeing with the center line of the plank.

Viewing the two systems of hand railing as exemplified in the accompanying sketches the superiority in the way of simplicity must be conceded to the tangent system, while the falling-line system excels in complex cases only, where the stairway conditions call for ramping the wreath.

It may be said in conclusion that the falling-line system is the greatest achievement of the science since the advent of the tangent system, overcoming as it does all the limitations of that system. Considered as a supplementary system for special and complex cases it is of incalculable value. It completes the technical equipment required for all the exigencies of the trade.

Silos of Primitive Design

The silo as an important adjunct of the modern farm equipment is rapidly growing in favor throughout the country, particularly in those sections where the pastures do not always afford sufficient green fodder to keep the dairy cattle through

Silos of Primitive Design—A Unique Example

the winter, and resort must therefore be made to silage. It is well known that there are many kinds of silos, the construction depending largely upon the preference of the farmer, but they are by no means a present-day invention. According to tradition, hundreds of years before the Christian era the Egyptians put grain and other crops in strong covered jars. Julius Cæsar is said to have made huge clay-lined pits along his military roads to hold green forage for the return march.

In Africa the natives stored grain in a structure something very similar to a silo, but built of interwoven reeds, plastered inside and out with clay, standing on stilts to keep it away from the moist

Another Type of Silo of Primitive Design

ground and roofed with thatch. These were built from 3 to 6 ft. in diameter and from 6 to 9 ft. high. The two pictures which we present upon this page and for which we are indebted to the *Technical World* illustrate types of Mexican silos. They are made of adobe and for the most part are rather rude structures, although one of the pictures shows a storehouse that follows somewhat the lines of modern silos. We understand that similar structures may still be seen not many miles from our Texas border.

The square silo is rather ingenious, but not so good as the round type which is well built, shapely and fairly efficient. Reeds make up its frame and a thatched roof prevents the rain from washing away the clay coating.

With this much said in regard to primitive forms of silos it will be generally acknowledged that there is no better silo than that built of concrete, and preferably with concrete roof and chute. It is durable, the elements cannot destroy it, and fire in an adjacent barn cannot injure the contents. It is too strong and massive to be blown down and its cost is by no means excessive. Next in order to the monolithic silo is the concrete block silo, and in some localities conditions are such that it is to be preferred. The same amount of reinforcing material is used in both cases laid between courses.

Hights of Buildings in Cuba

One of the principal features of the revised edition of the sanitary ordinances of Cuba which became effective on the first of the year is that which prohibits the erection of buildings higher than one and a half times the width of the street on which they shall be built. The construction of high buildings, unusual for Cuba, has been contrary to law under the construction ordinances, and at present Habana has some very fine large business structures in its narrow streets.

Two-Family House at East Orange, N. J.

What Is Known as a "Double" or "Twin" Dwelling of Frame Construction with Slate Roof

THOSE readers of the paper who have recently been making inquiries with regard to designs for houses intended to accommodate two families are likely to be interested in the drawings which are presented herewith and which relate to what is known as a "twin" or "double" house; that is, one intended for occupancy by two families, but which is divided vertically from basement to ridge. The house here shown is of frame construction and has a slate roof. An examination of the floor plans shows all the rooms to be of comfortable size and each family has on the first floor an entrance hall, a bay-window parlor beyond which is a dining room and at the rear a kitchen and a commodious pantry.

On the second floor is a large hall which communicates with three bed rooms and a bath room, each bed room being provided with a commodious clothes closet. The rooms are well lighted and from the hall there is a door opening on to the balcony over the front porch. In the attic there is sufficient space for a very large room which would make an excellent billiard room.

General Appearance of the Completed Structure

The house has a frontage of 37 ft. and is divided by a 12 in. party wall running from basement to ridge. A porch extends entirely across the front of the house and from it one enters a tiled vestibule which is separated from the entrance hall by a half-glazed 3 x 7 ft. door.

According to the specifications the footings of the walls, chimneys, piers, etc., consist of one part Portland cement, one part course yellow sand and five parts gravel, laid 8 in. thick and 6 in. wider on all sides than the walls, etc., resting thereon. The foundations are 12 in. thick laid up with hard burned "Jersey" brick in cement mortar, the mortar consisting of one part Portland cement and two parts sand. The walls facing the street as well as the outside piers, where exposed to view, are laid up with best buff brick. All flues are lined with tile flue pipe the entire hight, and are 8 x 8 in. in size. The outside of the walls below grade were given a coat of Portland cement floated on from the base course up to the grade level.

The cellar windows and doors have 2 x 6 in. rough stone sills and are 2 in. longer than the window openings. The piers have 3 x 12 x 12 in. blue stone caps. The girders are 6 x 8 in. the posts 4 x 6 in., sills 2 x 6 in., and the plates 4 x 4 in. The first and second tiers of floor beams are 2 x 10 in. placed 16 in. on centers. The rafters are 2 x 6 in. placed 24 in. on centers, and the ceiling beams are 2 x 6 in. placed 16 in. on centers. Each tier of floor beams is strengthened by two rows of 1 x 2 in. cross bridging. The floor and roof beams for the porch are 2 x 8 in. placed 20 in. on centers. The wall and partition studs are of 2 x 4 in. hemlock placed 16 in. on centers and are doubled at all door and window openings in order to render the frame rigid.

The entire outside of the building, including bay window, etc., is covered with matched North Carolina pine boards driven up close and well nailed to the studding. These are covered with good quality sheathing paper, well lapped and run under all trimmings, and this in turn is covered with 6 in. white pine clapboards laid with broken joints.

The porch and all outside platforms have 1 x 3 in. tongued and grooved pine flooring. The ceiling of the porch and the entire inside of the rear porch is ceiled with 1½ x 3 in. beaded North Carolina pine boards.

The roof of the main building and of the front porch is covered with 1 x 10 in. matched North Carolina pine boards on which is laid the slate covering.

The floors throughout the first and second stories of the house are 1 x 3½ in. tongued and grooved North Carolina pine driven up tight and blind nailed to every bearing.

All outside doors are white pine and the inside doors are of veneered birch, six panel, stock design and glazed with Florentine glass. The front hall doors are glazed with plate glass. The bath room windows have Florentine glass.

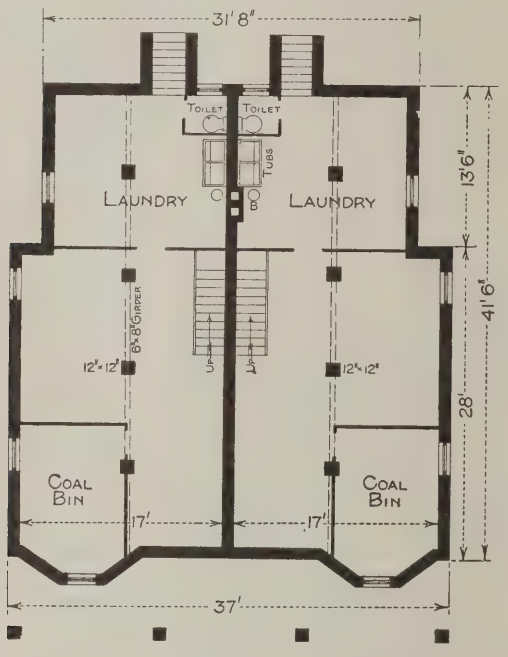
The interior trim is of cypress, the jams being

⅞ in. thick and having a ⅝ x 2 in. molded stop planted on the face. The dining room walls are finished with chestnut panels and all other trim corresponds. The bay-window parlor is 11 x 14 ft. 6 in. and is separated from the hall and the dining room by sliding doors. It is fitted with a solid mahogany mantel and the trim is white enameled.

The kitchen for each family is provided with a sink and drain board placed in a corner near the window so as to give ample light. The kitchen equipment includes a Thatcher range and a gas hot water heater, also a gas range. There is a "wind break" or rear entry opening out of the kitchen and through which communication is established with the backyard. The pantry which measures 5 x 8 ft. in size has a built-in ice box connection.

The laundry is in the basement and has a two-part Alberene wash tray, a sink, a gas stove and a toilet.

The walls and ceilings of the rooms on the first and second floors are plastered two-coat work, the



Two-Family House at East Orange, N. J.—Foundation Plan—Scale 1/16-in. to the Foot

plaster for the first coat being mixed with finishing lime and white sand gauged with plaster of paris. The third story is finished with Peerless wall board.

There is a separate sewer connection for each side of the building so that each plumbing system is entirely independent of the other. Each bath room has an iron enameled wash basin, or lavatory, a 5-ft. iron enameled bath tub and a porcelain water closet with cabinet oak finished copper lined flush tank. All pipes and faucets in the bath rooms including the waste pipes to the floor are nickel plated. All fixtures are supplied with hot and cold water.

The house is piped for gas and wired for electric lights and bells. The vestibule and bath rooms have tile floor and the kitchen has a tiled base for the range.

All outside work was treated with two coats of white lead and linseed oil and all metal and tin work received two coats of metallic paint. The gutters and flashings were painted on both sides. The front hall door is grained and varnished in imitation mahogany and given two coats of Spar varnish. All inside wood work except the floors received one coat of liquid wood filler and then after being rubbed down a good coat of transparent varnish.

The houses are heated by "Model" steam boilers made by the Richardson & Boynton Company, 31 West Thirty-first street, New York City, properly installed and with asbestos and air-cell covering for the pipes.

The building here illustrated and described was erected at East Orange, N. J., at a cost approximating $6,000. The general contractors were Kaplan Bros., Inc., Newark, N. J., and the same contractors furnished the plans and specifications, prepared in accordance with sketches of the owner, Fred Arlen, 136 Jefferson avenue, Brooklyn, N. Y.

Officers of Chattanooga Builders' Exchange

In our last issue we referred to the preliminary steps looking to the formation of a Builders' Exchange at Chattanooga, Tenn., since which time a permanent organization has been effected, with officers as follows:

President.....F. B. Sloan
Vice-Pres.....A. F. Hahn
Secretary-Treasurer.....John L. Snoddy

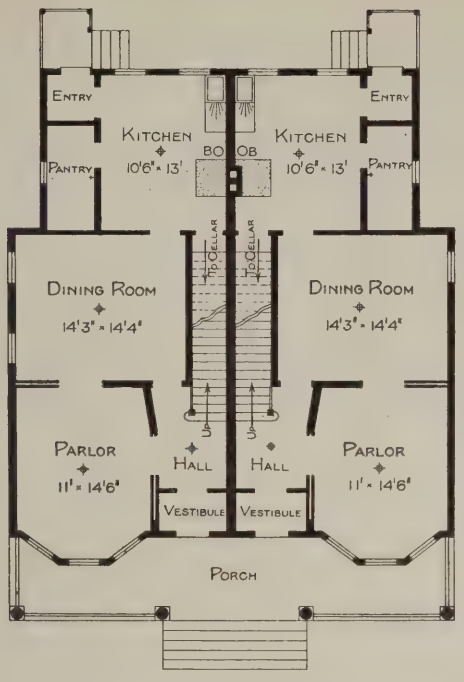
A Board of Directors was also chosen consisting of 10 members and it was at a meeting held by them on May 6 that the permanent secretary was selected. Permanent headquarters have been established in the Montague Block and the rooms have been fitted up to meet the requirements of the organization. The Exchange organizes with practically 100 members, representing all phases of the building industry.

Planning "Form" Work Ahead

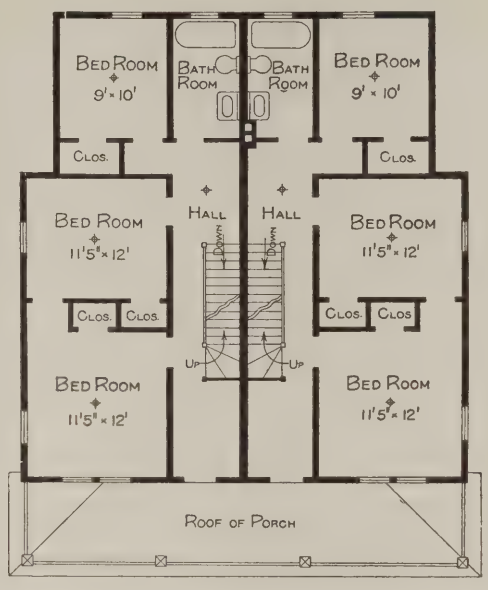
Some years ago when we sent the foreman simply a set of blue-prints of the building and said "Go ahead and build it," leaving him to work out his own "form" designs, column "forms" used to cost, for direct labor, as much as 18 cents a square foot, and floors 12 cents, says Leonard C. Wason, president of the Aberthaw Construction Co., Boston. Now we spend much time in the office making plans —sometimes as many as forty-five sheets of "form" details for a simple building. These designs may cost .2 of a cent per square foot of form-work. But now if the cost per labor for floor forms runs over 4 cents a square foot we want to know what is the matter; if it runs over 7 cents for a column we usually make a row. We have come to the conclusion that a dollar spent intelligently in the drafting room usually saves ten on the work—sometimes more.

A Norman Castle in New York

Observant architects and builders visiting the upper confines of Greater New York have been much interested in the picturesque structure which stands on the ground of the Mount St. Vincent Academy at Riverdale, overlooking the Hudson River. It is known as Fonthill Castle and is said to be as near like the accepted form of mediaeval



Main Floor Plan—Scale 1/16 In. to the Foot



Second Floor Plan—Scale 1/16 In. to the Foot

Front Elevation of House Showing Balcony: also Section Through Main Wall—Scale ⅛ In. to the Foot

Two-Family House at East Orange, N. J.—Designed for Fred Arlen of Brooklyn, N. Y.

strongholds as anything to be found in this part of the country. The castle consists essentially of a series of six towers of various hights and dimensions standing out close to the edge of the river. Fringing the tops of the towers are battlements and rifle ports.

The tallest tower, known as the stair tower, rises 70 ft. above the campus. The stairway is of granite inserted in a solid brick column which extends from the basement to the roof. In the main tower there is an octagonal shaped rotunda and surrounding this room at a hight of 16 ft. is a gallery faced with Norman arches. The rotunda is lighted from a large old-fashioned glass dome in the ceiling.

The castle is used as a museum and some of the mineral collections on exhibition are said to be of great interest and value. The building is probably the nearest approach in appearance to the warlike homes of Norman barons to anything at present to be found in this part of the country.

Export Trade of the United States in Construction Materials

The era of rebuilding which will follow the establishment of peace is quite likely to open new markets for American manufacturers, and this fact makes important a special compilation of the Department of Commerce of the Bureau of Foreign and Domestic Commerce, which enumerates representative articles making up our foreign sales of construction materials and articles necessary for the equipment of buildings and factories.

The following table includes representative articles used as building materials or for factory and house furnishings and shows the value of their exports from the United States in the fiscal year 1914:

Articles	Value
Boards, scantlings, shingles and sawed timber	$66,278,014
Structural iron and steel	12,533,063
Pipes and fittings, wrought	14,337,973
Furniture, wood and metal	7,443,217
Builders' hardware	6,031,879
Cement	3,382,282
Paints, varnish and white lead	3,148,705
Galvanized sheets	3,773,425
Chandeliers, etc.	2,806,034
Dynamos, etc.	2,634,465
Nails and spikes	2,253,451
Stoves and ranges	1,808,196
Doors, sashes, trimmings	1,794,013
Bolts, nuts, etc.	1,635,707
Transformers	1,455,343
Elevators	1,382,893
Telephones	1,552,951
Zinc oxide	1,215,366
Roofing felt	1,029,127
Hair	1,085,038
Fire brick	976,335
Leather belting	879,604
Bath tubs and lavatories	779,369
Tiles (except drain)	779,323
Interior wiring, fixtures	721,069
Marble and stone	676,723
Building brick	623,115
Batteries	685,640
Paper hangings	453,412
Electric fans	432,656
Radiators, etc.	429,720
Window glass	347,106
Electric lamps	468,269
Plaster	283,325
Lime	200,437
Sand	188,999
Roofing slate	188,057
Linseed oil	134,540
Fire extinguishers	109,573
Oil cloth for floors	60,403

A complete enumeration of the various markets for these materials would not be practicable in a brief statement. It may be said, however, that our lumber goes largely to Europe, Argentina, Australia, Cuba, Mexico, and China; our structural iron and steel to Canada and Panama; our builders' hardware to Canada, Central America, and Europe; our paints, chiefly to Cuba and South America, and our varnishes to Europe.

New Edition of National Building Code

The National Board of Fire Underwriters has issued the fourth edition of the Building Code, a proposed ordinance providing for fire limits and regulations governing the construction, alteration, equipment, repair or removal of buildings or structures. The revised edition contains over 60 pages of new matter and represents the best engineering practice of the day. The first edition of the Building Code was published in 1905, since which time more than 20,000 copies of it and succeeding editions have been distributed to the public.

Steel "Forms" Compared with Wood

The appearance of a steel "form" job is much better than that obtained with wood. The lines are true; the surfaces are smooth, with none of the irregular corners one gets with boards when they shrink, or where, if a little weak, they spring. It is much easier to finish the surface after the steel forms are stripped.

But the small wedges and keys which are used are a nuisance. They are so small that they are easily lost. On one job we provided three times as many as were needed to set up all the forms, says Leonard C. Wason, president of the Aberthaw Construction Co., Boston. After the forms had been used four times there were hardly enough keys and wedges left for the fifth. We trust to save them by putting a man with a pail at the special task of picking them up as soon as they were removed, but had to buy more. The bonding together and wedging of panels is something which will have to be studied out by the makers, so that the keys will stay with the plates and not be lost by falling to the ground.

Brighter Outlook in Building Trades

As indicating a brighter outlook in the local building situation, Secretary Roswell D. Tompkins of the United Board of Business Agents of the Building Trades, is reported to have said a few days ago that nearly 115,000 building workmen are at work in the building industry in New York and that only about 10,000 or 12,000 are now unemployed.

"Those now idle," said Secretary Tompkins, "will be at work in a month or so and then all workers in the building industry will be busy.

Building Operations in St. Louis

The fiscal year of the Building Department in the city of St. Louis, Mo., ended on April 13 and in his report to the mayor, Building Commissioner James M. McKelvey stated that the total estimated value of building operations for the period named was $12,327,931. This was a decrease of $2,647,979 from the total of the preceding year and was the smallest in eleven years.

Building a Genuine Indian Bungalow

A Description by a Native of India of the Way the Work is Done in That Country

By A. R. Sarath-Roy.

THE building of an Indian bungalow is rather an exciting experience, for labor is plentiful and cheap and mostly unskilled. Also the chances of getting just what one sets out to obtain are somewhat hazardous, for the methods of calculations for material and strength, as well as tools and implements employed are, to say the least, "just a little primitive." But it is an education, and when one is through with it all, he has a glorious feeling, something like the glow after a cold bath in icy weather, accompanied by the triumphant feeling of having done something big. In fact, there is a Hindu proverb which runs thus, "A man is a man, only after he has built a house, planted a tree and begotten a son." Notice the house is put as the first item—probably because it is the most difficult.

The Bungalow Architect

The architect who would specialize in India in building bungalows, would fare like the poet who dissipates his borrowed capital in return stamps. The native of India has no use for a bungalow architect. Custom and tradition have definitely outlined the styles and the methods of procedure in their construction. Thus every man is his own architect. When a man wants to build a bungalow he digs in his garden to see how much money he has, then he decides which of the four styles of bungalows he will build. The four styles are:

1. Kuccha with thatched roof.
2. Kutcha with Khapra roof.
3. Puckka with Khapra roof.
4. Puckka with Puckka roof.

Here I may mention, before explaining the above styles, the essential characteristics of the Indian Bungalow—a Hindu word, pronounced correctly as bung-ga-low—differing from the American bungalow. An Indian bungalow is

Features of an Indian Bungalow

1. Never more than one story high.
2. Has always rooms with high walls, seldom lower than 14 feet and often rising to 22 feet high.
3. Must have outside light in every room.

Kutcha means raw, and refers to the bricks, which are so-called if they are sun baked, in contradiction to puckka, which is kiln baked or burnt. *Puckka* as applied to the roof means a solid brick or concrete roof, on which one may walk and sleep. *Khapra* is the word for earthen tiles, which are generally burnt red, and sometimes painted. They resemble the so-called Spanish tile used in California on the roofs of the old Mission houses. In fact, they are the same, except in size.

The Master Mason

When all the above preliminaries have been decided the man sends for a master mason, who is generally a gray-haired man and the real architect. After his wages (which is a matter of ten to fourteen rupees per month, a rupee being about 33 cents) has been agreed upon he is told of the plans of the bungalow. The master mason makes his comments and says how many bricks will be required. It is a mystery as to how he makes his calculations; perhaps some ancestor of his with mathematical genius twenty generations before him had worked it all out, but he is generally pretty accurate in his guess. He says it will require so many kilns, big or small. A small kiln contains 5000 to 6000 bricks, and a large kiln 8000 to 10,000, even 12,000 bricks, the number varying in different parts of India.

Next the plan of the bungalow is staked out with string and peg, and the thickness of the walls—18 in. to 24 in.—is outlined by strings staked parallel on the outside of the general plan. Laborers are set to dig the foundation 4 ft. deep. It is a solid foundation, there being no cellar.

In the meantime brickmakers have begun their work with their hand moulds, making 300 to 500 bricks in an eight-hour day. As fast as the bricks dry in the sun the master mason begins constructing the kiln, and the method used is a wasteful one, and while it is a part of the work of building a bungalow, I shall not describe it here for want of space. Yes, the bricks take about a day of the scorching hot tropical sun to dry. After the brick kilns have been completed a lime kiln is built to burn the quarried lime that has to be used for mixing the mortar.

Building the Foundations

Large stones and boulders are brought, and they are hewn and cut into slabs to be placed at the bottom of the foundation. Other stones and bricks are broken into small pieces to fill in the foundation. While the master mason is directing and superintending all this work, the brick kilns are burnt out and cooled. The black-burnt bricks, which are hard as a rock, are selected, and the master mason, with other masons, begins laying the bricks of the walls 4 ft. below the surface, and these walls are raised 4 ft. above ground.

Then the foundation is filled in with broken stones and bricks between layers of mortar and

cement till it is level with the top of the walls 4 ft. above ground. It is soaked with water, then rolled and beaten down solid and allowed to dry out. But this is only one department of the work that is going on.

A master carpenter has been employed. He has been buying lumber, sal and teak, the sissum wood and other woods in barked, dried and seasoned trees. Sawyers cut these trees into planks, beams and rafters, and then the work begins on the frame of the house. He with his apprentices and fellow carpenters make the doors, window frames, jalousies, etc.—in short, everything required in wood for the bungalow.

Even the blacksmith has come with his fire and his forge. He makes the necessary hardware. However, to-day he is not so much in requisition, as the people are now buying the readymade hardware imported from foreign lands.

When the Carpenter Takes Charge of the Work

Soon the walls rise to their height of 20 ft. to 22 ft.; then the carpenter takes charge, and the master mason turns his attention to the floor. Big, heavy beams, some of them 2 ft. square, some 2 in. x 20 ft., are laid 3 to 5 ft. apart; then 2-in. x 2-in. rafters are nailed on them from 9 in. to 12 in. apart. Then, if the roof is to be *Puckka*, the master mason again takes charge and lays one or two layers of brick, which are covered over with pebbles and small pieces of broken bricks set in mortar and cement, then beaten down. The *Puckka* roof is beaten down with a flat wooden hammer curiously shaped like a flat-iron with a handle attached to it, by dozens of women. If the roof is not to be *Puckka* it is covered with just a layer of brick and cement to make it water tight.

The walls are plastered and whitewashed, after which the floors are leveled up and polished smooth with a composition of powdered burnt brick, slaked lime, molasses and a vegetable oil called surgoojah oil. This composition is thickly laid on the rough leveled floor and smoothed with a trowel, the lubricant used being the above mentioned oil with a heathen name.

The outside walls have been raised about 2 ft., while the middle walls reach a height of about 8 ft. above the ceiling to support the roof of thatch or *Khapra*. Plenty of space between ceiling and roof is necessary to keep the house cool in summer. The roofers take up their work and lay the tiles, on the wooden bed prepared by the carpenter.

When the Work Approaches Completion

The work is approaching completion; the carpenters are busy fitting in the doors, jalousies and window panes, but it will not be ready for occupancy until they have made the furniture, then the house or bungalow is complete. As the railroads make places more and more accessible, more readymade furniture is being bought and brought from the great cities. Mail order houses are very active in India, and they sell anything from a shoestring to a full-grown grand piano.

To return to the bungalow, it might be interesting to note that the walls are neither panelled nor papered—just plastered and whitewashed. The floors are bare brick and cement, covered with reed and fibre, bamboo or grass matting to make them less bare and hard. There are chimneys and mantel-pieces in many of the more modern houses, but only for decoration. The fireplaces are bricked up and the flues cannot be used—probably neither sound nor hydrogen gas would pass through them. It is a precaution against vermin and snakes.

Thatched roofs of grass or straw are the coolest, but they are dangerous firetraps, and in the long run, expensive. After one season of tropical rains they rot and become filled with fat, blue, 4-in. maggots that look like fire worms found in old fires that are kept up continually, and are very disgusting to the sight.

Kutcha walls are weak and do not last very long. They soon weaken in the heavy tropical downpour. In India they build houses to last for generations, therefore it is almost a disgrace and a sure sign of poverty to build a bungalow of *Kutcha* or sun-baked bricks.

Bungalows vary in size, some of them containing as many as twelve and sixteen rooms, all on one floor. Ground is cheap. In some parts it can be bought for 25 to 50 rupees per acre. All Indian bungalows, perhaps without exception, have at least two verandas, one in front and one in the back. Very often verandas surround the houses, and they are always protected by the roof, which comes down low over them, projecting 3 ft. or 4 ft. beyond. This gives the appearance of a low roof.

The Kitchen

The kitchen is seldom included in the bungalow of a foreigner. It is built with brick oven and range for charcoal fire in a shed at some distance from the house, and is often connected with the back veranda by a covered run.

It would be difficult to note all the points of interest and differences at one sitting. Yet it may please some to know that there are no city or government inspectors to come in and condemn a building for weakness or defective sanitation. There is more or less of a chance for graft—depending on who reads this. Also one has not to wade through reams of meaningless architect's specifications, which serve only as a groundwork for an embellishment of extras for which the man who foots the bills has to pay.

Another parting shot: There is not an inch of plumbing in the Indian bungalow. The bath water passes out through a hole in the wall, which, bye-the-bye, affords a splendid ingress for wandering snakes in search of a habitat, and the refuse is carried out in porcelain utensils. Rather crude and primitive, but the safest method for the tropics.

Now go ahead and build an Indian bungalow. It will make a man of you, educate you as an engineer, architect, etc.; harass, embarrass and drive you crazy. I am just getting over it.

Reliable statistics show that of all the timber trees cut in our forests less than half of the available wood material is actually used.

For shingles alone, 750,000,000 ft. of timber is cut in that part of the State of Washington which lies west of the Cascades.

Rustic Pergola for the Country Home

Details of a Picturesque Arbor That Is Inexpensive to Construct—Supporting Columns of Concrete

THE rustic pergola, or arbor as some might term it, which is shown in the picture on this page, has for its support four octagonal cinder-concrete columns surmounted by undressed timber; in fact the picture shows them to be just as they were cut in the woods. In constructing the columns there were required 3 cu. yds. of cinder and 3 bbls. of cement, the work being done by one man in four days. This mixture, however, is too lean and unsafe for the unskilled worker to use and the proper proportions of cement sand and stone are given below.

The arbor is 8 x 12 ft. The columns are 7½ ft. high, 2 ft. at the base and 18 in. at the top. Each has a foundation of concrete 2 ft. 6 in. each way—in other words, a concrete footing of that dimension. A square form of boards was erected and corner pieces inserted to form the octagon. It was intended to give the columns a finishing coat of plaster, but they looked so well in their crude state that it was never applied.

Simple designs of this type compare favorably with the most costly and ornate conceptions, and are made at greatly reduced cost. Had the columns shown in Fig. 1 been elaborate in design and surmounted with dressed timbers it is questionable whether the arbor could have been built for less than $100. Moreover, many people of good taste would prefer the more rude and simple patterns. These columns take their place in the landscape with the unobtrusiveness of a tree, while their rough surface is better adapted to the growing of vines than columns possessing a smooth surface. In fact, the columns on the world-famous terrace at Amalfi are even more simple than these octagonal forms.

Two types of forms for constructing columns are shown in Fig. 2 of the drawings. The form at the left is the more economical where it is the purpose to use it many times, but for a single operation, such as the arbor described, the form at the right with braces nailed instead of being fitted with bolts would be more economical.

The concrete could be mixed in the proportion of 1 part Portland cement, 2 parts sand and 4 parts stone or screened gravel, as cinders are not always available. It is important to remember that cinders do not mean ashes, so it would be better to use the stone or gravel.

The work here shown was executed in Beverly, N. J., at the suburban home of J. Fletcher Street, a Philadelphia architect.

Fig. 1—The Appearance of the Finished Arbor or Pergola

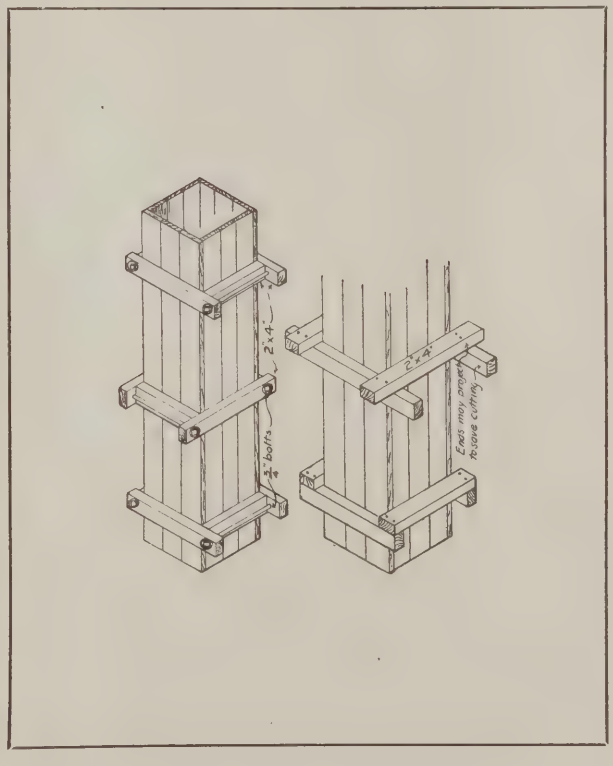


Fig. 2—Two Styles of "Forms" for Making the Columns

A Rustic Pergola for the Country Home

Something About Thatched Roofs

More or less comment is appearing in the foreign building and architectural journals regarding thatched roofs and a correspondent in a London paper expresses great regret that on many rural cottages and farm houses thatch has been replaced by corrugated iron; that is to say, "One of the most beautiful of roof coverings has substituted for it the most hideous." Continuing he says:

"Perhaps those who live in towns are more susceptible to the beauty of thatch than are those who, living in rural surroundings, are more accustomed to it, for to us the countryside would lose half its charm and individuality if the thatched roof were to disappear. There are few, if any, lovelier artificial things than a thatched English cottage or farmstead, and none that have become more completely a part of the tradition and the spirit of English landscape, and of that rural scenery which has for centuries inspired the work of the greatest hands in poetry and art. To those—and it is to be hoped they are many—by whom the unspoiled charm of the country is regarded as a real and valued inheritance, the loss of so time-honored a rural grace must be a matter of serious concern.

"Not only on the ground of beauty may the use of thatch be advocated, it is also a very good nonconductor of heat, consequently it is warm in winter and cool in summer. A well-thatched roof should remain snug and weatherproof with but little repair for from twenty to thirty years, and reed can be placed on rafters which would be too light for other materials.

"Again looking at the subject from the farmer's or breeder's point of view, experts tell us that stock never do so well as when brought up under the thatch roof. In most places there are still good thatchers, and an increased demand would doubtless cause more men to learn the work.

"Apart from the question of cost, there are two objections generally raised against the employment of thatch; first, that it harbors vermin, and secondly that it is inflammable. As regards vermin, a dressing of corrosive sublimate is stated on high authority to be a protection against fleas, etc.

"There are several effective methods of fireproofing thatch, one of which consists of sulphate ammonia 28 lb., carbonate ammonia lump 14 lb., borax lump 7 lb., boracic acid 7 lb., alum lump 14 lb., water 500 lb. The reeds may be dipped into this or sprayed, or it can be put on with a garden hose after the reeds are fixed."

Buildings and Water Supply of Ancient Rome

The Romans were essentially a constructive race, highly educated, and a people who understood the principles of hydraulics. Ancient Rome was supplied with water by means of four aqueducts, which delivered 51,000,000 gallons daily. This quantity is much in excess of modern demands, and to-day the surplus water which still flows through the old aqueducts is utilized for electric light. Professor Munro, in a recent address before the Engineering Society of the University of Bristol, England, laid particular stress upon the beautiful gateways and arches which the Romans constructed whenever it was necessary for an aqueduct to traverse a highway. Of the supply for Rome, a length of 242 Roman miles lay underground, while 42 were above ground.

Fountains were a particular feature in Roman construction, and many are still to be found in a state of remarkable preservation. The marvelous condition of effectiveness in which the Roman constructions remain is due chiefly to the stone which was used in their construction. Tufa, a stone of volcanic origin, and soft enough, when first exposed, to be worked with bronze tools, produced an exceedingly hard and durable building-stone on exposure to the atmosphere. Another stone of aqueous origin, known as Travertine, was cut out in blocks for building purposes of 2 ft. square cross section by 4 ft. long, and these blocks are characteristic of Roman remains to-day.

Many of the Roman buildings were constructed of concrete, with the result that whole structures, such as the Pantheon at Rome, appeared as though cut out from a solid block of material. In many cases triangular bricks, ½ in. thick, faced the concrete buildings. Professor Munro concluded his address with a description of the Pantheon, circular in form, and possessing walls 20 ft. in thickness. The dome was originally covered with gold-plated bronze, but this was appropriated by Constantine. The building seems to have served every purpose, from a sweating-room for the baths in the time of Agrippa to a mausoleum for the Kings of Italy at the present time.

Specifications for Log School House

In a certain school district of Montana, the trustee decided that they would build a log school house, and this is the way the specifications read, says a recent issue of the *Improvement Bulletin:*

One log house, 20 x 30 ft. inside (the logs are on the ground). Hight from floor to ceiling, 10 ft.; the logs must be hewn on the inside; cement foundation 12 in. thick, 2 x 8 joists, 18 in. apart, double bridged; double floor, rough lumber with building paper between, with hard yellow pine matched floor, wainscoting 4 ft. high from floor, 6 windows, 3 on each side, size of window glass, 14 x 30. One door in end of room, 2 ft. 8 in. by 6 ft. 8 in., 2 in. thick, with 12-in. transom. Ceiling joists 2 x 6 inches, 2 ft. apart. Shiplap must be put on ceiling, with beaver board on top and walls must be beaver board to meet wainscoting. Rafters, 2 x 6 in., 2 ft. apart; sheeting solid with building paper between sheeting and shingles. Shingles must be laid 4 in. to weather; gable ends, shingled with building paper between. One brick chimney, hight 4 ft. from top of roof. Put in middle of room. Shutters on outside of windows. One shed or entrance, 8 ft. long and 10 ft. wide, to be put in main building; walls from floor, 10 ft. high. Roof must be same hight as main building, with paper and shingles; also gable end must be same as main building. Rough lumber on wall with paper and siding on outside. One window, 12 x 24 glass. Belfry put on top for school bell. One door, 2 ft. 8 in. by 6 ft. 8 in., 2 in. thick, with mortised lock.

The World's Costliest Apartments

Many of our readers have heard of the fabulous sums which are yearly paid as rental for some of the apartments in New York City, but it is doubtful

if there be more than a comparatively few who realize of what one of these costly apartments consists. The one which has set the high water mark in rentals occupies an entire floor in a 12-story building at the corner of Fifth Avenue and 81st Street, and there is one other apartment in the building having the same space. Some may ask what should make an apartment worth a rental of $25,000 a year, and in reply it can be said that for one thing the building in question is located on the most costly land available for such houses and the other is that it contains every known device to render life safe and comfortable. The site of this building contains 12,800 sq. ft. and the land is worth something like $100 a sq. ft., the property representing an investment of about $3,000,000, which, divided among the 12 floors, means $250,000 a floor.

For the purpose of showing the general arrangement of the rooms in this high rental apartment we present herewith the floor plan of it. A few moments' study will show what a labyrinth of rooms there is and what an army of servants is necessary to look after the needs of a private household occupying a single floor. It will be seen that there are two passenger elevators to serve the tenants and these are a solid case of metal lined with French walnut exquisite in grain and finish.

Floor Plan of the World's Costliest Apartment House

Stepping from the elevator one finds himself in an outer corridor or hall, from which he enters a vestibule with floor of marble but walls paneled to the ceiling with English oak treated in such a way as to give a subtle blending of green and gray and brown. Beyond the vestibule is a conservatory 15 x 34 ft. in size, windows along one side admitting light from the central court, which is 32 ft. square and faced entirely with mat-glazed tiles to increase the reflection of light. At the front of the house are living room, dining room and billiard room with fireplaces in the first and last named.

Perfection of detail is one of the big items in boosting the rent of this apartment. For example, every bit of hardware was gold plated before it was put in place, and this was done for a double purpose. Gold does not tarnish and the fixtures will not, therefore, need to be polished but simply to be wiped with a dry soft cloth. This prevents the marring or discoloring of the wood in which the fixture is set. For the side lights in many of the rooms the brackets are of solid brass, gold plated. In the dining room they are silver plated on white metal. All radiators are concealed inside the paneled sections below the windows, the heat escaping through grated openings. Outside the paneling there is a little button at the end of a tiny brass handle not more than an inch long. This turns in a circle from one to another of four diminutive brass knobs no larger than shoe buttons. This little brass handle makes it possible to regulate the valve which admits steam to the radiator so that one can have four different amounts of heat.

The casement window above the radiator is another feature. In the wooden frame next to the casing there is a gold plated lever. When the lever is turned upward the entire window moves up an inch, which brings it clear of the window sill. The usual knobs, also gold plated, are then turned and the casement opens quite according to the poetic tradition.

The dining room measuring about 20 x 28 ft., is a perfect example of the seventeenth century Adam rooms. The walls are solid paneled with five ply veneer wood to prevent warping or splitting. The walls are painted with nine coats of paint as carefully as the work of finishing an automobile body is done. There are three tones used to differentiate the various moldings and panels. The broad surfaces are in the palest of French grays, some of the moldings are white and the rest are just off the white. The mantel is of white marble, clouded with gray, and the lighting fixtures are silver plated.

From a private hall leading from the vestibule one enters the sleeping rooms on the 81st street side. Most of these have private baths; all of them have closets, and in the wall of each closet is built a jewel safe with the usual combination lock for safeguarding the family jewels.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in April, 1915, and April, 1914

SINCE the first of the year the decreases in building operations month by month as compared with the corresponding period of 1914 have grown rapidly less until an equilibrium has almost been established for the month of April. Reports from 109 cities give a total estimated cost of building improvements for which permits were issued in that month to be $80,588,412, while in April last year the total was $81,259,311, thus showing a difference of less than one per cent. By dividing the country into four sections or zones it is found that the eastern cities show an increase in the value of building operations as compared with last year and similar comments apply to the cities reporting from the southern states, although to a somewhat less degree. Other sections report decreases.

Naturally interest attaches to the showing of the larger cities and it is gratifying to note that out of the five boroughs constituting Greater New York four show an increase over last year in activity, as do also Philadelphia, Hartford, Jersey City, Manchester, Bridgeport and Newark. Of the 41 eastern cities reporting 21 show increases and 20 decreases. The accompanying table shows the figures for the respective periods.

CITIES IN THE EASTERN STATES

	April, 1915	April, 1914
Albany	$285,745	$1,156,595
Allentown	144,860	438,700
Altoona	108,570	130,107
Binghamton	180,335	567,727
Boston	5,257,000	5,471,000
Bridgeport	1,493,413	233,844
Brockton	80,803	71,797
Buffalo	1,190,000	1,280,000
Elizabeth	141,575	193,774
Erie	213,918	399,183
Harrisburg	95,375	292,175
Hartford	582,602	447,143
Hoboken	57,600	105,273
Holyoke	21,395	554,137
Jersey City	694,000	262,171
Lawrence	74,150	190,960
Manchester, N. H.	909,520	113,421
Newark, N. J.	949,846	754,142
New Bedford	437,520	392,150
New Haven	465,320	249,485
New York:		
Manhattan	6,920,467	5,446,463
Bronx	3,057,143	1,938,742
Brooklyn	5,284,656	5,230,120
Queens	2,412,905	2,422,248
Richmond	389,787	230,236
Passaic	81,099	239,982
Paterson	124,426	293,458
Philadelphia	3,449,900	3,075,905
Pittsburgh	974,283	1,158,225
Portland, Me.	177,734	85,000
Quincy, Mass.	154,725	153,511
Reading	111,375	87,200
Rochester	1,159,257	1,156,109
Scranton	118,952	157,383
Schenectady	101,748	184,453
Springfield, Mass.	365,475	450,460
Syracuse	271,474	483,780
Troy	60,745	37,330
Utica	573,360	277,005
Wilkes-Barre	119,746	86,194
Worcester	542,860	485,174

From the middle states there are 30 cities reporting, of which 17 show increases and 13 decreases, with a resulting loss of 6.18 per cent. In view of the labor troubles in Chicago it is not surprising that there should be a falling off in active operations last month in that city as compared with the year before, but, on the other hand, Cincinnati, Cleveland, Detroit, Kansas City, Mo., Minneapolis and Toledo show important increases.

CITIES IN MIDDLE STATES

	April, 1915	April, 1914
Akron	$381,035	$659,030
Canton	217,520	107,100

CITIES IN MIDDLE STATES (*Continued*)

Chicago	6,820,700	9,465,800
Cincinnati	1,317,485	964,423
Cleveland	3,076,385	2,594,115
Columbus	406,555	683,555
Dayton	210,260	421,300
Des Moines	225,223	181,178
Detroit	4,268,460	3,013,725
Duluth	340,178	440,491
East St. Louis	378,280	78,745
Fort Wayne	238,520	388,550
Grand Rapids	298,394	132,134
Indianapolis	776,511	1,037,466
Kansas City, Mo.	1,125,170	736,665
Kansas City, Kan.	147,560	113,995
Lincoln	195,999	172,540
Milwaukee	1,150,508	1,311,739
Minneapolis	1,951,035	1,912,290
Omaha	389,420	593,035
Peoria	317,305	202,650
Saginaw	69,816	93,585
St. Joseph	130,320	74,820
St. Louis	986,719	1,734,412
St. Paul	829,914	1,204,759
Springfield, Ill.	115,115	79,015
Superior, Wis.	95,445	67,514
Toledo	959,042	772,144
Topeka	108,875	69,875
Youngstown	219,505	470,035

In the southern tier of states there are 22 cities reporting, of which 8 show increases and 14 decreases. The totals so nearly equalize as to leave a difference of only $10,256, or a shade more than .15 per cent. gain over last year.

CITIES IN SOUTHERN STATES

	April, 1915	April, 1914
Atlanta	$446,337	$565,879
Baltimore	1,019,186	635,215
Beaumont	36,008	51,799
Birmingham	169,701	318,144
Chattanooga	44,295	219,490
Dallas, Tex.	492,175	565,335
Greensboro	66,800	48,935
Louisville	282,400	447,870
Memphis	438,355	420,085
Miami	64,000	43,950
Nashville	70,078	258,505
New Orleans	339,571	204,587
Norfolk, Va.	152,623	312,630
Oklahoma	46,865	35,825
Richmond, Va.	370,114	557,131
Savannah	139,585	58,830
San Antonio	131,955	324,760
Shreveport	63,817	160,668
Tampa	106,665	125,280
Tuscan	18,734	49,765
Washington	1,929,020	851,309
Wilmington	124,020	286,056

Coming now to the extreme western section of the country, with 16 cities reporting, 3 indicate increases and 13 decreases, with a loss of 19.2 per cent. The important changes are found in Los Angeles, Portland, San Diego, Seattle, Denver and Spokane.

CITIES IN WESTERN STATES

	April, 1915	April, 1914
Berkley, Cal.	$129,000	$303,950
Colorado Springs	12,045	60,000
Denver	326,590	225,405
Los Angeles	1,591,399	1,898,304
Oakland	530,302	405,540
Pasadena	96,923	156,455
Portland, Ore.	559,415	769,500
Sacramento	58,591	207,345
San Diego	95,350	240,805
Salt Lake City	252,852	321,200
San Francisco	1,646,374	1,707,064
San Jose	103,077	83,094
Seattle	837,105	1,227,930
Spokane	127,775	216,610
Stockton	38,503	58,742
Tacoma	47,889	105,303

For the first four months of the current year the showing compares favorably with 1914, there having been a decrease of only a little more than 5 per cent.

Every Reader of Building Age Is "In" on This Offer

We want you to see with your own eyes just what this remarkable labor-saving tool is and does.

If we can only place the **Ideal Three-In-One Rafter Try and Mitre Square** in your hands, we know you will boost it heartily to all your builder-friends.

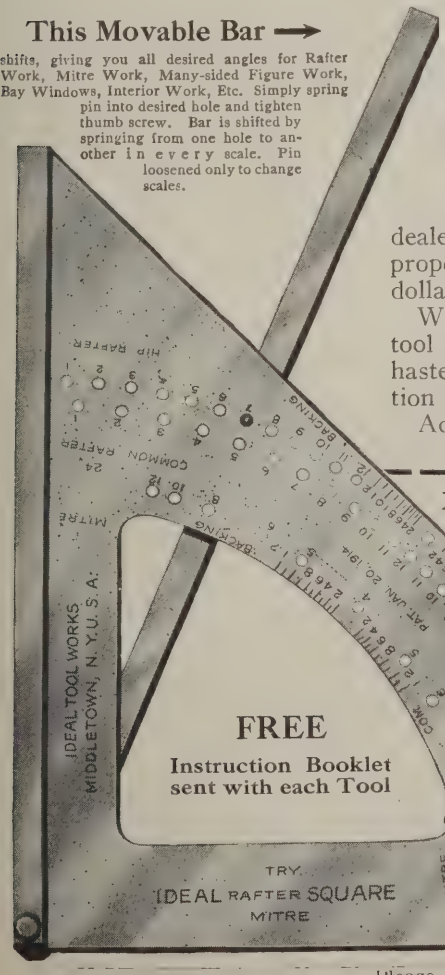
And that, of course, means more business for us and labor saving for **your builder-friends.**

So here's our offer! **To every Building Age reader giving us the name of his local dealer we will give credit for $1.00 on this $2.00 tool. We'll chop the price in half! And we'll pay the postage too!**

The "Ideal" enables any man to accurately lay out any style rafter or make any mitre cut.

It takes years of practice by the steel square method to lay out rafters such as Common, Hip, Valley, Jack or Cripples. Here it is all laid down in scales that any man can understand. Simply shift the movable bar into the hole showing the number of inches rise to the foot and mark it off. The different rafter scales are marked on the square (see illustration).

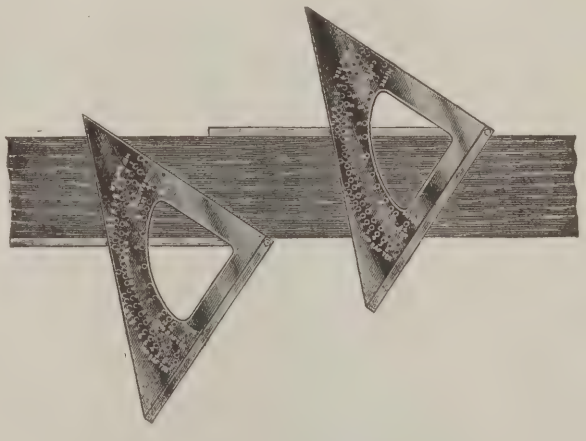
With the "Ideal" you can cut 3, 4, 5, 6, 8, 10, 12, or 24 equal-sided figures and cut 81 different angles, making it splendid for bay windows or mitre work. It is absolutely accurate and dependable. Made of the finest tool steel, carefully finished and fits in the tool box nicely.



The coupon below is placed for your convenience. All you need to do in order to get the $2.00 Ideal Tool for $1.00 is to mail us the name and address of your local dealer, and the coupon properly filled out with a dollar bill pinned on.

We will return you the tool postpaid and post-haste, with a free instruction book included.

Act Now!



Ideal Tool Works, Middletown, N. Y. (A)

Gentlemen—I wish to take advantage of your special half-price offer and am enclosing $1.00, for which I am to receive, prepaid, your regular $2.00 Ideal Try, Rafter and Mitre Square.

Name .....

Address .....

Town .....

State .....

Dealer's Name .....

Address .....

.....

Town .....

State .....

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

"Almetal" Store Front Construction

An improved form of store front construction which is being brought to the attention of architects and builders by the Detroit Show Case Company, 483 West Fort street, Detroit, Mich., is known as "Almetal" and is made in but two pieces, the outer part being of No.

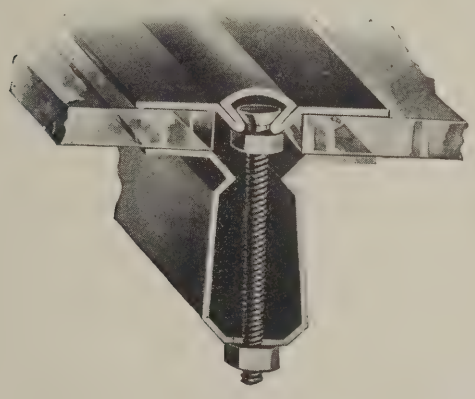


Fig. 1—Division Bar in the "Almetal" Store Front Construction

16 B & S gauge copper and the inner part of No. 20 gauge. One of the special features is the division bar, which is made in two sections only and is illustrated in Fig. 1 of the engravings. The inner piece is drilled for the screws, and the latter are tightened in place in the face piece before glazing is commenced, the construction being such as to provide adjustment to the thickness of the glass. The screws do not show in front, and the face of the bar is plain and clean. The claim is made that equal pressure is exerted against both outer and inner pieces. A point of safety is the rabbet in the "Almetal" store front, which is very deep, and this means a good grip on the glass. If the latter happens to be cut scant the hold of the "Almetal" is not weakened. A heavy wind will press the glass in and out from the window, but the deep rabbet of the "Almetal" will not allow the glass to escape. When the glass settles in the sash a creosoted block will save it from disaster. The complete "Almetal" line consists of sill, jamb and transom coverings, awning transom bars, bulkhead covering, kick plates, etc., and any reader of the paper who may be interested can secure on application a copy of the architects' detailed sheet and price list sent out by the company.

The "Transfer" Brand of Shingles

We have before us a copy of an attractively printed pamphlet profusely illustrated with halftone engravings and describing how the Transfer brand of shingles are made by the Transfer Lumber & Shingle Company, North Tonawanda, N. Y. The pamphlet represents an effort on the part of the company to better acquaint its friends and those whom it would like to have become its friends, with conditions surrounding the manufacture of red cedar shingles and particularly to show that considerable science is required to produce high grade shingles. The illustrations represent views in the forest where the red cedar is obtained, also interiors of the mill where the "bolts" are being cut up into shingles, the packing department, the dry kilns showing zigzag method of loading on trucks to insure uniform drying, and the repressing department where each bunch of 16-in. shingles is repressed at the dry end of the kiln before the labels are pasted on. The descriptive matter is of a most interesting nature, and we understand that any reader of *The Building Age* who desires a copy can secure one by sending to the address above given.

The Stewart Garage Heater

In every garage, whether it be the building intended to house only one or two cars or the more pretentious affair with accommodations for several of the popular vehicles of the present day, a necessary and exceedingly convenient adjunct of the equipment is a heater for providing warmth as well as a supply of hot water for washing the car or for other purposes. A construction which is well adapted to meet the requirements of the small garage is illustrated in general view in Fig. 2, representing as it does style "B" of the Stewart garage heater made by the Fuller & Warren Company, Troy, N. Y. This heater is provided with tank having cover and faucet, and is especially adapted for use where it is not possible or convenient to have running water. The construction is of cast iron with the exception of the body, which is of heavy rust-resisting sheet iron.

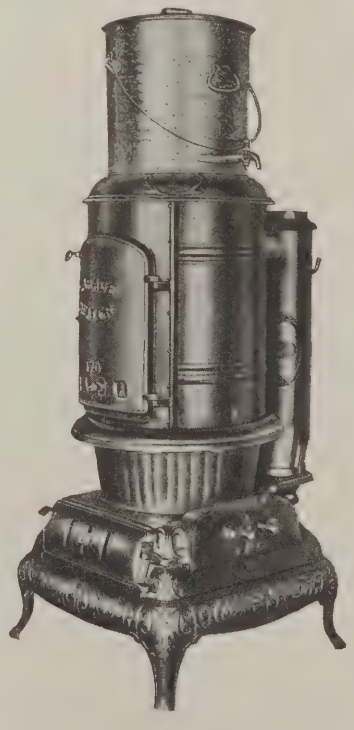


Fig. 2—General View of Stewart Garage Heater

It has an all-cast iron return flue which increases the effective heating surface, gives complete control and tends to promote perfect combustion. The grates are of the triangular type, operating very easily and insuring a bright clean fire. Where wood is used for fuel a wood plate is furnished at slight additional cost.

Where coal is used a self-feeding magazine is provided which will keep a steady fire going from 24 to 48 hours. The ash pit in the heater here shown is very large with the bottom sunk so as to permit the use of an ash pan of unusual capacity. The body of the heater is drilled for a water heater connection and securely capped so that if such an arrangement is desirable at any time it can be easily made. The style of garage heater here shown is made in 3 sizes, with inside diameter of fire part ranging from 15 in. to 19 in.

Sargent's New Tonguing Plane

Until recent years it was necessary for carpenters to tongue the edges of board with one plane and groove them with another, both of the planes being made of wood. Several patterns of combined tonguing and

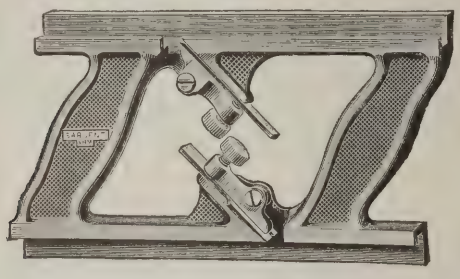


Fig. 3—Side View of Sargent's New Tonguing Plane

grooving, or matching planes have recently been manufactured, which will cut a tongue in one board to fit into the groove of another. One of the latest and most improved devices of this kind is the Sargent matching plane, made by Sargent & Co., 53 Water street, New Haven, Conn., illustrated in Fig. 3 of the engravings. These iron matching planes are made in three sizes so designed that by using one side they cut the tongue and by turning over they cut the groove. They are light and compact in construction with no waste metal. Being flat they are conveniently carried in the carpenter's tool kit or in the drawer of his bench. The ledge or guide on the plane is 3/16 in. wide. No. 1066 will cut a ⅛-in. tongue and groove on boards from ⅜ in. to ½ in. The tonguing cutter is not wide enough for boards thicker than this. To make the tongue and groove central the boards should be ⅜ in. No. 1067 has ⅞-in. cutters and is designed for ⅝-in. boards, although it may be used on boards from ½ in. to ¾ in. No. 1068 has a ¼-in. cutter, and is designed for a ⅞-in. board, but may be used on boards from ¾ in. to 1 in.

Metal Lath Hand Book

We have just received a copy of the above named work published by the Associated Metal Lath Manufacturers, 812 Wick Building, Youngstown, O., and which is priced at $1 per copy. It was edited by H. B. McMaster, formerly Commissioner of the Publicity Bureau, and upon the title page is given a list of the members which embrace, the Bostwick Steel Lath Company, the North Western Expanded Metal Company, the Berger Mfg. Company, The Sykes Metal Lath & Roofing Company, American Rolling Mill Company, Consolidated Expanded Metal Companies, the Garry Iron & Steel Company, the Trussed Concrete Steel Company, the General Fireproofing Company, the Penn Metal Company and the Corrugated Bar Company. The book is designed to place concisely before architects and contractors the best methods of using metal lath. Illustrations and descriptions of various kinds are given, together with observations by the best authorities on construction affected by its use. Not the least interesting feature of the work is found in the condensed record of various scientific experiments, particularly in the way of fire tests which have been made to determine fundamental data affecting the use of metal lath. One of the tests presented is that made by Professor MacGregor at the Columbia University Testing Station in Brooklyn to determine the fire resisting value of the light solid metal lath wall. The results of this test and various illustrations concerning it appeared in *The Building Age* of December, 1914. Another feature of the hand book is an illustrated description of the metal lath made by each of the various members of the association. The entire matter is arranged in a way to be of special value to the architect and builder, especially the pages on acoustics, overcoating, specifications for exterior plastering, finishing, etc.

Annual Meeting of Joseph Dixon Crucible Company

The annual meeting of the stockholders of the Joseph Dixon Crucible Company, was held at the company's office in Jersey City on Monday, April 19, 1915. A large attendance of stockholders present expressed their satisfaction with the management and re-elected the former board of directors for the ensuing year. The vote recorded was the largest ever represented at an annual election, 19,519 shares out of a possible 20,000. The following named gentlemen are the directors elected: George T. Smith, Robert E. Jennings, George E. Long, E. L. Young, William G. Bumsted, J. H. Schermerhorn and Harry Dailey. The officers elected by the board of directors are: President, George T. Smith; vice-president, George E. Long; treasurer, J. H. Schermerhorn; secretary, Harry Dailey; assistant treasurer and secretary, Albert Norris.

The Dietzgen Steel Tape

In our last issue we briefly referred to the steel tapes manufactured by the Eugene Dietzgen Co., 166 West Monroe St., Chicago, Ill., which are of such construction that the company has confidently adopted the slogan "Tapes for Hard-Wear." Not only are they guaranteed for durability, but the arrangement of figuring which simplifies reading is an additional inducement for consideration by the carpenter and builder who can tell at a glance the exact measurement without referring backwards or forwards. The feet are plainly indicated by large slanting figures, and the inch marks always tell the reader to which foot they belong. A view of one of these tapes is shown in Fig. 4. The graduations are provided at the top for more convenient reading. The steel tape has a black finish, and the various divisions and numbers are etched. This finish not only increases the legibility of the numbers but is also a safeguard against rusting, overcomes the necessity of protecting the ribbon by oiling

Fig. 4—Side View of the Dietzgen Steel Tape

and aids greatly in maintaining its appearance. The cases made for each length of tape have a steel lining which prevents indentations, thus smooth reeling is assured at all times and the ribbon is protected. On the exterior the cases are provided with leather or nickelplated finish. The former is hand sewn and double stitched. The handles of all cases are of the folding type. The pressure of a button releases the handle and gives a strong leverage for rapid reeling.

(*Continued on page* 76)

YOU Can Profit By The Same Service That Makes Money For 10,000 Other Contractors!

LUMBER IN CAR LOTS SAVE $100 to $300

Our Special Latest Lumber List and FREE Catalog offer choice to you of millions of feet of clear, dry clean, seasoned lumber at Wholesale Prices. Millwork, etc., Dimension, heavy Joists and Timber, Drop Siding, Beveled Siding, Ceiling, Partition, Wainscoting, Finishing Lumber, Laths, Shingles, Boards, Posts, Poles, Battens, etc. All lumber graded in accordance with rules of the Lumbermen's Association. All Millwork of High Quality Standards, established by the Northwestern Sash Door and Blind Mfrs. Association. Every stick guaranteed up to standard quality.

Estimates furnished FREE on guaranteed costs to you. BARGAINS in Moulding and Finish. Many special designs. All latest new stock. See Big Reductions in 1915 Grand Free Millwork Catalog, just out.

PORCH MATERIAL AND OTHER MILLWORK

Cypress built-up, lock-joint columns as low as $1.50. Cannot possibly come apart and will stand all kinds of climatic conditions. Square, built-up cypress columns from $2.07 to $3.68. Turned porch balusters per carton of 25, from $1 to $1.90. For complete list of many other millwork bargains, send for our big Catalog. Everything ready to ship at once. Hundreds of special designs that local mills would take two to three weeks to turn out.

THIN OAK FLOORING

Cheaper to lay than carpet. A permanent hardwood floor at extremely low cost. A remarkable innovation!

Size ⅜"x1½". Random lengths.
Price per hundred lineal feet only **80c**

Clear Thick Oak Flooring, 13-16 inches x 2¼ inches per 1000 feet	**$56**
Clear Maple Flooring, 13-16 inches x 2¼ inches per 1000 feet	**47**
Select Maple Flooring, 13-16 inches x 2¼ inches per 1000 feet	**43**
Clear Yellow Pine Flooring, 13-16 inches x 2¼ inches (Edge Grain) per 1000 feet	**37**
Clear Yellow Pine Flooring, 13-16 inches x 2¼ inches (Flat Grain) per 1000 feet	**27**
Clear Fir Flooring, 13-16 inches x 2¼ inches per 1000 feet	**40**
Clear Fir Flooring, 1¼ inches x 3¼ inches per 1000 feet	**45**

FIR DOORS

with most beautiful grain. Now being specified by many architects. Will match up with Yellow Pine Trim. We use Old Growth Yellow Fir. Edge grain stiles and rails. The one panel has a rotary cut veneered, flat panel Bead and Cove sticking. Panels are plump ⅜" thick. One panel doors $2.10. Two panel doors $1.86. See catalog, page 22.

WALLBOARD

Wallboard is The Great Modern Substitute for Lath and Plaster. Also fine for partitions to finish off rooms, attics, etc. Comes in sheets ready for use. Goes on dry. Cold-proof, vermin-proof, handsome, durable. **Costs Less** than Plaster. Wallboard costs 50 per cent less to lay. Lasts as long as building.

QUALITY WALLBOARD
1000 Square Feet, $22

5000 OTHER BARGAINS

are shown in **our big 156 Page Illustrated Catalog.** This great book **makes prices for over 10,000 other Contractors, Carpenters and Builders.** Make it work for **you.** Make it **save** you money. It **can!** Send for it. **Free! Use the coupon! Now!**

GORDON-VAN TINE CO.

In Business Half A Century

766 Federal Street **Davenport, Iowa**

YOU can make money by having our Contractors' Service Bureau working for you. It is already increasing profits for over 10,000 other Carpenters and Builders in every State. It is furnishing free "Guaranteed Right Estimates." It is assuring prompt deliveries, cutting out lost time and labor costs. It is drawing plans for them—far cheaper than local architects could. It is solving many knotty problems out of the day's work. And it is doing a hundred and one other things. Make the Gordon-Van Tine Expert Service Department work for you. Buy on our wholesale "mill-to-you" prices. It is profitable for you to pay about 3½% for freight and to save 25% to 50% on your bill.

Prompt Delivery Anywhere Quality and Satisfaction Guaranteed or Money Back

Use the Coupon! Get our free 156 page, illustrated Bargain Catalog. Describes and pictures over 5000 snaps in Lumber, Millwork, Builders' Hardware, Glass, Paints, Roofing, Wallboard, Doors, Windows, Porches, Stairwork, Flooring, Shingles, Nails, Enamels and many other money-savers! Costs you nothing to get this Great Book! Free! Let it make prices for you. Write our Service Bureau at the same time for any information or assistance you want. No charge—yours for the asking.

Send the Coupon for this great price-maker. Today! NOW!

This 156 Page Illustrated Catalog of 5000 Bargains FREE!

FREE CATALOG REMINDER

GORDON-VAN TINE CO.
766 Federal St., Davenport, Iowa

Put my name on your Carpenter's and Contractor's *free mailing list* for Special Price Bargain Bulletins. Also send me your **1915 Grand 5000 Building Bargain Catalog FREE.**

Name.....

Address.....

When winding has been completed the handle fits snugly into a cavity so that the case fits into the pocket flat. The company's catalogue "B" illustrates and describes a great variety of tapes and instruments, and a copy of it may be had on application.

New Book of Building Plans

A new book of building plans which differs in many ways from the general run of bungalow books is that which has just been issued from the press by the Hewitt-Lea-Funck Company, 859 Crary Building, Seattle, Wash. It is the company's prize plan book and not only contains photo illustrations showing exterior and interior views of houses, but also floor plans, brief specifications and prices covering about 100 cottages and bungalows ranging in size from three to nine rooms but with the great majority showing six or seven rooms. One distinct advantage claimed for the book is that the houses shown are really homes; that is, those which have been actually built and have proven satisfactory to the owners. A feature not regularly found in bungalow books is the detailed information relative to specifications and costs. In connection with each house will be found the cost of lumber, lath, shingles, millwork, hardware, paint, and electric bell. In addition, costs are given for special millwork items such as cabinets, bookcases, etc., and also there is shown a fair price for excavating, foundation work, chimneys and fireplace, electric wiring, carpenters' work, painting and tinsmithing, furnace work and plumbing. The reader can thus figure out for himself how much a complete house will cost. The printing is handsomely executed on cameo-effect paper in an artistic brown and will be sent to any reader of *The Building Age* who may make application for it and encloses 10c. in stamps or coin to pay the postage.

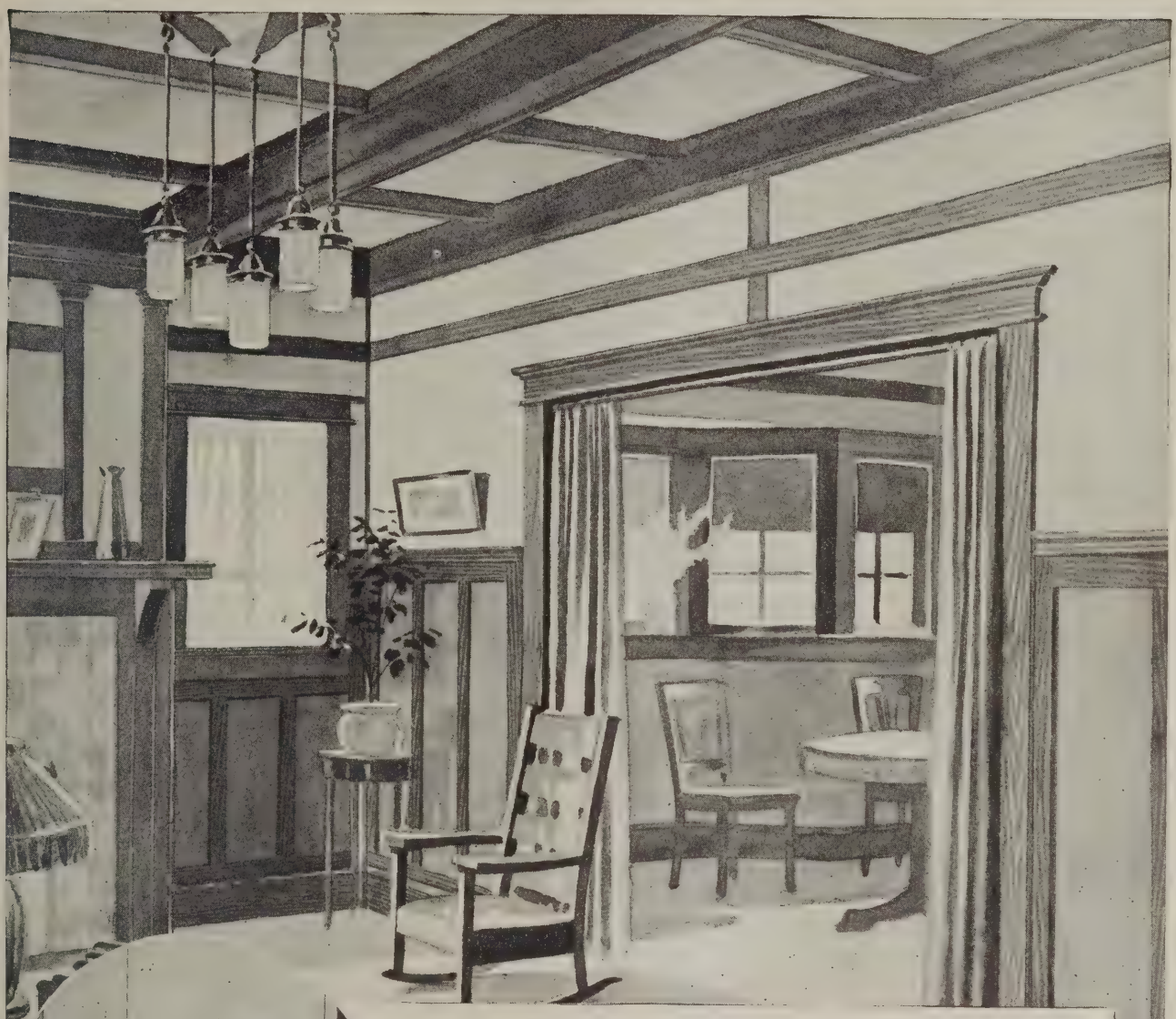
Exhibit of Ceresit Waterproofing Compound

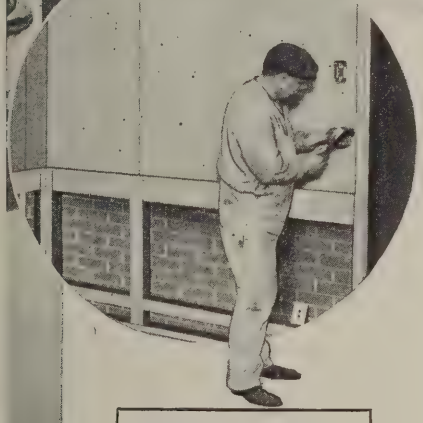
One of the exhibits at the Panama-Pacific Exposition which cannot fail to attract the attention of visiting builders, contractors, architects, etc., is the Ceresit Water-Temple which stands in the Palace of Machinery. In this exhibit the architect, E. B. Brown of

Fig. 5—Exhibit of Ceresit Waterproofing Compound

Stockton, Cal., has successfully accomplished the difficult task of combining beauty with utility. The display is that of the Ceresit Waterproofing Company, 981 Westminster Building, Chicago, Ill., and a general idea of its appearance may be gained from an inspection of Fig. 5. The fountain at the pinnacle of the Water-Temple pours a constantly flowing stream of water over the cement dome, and this water runs along the eaves and then down from the eight supporting pillars of the temple to its base, from which point it is pumped back to the roof again. There are plate glass inserts in each pillar, and the interior of each is illuminated with concealed electric lights, showing a miniature Niagara between walls of ceresitized cement, while the roof of the same material further illustrates the effective and permanent waterproofing qualities of Ceresit. A semi-indirect electric light gives a pleasing effect inside the Temple, which stands 16 ft. high and is a prominent feature among the many displays in the Palace of Machinery.

(*Continued on page 78*)





For Walls and Ceilings

Fiberlic

No, it is Not Another "Wall Board"

If you were designing your own home, which of the two materials would you choose for your walls and ceilings, bearing in mind the following essentials?

Strength. Which strikes you as being the stronger, a material made of ground wood and waste paper (as practically all wall boards are), or Fiberlic, made from long, tough, coarse imported root fibers?

Fire Resisting. Can you imagine how any wood product—any "wall board"—can resist fire? We've put Fiberlic to the blow-pipe test, but rather than give you the results here we would like you to make the same test also—yes, you will be surprised.

Insulating Qualities. Because Fiberlic is made of one uniform raw material—tough, thick, strong, compressed root fibers—it must be denser and therefore capable of resisting heat, cold and sound much better than "wall boards" made up, as they are, of ground wood, waste and other materials.

Can You Prove Our Claims? Quite easily. Write for samples of Fiberlic and put them alongside the best "wall boards." Put them to similar tests—we will leave the verdict with you. We will be greatly mistaken if the appearance—the very "feel"—of Fiberlic does not convince you of its superiority.

Samples and Prices Quoted on Request

THE FIBERLIC CO., Camden, N. J.

New England Branch:
Washington Street North, Boston, Mass.

New York Branch:
Fuller Bros. Co., 139 Greenwich Street

FIBERLIC

Interior Flat Wall Paint
Mill White Flat
Mill White Gloss

In order to secure satisfactory and uniform results for users of Fiberlic, the above paints have been developed. The quality of these paints is unexcelled.

Write for booklet

C. B. Woodard, Springfield, Tenn., is directing the attention of architects, theatre managers and fire departments of various cities throughout the country to the Woodard automatic safety-exit doors. They are furnished with either wooden or metal surface and lock automatically when closed from the outside. The point is made that these doors have been approved by the Committee on Standards of the Fire Department of the City of New York.

Neponset Proslate Roofing

An illustrated folder sent out by Bird & Son, East Walpole, Mass., calls attention to the merits of the above roofing which is made in either plain red or plain green, or in green slate and red tile patterns. The foundation of Proslate roofing is said to be Neponset Paroid roofing. In addition to its general use as a roofing Proslate is particularly suitable for flat porch roofs where shingles of any sort should not be used. The claim is made that when employed for this purpose Proslate does away with all the painting which is usually necessary on such roofs. The circular calls attention to other Neponset products which embrace wall board, waterproofing, building papers, floor covering and Florian sound deadening felt.

Linderman Automatic Dovetail Glue Jointer

Under the above title the Linderman Machine Company, with main office and shops at Muskegon, Mich., and also with shops at Woodstock, Ont., Canada, has issued an exceedingly attractive catalogue illustrating and describing the machine in question. The value of the automatic jointer is fully described by illustrations of the machine, also its operation, the construction, the quality of the joint, its capacity and also its use as a universal woodworker. The company points out that the construction is such as to offer a great improvement in jointing lumber by making panels entirely on one machine and at one automatic operation, while it formerly required from 3 to 5 operations to trim the edge, joint, glue, unite and then size the panel to width using as many machines and operations to do the complete jointing.

"Kno-Fur Special" Metal Lath

The North Western Expanded Metal Company, 904 Old Colony Building, Chicago, Ill., recently announced that beginning with April 1 all orders for "Kno-Fur" lath will be furnished in the same mesh as "Eureka" expanded metal lath and made from the same high grade of steel as the company's "Kno-Burn" and "Eureka" metal laths. This new style is designated as "Kno-Fur Special" and is furnished painted black or galvanized. The claim is made that this new type of "Kno-Fur Special" metal lath can be used at a much less cost than the original, which was made from the more expensive acid resisting steel. A circular sent out by the company carries an illustration of the new lath and also a table showing stock sizes and weights.

Machine for Wiring Screen Doors and Windows

The carpenter and builder who is often called upon to rewire screens and who has some difficulty in getting the wire taut will be interested in the machine which has been placed on the market by J. F. Schafer, of Mount Pulaski, Ill. The apparatus here described is a portable machine consisting of few parts and designed to stretch the cloth on the frame and hold it taut until securely attached. It consists of two cast iron sides with a broad bottom to give the machinery a substantial base and support the various working parts. Three wood rolls spaced to hold a roll of wire cloth have bearings in these sides. Hardwood bars hold the sides firmly, and are of a length to allow the use of wide cloth. A wrought iron screw with large hand wheel for easy turning is supported between two hardwood parts at the front and top, and its lower end is attached to a swivel at the center of the holder bar, fitting its entire length on the bar below it. The ends of the holder bar pass through openings which serve

(*Continued on page* 80)

as guides in the cast sides. The front of the machine is provided with a push bar, and on the right of the cast side is a wrought screw which is turned by a crank. The power is transmitted to the push bar from the screw through two angle levers, pivoted to the bar at the front and bottom of the cast sides and by two rods passing through this bar. To operate the machine it may be set on a bench and a roll of the cloth placed on the three rolls. The frame to be covered is placed on the bench in front of the push bar, and the cloth is brought to the end of the frame opposite the machine, where it is securely tacked. The holder is then brought firmly on the cloth by means of the hand wheel on the screw. The wire is stretched by turning the crank, forcing the push bar against the frame. When the desired tension is reached the remaining three sides are tacked and the cloth is cut from the roll. It is emphasized that there is no waste with this operation, in addition to which the roll is neither bent nor damaged in any way. The work is done very quickly and it does not require an expert mechanic to operate the equipment.

The "Great Bell" Brick Set Furnace

During the building season one of the many things to which the architect, the contractor and the prospective owner gives particular attention is that of heating and the system of apparatus which it is best to install in order to give satisfactory results. Many of our readers are therefore likely to be interested at this time in the construction which we illustrate in a

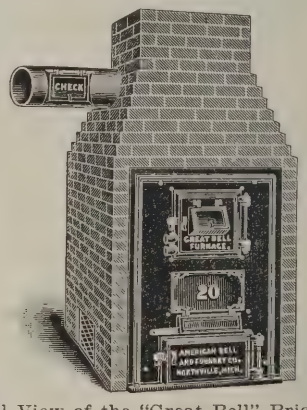


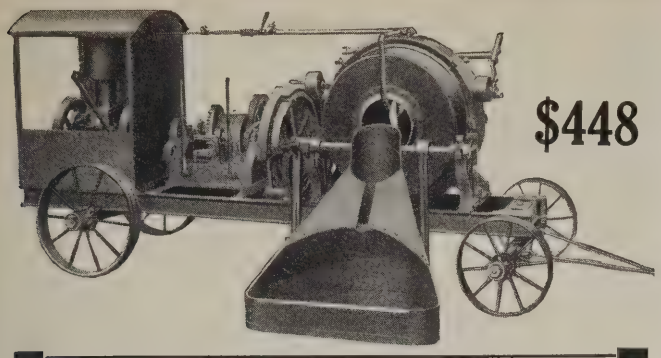
Fig. 6—General View of the "Great Bell" Brick Set Furnace

general view in Fig. 6 and which is described as the "Great Bell" pipeless furnace. It is an all-cast iron heater, made exceptionally heavy to withstand great heat and is referred to as low in cost, easy to install and especially adapted for dwellings having from four to six rooms. The arrangement is such that cold air may be supplied either by three 8 x 10 registers in the base of the furnace or can be taken from above by a cold air pipe leading back to the furnace from some distant room above. The latter method is said to have been very successful when it is not desirable to take cold air from the cellar. The center section is connected to the dome and fire pot by cup joint filled with cement and locked together. The center section is about ⅝ in. thick and the fire pot from ¾ to ⅞ in., and is said to be practically indestructible. The fire pot has an inside diameter of 20 in. The front is of cast iron, and with the size shown the makers recommend the use of a 14 x 20 register at the top, as this size gives the best results. The "Great Bell" is made by the American Bell & Foundry Company, Northville, Mich., and a catalogue which has been issued fully illustrates and describes the furnace in question as well as other productions of the concern.

The Gruhl Reversible Window

A window which may be tilted to any desired angle for ventilation purposes and which may be swung down so that both sides of the glass may be cleaned without trouble, is featured in a 6-page folder recently issued by the Gruhl Sash & Door Co., Milwaukee, Wis.

(*Continued on page 82*)



$448

The SMITH MIXERETTE

and our

"Straight from the Shoulder" Guarantee

A light, portable and easily operated mixer with a big capacity—3 cu. ft. of mixed concrete—40-60 cu. yds. daily.

And it's an all-steel mixer, just chuck full of money-making features. The big gear ring and driving pinion are enclosed in a dirt- and dust-proof casing, inside of which the drum revolves.

Look at the geared loader. No ropes, sheaves or overhead frame. It lifts quickly and evenly and without the twisting, jerking motion common to the pivot type loader. Equipped with geared loader at a cost of $315. If desired, batch hopper (3 ft. 10¼ in. feed level) can be substituted for the power loader. Such an equipment will cost only $246.00.

The Guarantee

We guarantee the Smith Mixerette to have a capacity of 3 cu. ft. of mixed concrete per batch, to comply with the specifications shown in our catalog, and to produce when fed to capacity, not less than 45-60 batches per hour of first-class concrete, to pass any inspection. If it fails to do so, we will take back the machine, refund the purchase price and the freight with 5% interest on all money paid from date of payment to date of return. Any defects or complaints must be reported promptly to this office.

We guarantee the Smith Mixerette to be of first-class workmanship and material throughout; and will replace F.O.B. factory any material which, within one year from shipment, proves to have been defective when furnished.

We guarantee the engine to pull the load. It is also covered by the special guarantee of the maker.

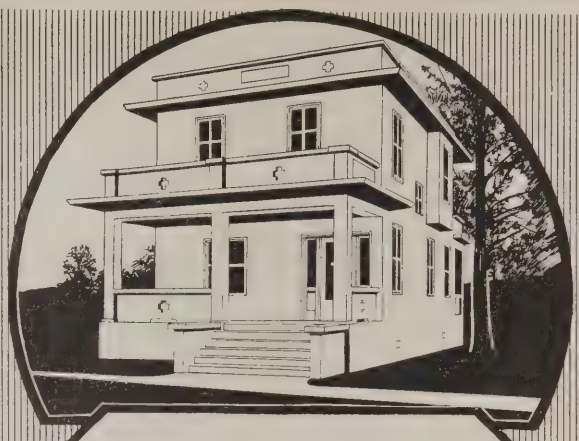
Now look at the hoist outfit. This rig is the only one made having the hoist mounted on the sills between the engine and mixer drum, the one place where there is no chance for the rope to cut or fray by rubbing against the drum flanges, engine house or gears. And it is sure some hoist. It holds enough ⅝-in. cable for a lift of 175 ft. It is operated by a powerful cone clutch and band brake. All levers are banked for one-man control. The substantial steel truck is equipped with standard wagon tread axles and strong, heavy wheels—we can't tell it all here—we haven't the space—so write for a copy of our "Mixerette With Hoist" Folder No. 161-H and standard Smith Mixerette Folder No. 115-H.

THE T. L. SMITH CO.

3120-H Hadley St., MILWAUKEE, WIS.

1441-H Old Colony Bldg., CHICAGO, ILL.

$246



The Cottage Everlasting

is the one that has walls constructed with good cement. Stucco and solid concrete are economical to maintain and make a substantial, comfortable, handsome house. The illustration above is a view of a concrete house erected by the Chatham Real Estate and Improvement Co. of Savannah, Ga., and built with

ALPHA

The Guaranteed Portland Cement—The High-Water Mark of Quality

ALPHA satisfies the discriminating architect and builder because it is tested hourly for quality by chemists in all of the six great ALPHA plants. In composition, exact burning, and fine grinding, ALPHA is an exceptional cement. It represents 24 years of high-quality policy and is warranted to more than meet all standard requirements.

When hundreds of thousands of barrels of ALPHA are used on big engineering jobs, where cement has to meet the most exacting tests, and not a barrel is rejected, don't you think you will do well to use "The Guaranteed Portland Cement" rather than some brand not so well made or so carefully tested?

A little difference is a big difference in a product like cement. Don't experiment. Use ALPHA and be SURE.

Send for ALPHA Book No. 17, giving valuable information about cement and concrete work generally. This illustrated book tells how to do stucco work, how to build concrete barns, silos, ice-houses, and other small concrete buildings, walks, tanks, storage cellars, steps, etc.

ALPHA PORTLAND CEMENT CO.

General Offices: Easton, Pa.

Sales Offices—New York, Chicago, Boston, Philadelphia, Pittsburgh, Buffalo, Baltimore, Savannah.

The product described is known as the Gruhl sanitary reversible window, and the advantages accruing from its installation are said to more than warrant the small additional expense involved. Window cleaning is not hazardous with this construction as all the householder has to do is to pull down the sash and lift the stops. The window is then easily swung down, the pivot working very smoothly, and is balanced by the sash weights. The claim is made that the window will not rattle as a patented stop has been provided that, with adjustment, will take care of the expansion and contraction of the sash. The patented pivot cannot stick, being made of strong and non-corroding metal and is practically fool-proof. The ventilation features are also commendable. Fresh air is possible without draft as the flow of air is deflected to any desired angle. This is possible in all kinds of weather.

An All-Steel Builder's Derrick

There has just been introduced to the attention of building contractors by the Union Elevator & Machine Co., 215A West Ontario street, Chicago, Ill., what is known as the "Thirty Dollar" all-steel derrick, embodying many features of interest. The company calls especial attention to the fact that its all-steel construction insures great durability combined with comparative light weight. The complete equipment is such that one man, it is claimed, can set it in place in 15 minutes, and as easily take it apart. The mast is 4 ft. high and the boom 6 ft. long. Its capacity is 1,000 lbs. The apparatus provides a full circle swing and a boom which can be raised and lowered. Quick action is assured by providing a direct pull, and an eccentric lock holds the mast in any desired position. Ratchet and pawl is installed on both hoisting and boom cable drums, and a lever hand brake makes the equipment safe. For structural work and loading or unloading cars the derrick is referred to as being of special value to the building contractor. Its portability makes it possible to carry from one job to another without inconvenience or loss of time. This derrick is furnished with 100 ft. of cable and is supplied with or without block. The block may be had for a small additional charge. Another feature which the company claims will interest readers of *The Building Age* is the low price of the complete equipment. A general view of the derrick in practical use is shown in Fig. 7 of the cuts.

Fig. 7—An All-Steel Builder's Derrick

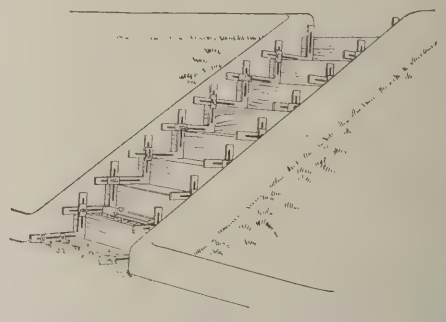
(*Continued on page 84*)

A New Roll Roofing

A new roll roofing, which in quality and thickness is said to be equal to its well known Giant Flex-a-Tile shingles, has just been placed upon the market by the Heppes Company, 4501 Fillmore street, Chicago, Ill. The roofing is in effect the shingle mentioned, in roofing form, but made in rolls. It is said to derive its great strength and durability from the heavy woolfelt and oil-free asphalt, both of which ingredients are unsparingly used in this new roll roofing. The company designates the new product as "Flex-a-Tile Dreadnought" to distinguish it from its other Flex-a-Tile products. Emphasis is laid upon the fact that the name Flex-a-Tile identifies all of the Heppes high grade roofing products, and in addition Flex-a-Tile identifies a diamond point and a slotted strip shingle. The company's arrow head, which is called the quality-mark for its building materials, also designates its Utility board as well as its silica-surfaced Rubbertex roll roofings and is found on each can or keg of its "no-tar" asphalt paints. This paint is said to spread thin, set quickly and dry slowly.

Adjustable "Form" for Concrete Steps

Progressive building contractors who make it a practice to familiarize themselves with inventions which from practical experience prove to be time-savers and have a tendency to reduce construction costs are likely to be interested in an adjustable cement step "form" recently invented by Henry D. Cornelius, president of the H. D. Cornelius Co., Indianapolis, Ind., and placed on the market by that concern. The "forms" shown in Figs. 8 and 9 illustrate the method of constructing ordinary straight steps and also the curved variety. In short, the equipment consists of a series of angle arms which when securely braced and fastened present a rigid structure which insures a neat and substantial job executed much faster than by the ordinary method. In setting up this "form" there are five simple operations. When the length and width of the steps have been determined, the end braces are set, allowing for the thickness of the board. They are then anchored to the ground and plumbed by a set screw which works in a slot. The third operation is the anchoring of the boards, following which the angle arms are anchored to the boards by slotted anchor braces. Finally, the angle arms are leveled in the anchor brace slot by thumb bolts. The upper and lower angle arms are connected with interlocking



Adjustable "Form" for Concrete Steps—Fig. 8—Method of Constructing a Straight Flight

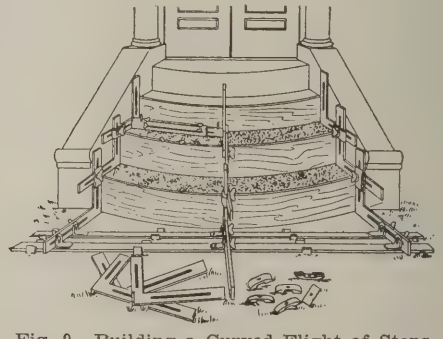


Fig. 9—Building a Curved Flight of Steps

(*Continued on page* 86)

clamps operating in slots to keep them perfectly rigid and plumb. The arms are provided with gauge markings which indicate the size of the steps, thereby making a measuring rule unnecessary. Each "form" is equipped with an adjustable planer, which operates on a guide having a slope gauge. The other end of the guide is slotted to slip over a pivot which is provided on the corner of each angle arm. The planer can be extended or contracted as desired, and accurate and even topping is assured. All parts of the "form" are interchangeable. With a simple fastening to the anchor braces the "form" is held firm and cannot slip. Any number of steps can be built regardless of length. These arms can also be used in connection with curbing, and the manufacture of fence posts and columns. The company has issued a catalogue which goes into the various details of this "form" quite thoroughly, and a copy may be had free on application.

Improved Buckeye Iron Planes

A series of new iron planes, embracing the Buckeye jack and fore planes, has just been brought out by the Buckeye Saw Vise Co., 2050 West Fifty-fifth street, Cleveland, Ohio. The smooth plane measures 9½ in. in length, having a 2-inch bit and weighing 2½ lb. The cap plate in Buckeye planes has heretofore been made stationary in the plane and the bit had to be taken out and put back through the bottom of the plane. In the new Buckeye plane the cap plate is made removable from the plane with the bit and they are removed and replaced very quickly. The company states that it is

Fig. 10—Showing How the Cap and Bit Are Removed from the Buckeye Smooth Plane

impossible to put the cap plate and bit in wrong, as they are dropped into their place together, and the tension screw is then tightened, after which the plane is ready for use. To remove the cap and bit from the plane the tension screw is turned out until the cap rests on the bit, the thumb is placed under the bit and two fingers are placed on the cap, all as shown in Fig. 10 of the illustrations, after which they are pulled out together. To adjust the bit to cut a finer or a thicker shaving the adjusting screw near the handle is turned down or out. The adjusting screw has four actions—up and down, and to right and left. To square the bit with the bottom of the plane the adjusting screw is simply pushed to the right or left. It is stated that these planes will not tear out, chatter or clog, even when they are used against the grain in difficult wood. The smooth plane is suitable for veneer work. The company states that the new planes are particularly adapted for use in manual training schools because of the ease with which they may be set.

Catalogue of Iron and Wire Work

We have received from the Mack Iron & Wire Works Company, Sandusky, O., a copy of what is known as "General Catalogue No. 15," just issued from the press. It is a work of 74 pages, profusely illustrated and showing to good advantage the leading lines which the company is prepared to supply. The point is made that the concern has a completely equipped organization and factory and is prepared to make anything under the

(*Continued on page 88*)

head of ornamental iron, brass, bronze, wire work, and light structural steel. The various pages are given up to wire window guards, stable fixtures, steel doors and shutters, grill work, metal partitions, counter and desk railing, elevator enclosures, etc. Not the least interesting feature from the standpoint of the builder is found in the details of construction for steel stairways. There are numerous illustrations of steel doors and gates, lawn furniture, iron and wire fencing, entrance gates, etc. The closing pages are given up to jail work, jail cells being one of the specialties of the company.

The "Ideal" Framing Tool

There has recently been patented and placed upon the market a framing tool which cannot fail to appeal to every carpenter and building mechanic who is interested in labor-saving devices and which is known under the name "Ideal." It is in effect three tools in one, being a tri-square, a rafter square and a miter square. It can be used for general work as well, and is especially valuable in cutting 45-deg. and 90-deg. work; also all work where the angle is the same as the pitch of the roof, such as gable, studs, sheathing, siding, etc. In Fig. 11 of the illustrations we show the framing tool in two positions for obtaining rafter bevels. This three-in-one square is made of tool steel and measures about 8 in. square. A number is stamped on each hole in the miter square, giving the number of sides of figure a square will produce when the locking pin is in

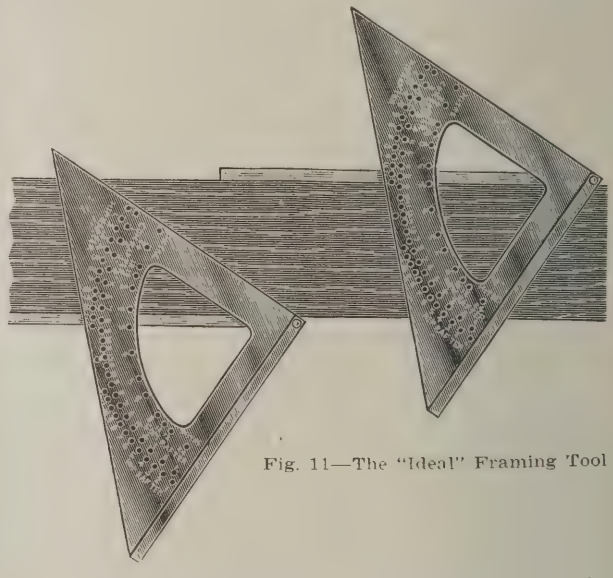


Fig. 11—The "Ideal" Framing Tool

that hole. This renders the tool very serviceable in laying out many-sided work, such as hexagon bay windows, etc. It is made by the Ideal Tool Works, Middletown, N. Y., and with a view to introducing it into every building community the company is anxious that carpenters and builders practically demonstrate the merits of the "Ideal" so that they will be in a position to recommend it to their fellow workmen. For this reason they have reduced the price one-half and are offering a limited number for a limited period only. An instruction booklet sent free by the company fully illustrates and describes the tool and explains how various kinds of work may be quickly accomplished by its use.

New Catalogue of Richards-Wilcox Company

We have before us a very attractive printed catalogue of 296 pages and known as "No. 12," relating to the varied lines of door hangers, grindstones and hardware specialties turned out by the Richards-Wilcox Mfg. Company, Aurora, Ill. This work we understand supersedes all previous catalogues and it is offered as "complete in detail, concise, and so arranged and classified as to cover in the most brief and comprehensive manner the various lines" manufactured and sold by the company. No labor or expense has been spared to make the illustrations as nearly as possible direct reproductions of the goods themselves. All lists and

(*Continued on page* 90)

tables have been revised up to the date of going to press of the catalogue and so arranged and tabulated as to render them quickly and easily understood. The lines presented are extensive and calculated to meet in their various classes every reasonable requirement. The catalogue is one which is of special interest to the architect as well as the builder, and a copy of it will serve as an excellent reference book of specialties of the character indicated.

The Kno-Burn Expanded Metal Lath

Under the above title there has just been issued from the press a very attractive 52-page pamphlet setting forth in comprehensive style the merits of "Kno-Burn," "XX Century," "Eureka," and "Kno-Fur" expanded metal lath as made by the Northwestern Expanded Metal Company, 904 Old Colony Building, Chicago, Ill. The advantages of metal lath are first considered and then the merits of the various specialties enumerated are given, together with illustrations of the material and examples of their application. In connection with the text are tables giving stock sizes and weights. It will be found of special value to the architect and to the builder.

The Foster Stair Router

A machine which will be found of special interest and value to mechanics doing stair work is the Foster stair router illustrated in general view in Fig. 12 of the cuts. It is of such construction that the cutter leaves the groove rounded to receive the tread and the sides

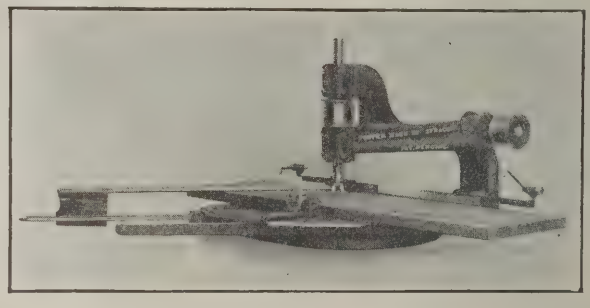


Fig. 12—The Foster Stair Router

under cut in proper shape for wedging, thus eliminating all hand work. The point is made that the machine can be used in limited space or against the wall, that no templet is required as the spaces between cuts and the length of cut are instantly determined by gauges, and that it is only necessary to lay out two steps on a stringer. There is no mechanism to get out of order and the work is always in sight. The machine can be used for sinking panels or running light molding. It is made by the Foster Machine Company, Grant Place, Syracuse, N. Y., and the claim is made that it does more work in one hour than can be performed by hand in from 4 to 6 hours.

The "Standard" Concrete Mixer

An attractive catalogue of 40 pages, in which are set forth at length the merits of the "Standard" low-charging concrete mixer, has just been issued from the press by the Standard Scale & Supply Company, 1345 to 1347 Wabash avenue, Chicago, Ill. Among the early pages attention is called to the company's plant, which has a floor space of nearly six acres, and in the catalogue under review are shown many important features which it is felt will further increase the economy and efficiency of the mixers in question. Various sizes and styles are made for the purpose of meeting many requirements, and as the mixers are mounted upon trucks they are readily portable. One style with folding platform is of special interest to contractors, as it especially meets conditions where it is required to frequently move the mixer from one job to another or from place to place as the work progresses. When the mixer is to be moved the platform is easily folded in

(*Continued on page 92*)

front of the drum and can be dropped again as soon as the machine reaches the mixing position, making a low wide platform ready for immediate use. We understand that many contractors who have procured mixers with regular platforms have later purchased the necessary parts and equipped their machines with folding platforms. The runways may be arranged at either side or the ends as may be most convenient, while the large platform and the low wide charging chute and capacious opening in the drum offer exceptional facilities for the rapid charging of the mixer. Among the illustrations are numerous halftone engravings showing the company's mixers in operation in connection with building work. Among the closing pages are illustrations of "Standard" hoists and elevators, wheelbarrows, carts, etc. Not the least interesting feature of the catalogue is a table showing the sizes, capacities and weights of the "Standard" low-charging concrete mixer.

Concrete Staple Fence Posts

A profusely illustrated catalogue of 48 pages dealing with the subject indicated by the above title has been issued by the Staple Post Mold Company, Waterville, Ohio. The posts turned out by this concern are said to be built on scientific and practical principles, the concrete being reinforced so as to render it strong enough in itself to support any fence if there were some way of holding it. The post is built with enough concrete around the reinforcement to protect it and hold it in position, the result being an exceedingly durable post. In the catalogue are shown various tests made with the posts and there are also pictures of some of the fences which have been built with staple posts. Directions are given for fastening fence to concrete posts; also much useful information in connection with the manufacture and merits of them.

The Green Gauge Router Plane

A tool that has just been placed upon the market embodying features of special interest to every carpenter in the country is the Green gauge lock and butt router plane now being manufactured by I. N. Sutton & Sons,

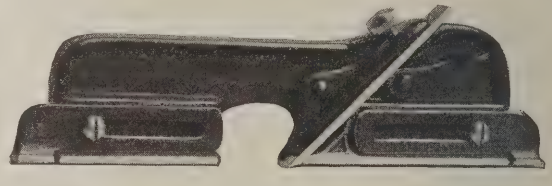


Fig. 13—General View of the Green Gauge Router Plane

215 Poplar street., Atlantic, Iowa. The tool is especially adapted for use in setting locks and butts, and can be set by lever to any depth. The claim is made that it will cut out the seat for lock or butts to a uniform depth below the surface, thus avoiding the uncertainty of setting butts. It is provided with extensions which enable the workman to rout out large butt seats as easily as small ones; at the same time it leaves the seat as true as the face of the jamb. It is light, strong and durable, and carpenters who have practically demonstrated its merits speak in high terms of its usefulness for the purpose named. A view of the tool is shown in Fig. 13 of the illustrations.

Fireproof Qualities of Metal Tile Roofs

According to the annual report of City Fire Marshall George Wead of Houston, Tex., recently filed with Mayor Campbell, material reductions in the fire insurance rate would be made by the passage of an ordinance to prevent the construction of any but fireproof roofs. He recommends that the roof limit be abolished and only metal, slate or tile be used in the construction of roofs. Altogether there were 582 fires in the city during the fiscal year, 34 of which were caused from adjoining buildings and 25 from beyond adjoining buildings. There were 115 due to sparks from flues. One of the many striking examples of safety and protection afforded by the use of metal tile roofing when the fire danger is in

(*Continued on page 94*)

close proximity is found in the case of a residence in Dallas, Tex., covered with Edwards metal Spanish tile which escaped without damage when sparks from a burning building close by fell upon the roof. The protection afforded by metal roofs in electrical storms has also been widely recognized by the roofing trade and is being appreciated in other fields. It may be interesting to state that the metal Spanish tile in question is made by the Edwards Mfg. Company, 423 to 443 Eggleston Avenue, Cincinnati, Ohio, and a complete catalogue showing all the products of the concern, including photographs indicating the different materials used, has been issued and a copy will be sent to any reader who may be interested.

New Officials of Booth Column Co.

W. S. Booth has resigned from the presidency of the Booth Column Company, Toledo, O., to assume a similar office in the new concern which he has organized, known as the Booth Bumper Company for the manufacture of wooden automobile bumpers. The Booth Column Company has elected the following officials for the ensuing year and are preparing to make a vigorous campaign for new business: President, William T. Hubbard; secretary, H. J. Ellis, and superintendent, George W. Heshley.

Myers Hercules Double Girder Track

One of the latest additions to their line of door hanger track made by F. E. Myers & Bro., Ashland, Ohio, is illustrated in Fig. 14 of the cuts. It is known as the Myers Hercules double girder track, and the picture

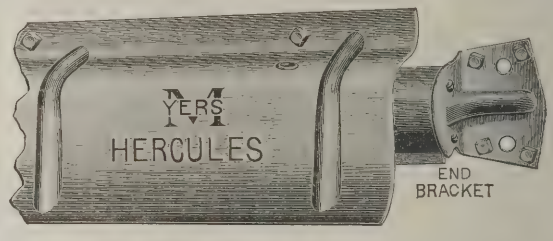


Fig. 14—Side View of Myers' Hercules Double Girder Track

which we present herewith is an enlarged view showing the corrugations that stiffen the covering, also the riveting by means of which the bracket is attached to the track. There is also clearly indicated at the right hand an end bracket. This covered track is used in connection with the makers' Giant door hangers Nos. 15 and 16, and the claim is put forth that the construction is storm, sleet, ice, rain, dust and bird-proof. The track and hanger is a great improvement over the old construction and is especially adapted for barns, garages, sheds or other buildings. The track is a combination of the Myers Giant track with a stiff-ribbed steel shield or hood riveted to the top of it. The claim is made that it fits snugly to the side of the building, stiffens the track and takes the place of brackets, at the same time preventing ice and water collecting on top of the tubular track. It extends down over the top of the doors, completely protecting them. The end brackets snugly fit the ends of the track and act as braces, while at the same time preventing nesting of birds or the accumulation of dirt in the track.

Western Office of Cortright Metal Roofing Co.

The Western office of the Cortright Metal Roofing Company, formerly located at 160 North Fifth Avenue, Chicago, has been removed to the Rand McNally Building, 538 South Clark Street, Chicago. The change in office location in no way interferes with their arrangements for carrying a large stock of their various shingles at their Chicago depot, permitting prompt shipment to all parts of the Middle West and Pacific coast points.

Molds for Poured Concrete Brick

One of the latest labor-saving devices for use in connection with the manufacture of concrete products and especially for making poured concrete brick is the pat-

(*Continued on page* 96)

ent mold that is being placed upon the market by Merrill Moore of Creston, Iowa. It is stated that faced brick are made on edge and common brick are made on end, the some molds being used for both methods. Each section is a combination of 7 molds and forms its own pallet. The sections are such that they can be quickly assembled and filled and the brick can be quickly piled. The manufacturer states that when discharged from the molds the brick are a finished product, uniform in size and that a great variety of faces can be produced. The construction is such that the back of the section is sprung to discharge the brick and the latter are handled but once as they are discharged from the molds directly into the pile.

TRADE NOTES

Edward J. Brandel, advertising manager for the Beaver Board Companies, Buffalo, N. Y., died in that city on May 12.

Murphy Varnish Company, Newark, N. J., has the usual amount of interesting comment in the last number of "The Finishing Touch," which is its house organ. Reference is made to the treatment of floors and to the Q and E varnishes. Any reader interested can secure a copy by addressing the company.

The Tannewitz Works, Grand Rapids, Mich., are distributing a series of "Bulletins" illustrating and describing some of their leading specialties. One "Bulletin" relates to the Universal double-revolving arbor saw bench, another to type F variety saw bench, still another to type H hand jointer or buzz planer, while still another deals with rod and dowel machines, saddle seat router and veneer presses. All these goods are illustrated and described in a way to render them of special interest to the carpenter-contractor, the builder and to the woodworker generally.

The latest issue of "Dutch Boy Painter," published by the National Lead Company, 111 Broadway, New York City, contains much interesting information relating to good painting as well as some comments that are of a humorous nature. The illustrations consist of halftone engravings, and the entire make-up is exceedingly neat and attractive.

The Pullman Mfg. Co., Rochester, N. Y., offers to send, on request, to any reader of *The Building Age* a copy of its catalogue descriptive of Pullman Unit Sash Balances, together with blueprints. The company claims for its balances that they are neat, smooth operating and very durable; that they are made with uniform size face-plates so that the matrices can all be cut at the mill when the frames are made. The balances are guaranteed for ten years.

Shearer Construction Company, 306 West Van Buren street, Centerville, Ia., is desirous of obtaining from patrons of *The Building Age* prices on composition shingles, metal ceilings, metal lath, Kellestone and building materials in general.

A booklet of 20 pages sent out by the H. W. Johns-Manville Company, with offices in the leading cities of the country, contains much interesting information relative to the J-M Keystone hair insulator, which is claimed to keep buildings warm in winter and cool in summer. Illustrations are given, showing the method of applying the insulating material, and numerous halftone engravings relate to some of the many buildings which the company's product has been used.

Vulcanite Portland Cement Company, Philadelphia, Pa., is distributing a booklet of a size convenient to carry in the pocket and designed to show examples of typical simple "forms" which may be used for building farm structures. The point is made that by

(*Continued on page* 98)

changing the details the "forms" shown can be adapted to any concrete work on the farm. These "forms" include those for walls, tanks, posts, chimneys, slabs, etc. Incidentally, reference is made to Vulcanite Portland cement, which is said to be slow setting and at the same time hardens rapidly. The reason for this quality is set forth and also the statement that the brand has been under one management since 1893.

E. St. Elmo Lewis, vice-president and general manager of the Art Metal Construction Company, Inc., Jamestown, N. Y., has been unanimously elected president of the Jamestown Board of Commerce, in spite of the fact that he had previously stated his inability to accept the office owing to pressure of business.

George G. Veness, 43 Midland avenue, Highland Park, Mich., is building 100 homes this year, and desires to obtain from manufacturers catalogues of lumber, hardware and building materials.

The Zahner Metal Sash & Door Co., Canton, O., will shortly begin the erection of a new two-story brick and concrete building which will be used for office purposes, allowing the use of the present office space for manufacturing purposes. In addition to this the company is planning the erection of an additional factory building, 100 x 400 ft. The announcement of the extensions was made at a banquet held May 1, in celebration of the first anniversary of the removal of the company's plant from Kansas City to Canton.

William Luther Mowll, architect, announces the removal of his offices from 50 Bromfield street to the Unity Building, 185 Devonshire street, Boston, Mass.

An illustrated folder which is being sent out by the C. H. & E. Mfg. Company, 320 Mineral street, Milwaukee, Wis., illustrates and briefly describes a line of contractors' equipment which cannot fail to interest a large class of our readers. The goods shown include portable saw rigs, engines, mortar mixers, electric and gasoline hoists, pumps, concrete chutes, elevators for hoisting building materials, tilting cross-cut saws, etc.

A prominent architect of St. Louis, who was planning for a client some houses ranging in cost from $2000 to $3000, wrote to the Oak Flooring Bureau, 895 Hammond building, Detroit, Mich., as to what grade of flooring it would recommend. The reply stated that No. 1 common oak flooring 13/16 in. thick was especially adapted for cheap dwellings, tenements, stores, high-class factories and manufacturing buildings. This grade, it was pointed out, is also used extensively in medium priced homes, principally in the rooms on the upper floors. This No. 1 common oak flooring is made in three widths and, when finished in a medium dark stain, is said to make a very serviceable and satisfactory floor.

W. P. Williams, proprietor of the Woodcraft Shop, Escondido, Cal., is equipping an office for the practice of architecture, and desires to receive samples and catalogues from manufacturers of building materials and appliances.

An interesting 32-page catalogue illustrating and describing a portion of the company's line of closet outfits, enameled ware, brass goods and plumbers' supplies, has just been issued from the press by Shane & Co., Thirty-third street and Wentworth avenue, Chicago, Ill. In the introductory pages the fact is mentioned that any piece of enameled ware which proves to be defective within a specified period after installation will be replaced without cost. Not every purchaser, however, is prepared to buy guaranteed materials so that the company carries a line of non-guaranteed fixtures at reduced prices in order that dealers may meet competition. Satisfaction or money returned is the slogan on these supplies. Catalog "C" is 10 in. long and 7 in. wide, a size which allows excellent illustrations to accompany each combination or fixture.

(*Continued on page* 100)

Do You Handle Wall Board that is Moisture Proof?

The illustration shows a simple but effective test for all wall boards. Cut off the corner on a bevel so as to expose the heart of the board. Place a drop of ink on it and watch results. If the ink soaks in water will do likewise, and the board will buckle on the wall.

Send for samples of Ceil-Board made under our new moisture-proof process and make this test for yourself

CAREY

Ceil-Board

SUPERSEDES PLASTER FOR WALLS AND CEILINGS

A recent test of Ceil-Board showed that a good sized drop of ink remained for one hour and thirty-five minutes. And then it did not go into the board at all but simply dried up just as if it had been on glass or metal. The heart of Ceil-Board is moisture proof—not merely top and bottom as other boards are.

Ceil-Board insures you against wall board troubles of any kind.

Ceil-Board is made scientifically throughout and in addition to being moisture proof, it is an effective insulator and sound deadener.

Furnished in Gray, Tan, Quartered Oak and Circassian Walnut finishes.

Ceil-Board is stocked at most of our branch warehouses shown below and is for sale by thousands of the best class of dealers.

CAREY CEIL-BOARD

THE PHILIP CAREY COMPANY

General Offices: 1003 Wayne Avenue, Lockland, Cincinnati, Ohio

Atlanta	Buffalo	Cincinnati	Detroit	Little Rock	Montreal	Philadelphia	San Francisco	Toledo
Baltimore	Charlotte	Cleveland	Jacksonville	Los Angeles	Nashville	Pittsburgh	Seattle	Toronto
Birmingham	Chattanooga	Dallas	Kansas City	Memphis	New Orleans	Portland	Spokane	Wheeling
Boston	Chicago	Denver	Knoxville	Minneapolis	New York	Richmond	St. Louis	Winnipeg
								Washington

The features of the "Simplex" pneumatic water system are shown together with a drawing indicating the method of installation. A copy of the catalogue may be had on application.

At the annual meeting of the Cement Products Exhibition Company, held May 11 in Chicago, B. F. Affleck was elected president, A. Y. Gowen vice-president, Robert F. Hall secretary and J. U. C. McDaniel treasurer.

The Vulcanite Portland Cement Company moved its New York office on May 1 to 8 West Fortieth street, opposite the Public Library.

Preston, Brown & Walker, architects, announce the removal of their offices from 1932 Dime Bank Building to 851 David Whitney Building, Detroit, Mich.

The mammoth Battleship Pennsylvania, recently launched at Newport News, Va., will have all of the interior furniture, including wardrobes, berths, dining tables, bureaus, bookcases, desks, etc., of art metal supplied by the Art Metal Construction Company, Jamestown, N. Y. The installation of this kind of furniture is in no sense an experiment, as several of the other new ships have been so equipped and with entire satisfaction to the Navy Department.

The first industrial organization in Akron, O., to announce the inauguration of a profit-sharing policy for the benefit of its employees is the XXth Century Heating & Ventilating Company. More than 175 employees will be affected by the new policy which will go into effect on July 1, when the new business year of the company begins.

A late issue of "Graphite" published regularly by the Joseph Dixon Crucible Company, Jersey City, N. J., contains some unusually interesting information regarding the kind of service which Dixon's silica-graphite is performing. There is a likeness of John M. Ready of the company's staff, who has recently taken a trip to the West Indies and who was accompanied by the vice-president of the company and the superintendent of the Dixon pencil factory. There is somewhat extended reference to Dixon's boiler graphite and to boiler management and inspection.

Warren Webster & Co., Camden, N. J., has just issued from the press a new catalogue dealing with the Webster Modulation System of Steam Heating. It is a work of 88 pages, profusely illustrated and contains much interesting matter relative to this system of heating buildings. We understand that a copy of the catalogue will be sent by the company to any reader upon request.

A catalogue recently sent out by Lewis T. Cline, Alpena, Mich., deals with various lines of wood turning and wood working machines. There are illustrations of the leading specialties which include machines for turning articles of various kinds: saws, grinding machines, wood slitting and barking machines, all of which are briefly described. Other illustrations show parts of different machines together with views of some of the work that has been turned out by them.

We wish to buy a good second-hand Sanding Machine. Address The Portsmouth Engine Company, Portsmouth, Ohio.

FOR SALE—DIAGRAMS for designing beams of wood or steel. Education not necessary for their use. Price, 20 cents. Agents wanted everywhere. Thayer, 6529 Aylesboro Ave., Pittsburgh, Pa.

FOR SALE, as a whole or as separate machines, a complete equipment of block-making machinery. Material can be seen at our farm, near Rochester, Michigan, Stone Shop Station on Detroit United Ry. Address inquiries to D. M. Ferry & Co., Detroit, Michigan.

TABLE OF CONTENTS FOR JULY, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, JULY, 1915

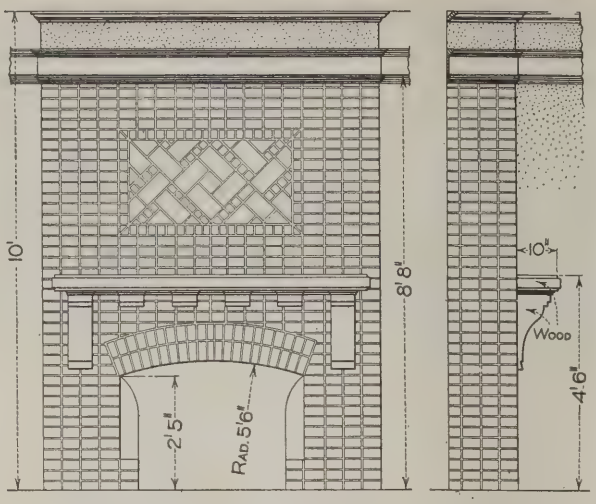
A Southern Home of Bungalow Type

A Well Planned Residence in Jackson, Miss., Embodying Many Features of Interest to Architect and Builder

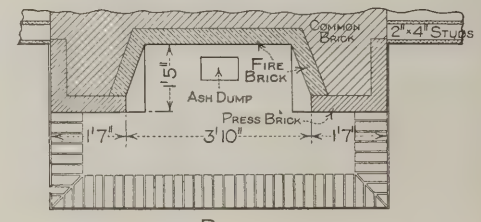
PROBABLY there is no class of dwelling so much in vogue at the present day as that cozy-cottage type of architecture commonly designated as the bungalow, for it is found in the city as well as in the country; at the lakeside, in the mountains, and by the seashore. Where it is intended as a city or suburban residence, and therefore for occupancy the year round, it is generally of a much more substantial construction than is the case where it is to be used only during the summer months. The character of the building is frequently such as to afford an interesting field for the ingenuity of the architect, and the results accomplished in the way of exterior treatment and interior arrangement strongly appeal to the prospective home builder. An excellent example of this type of architecture is the Southern home which we illustrate upon this and the pages which follow.

The Bungalow Residence of Isidore Lehman on South State Street, Jackson, Miss.—Architect, Emmett J. Hull of That City

The half-tone engravings show the external appearance of the finished building as well as the interior of the living room looking toward the open fireplace with the sun parlor beyond. An examination of the floor plan reveals a porch running entirely across the front of the building, while a terrace

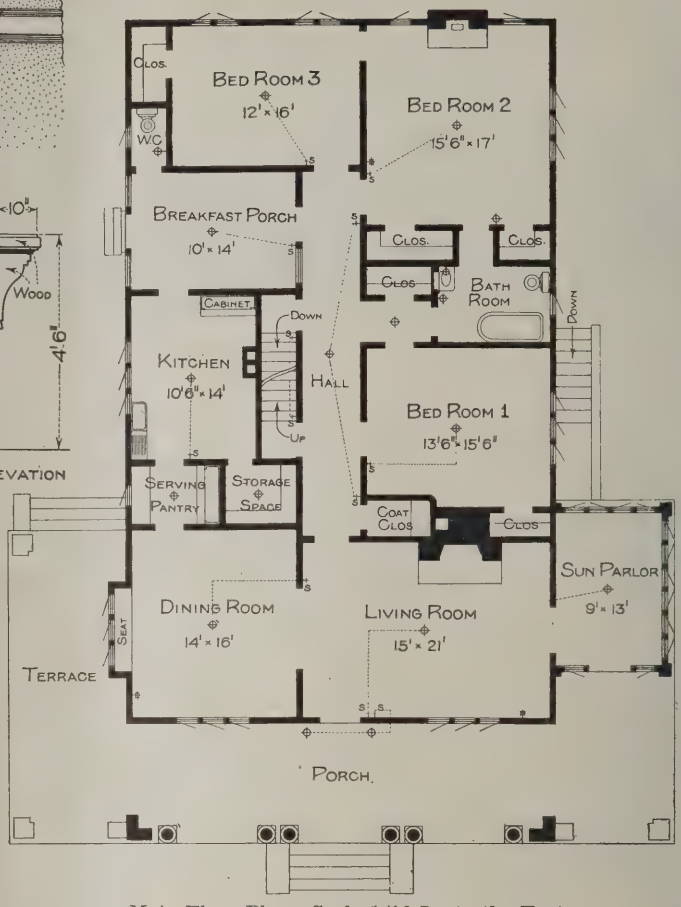


FRONT ELEVATION END ELEVATION

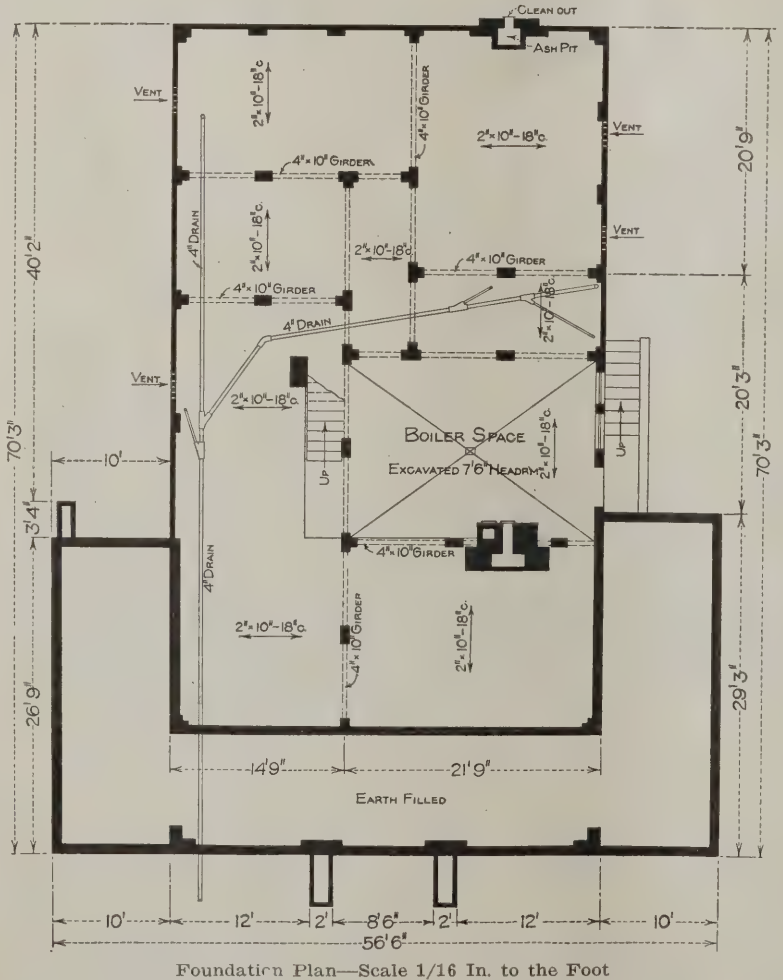


PLAN

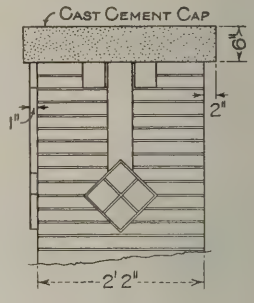
Details of the Brick Mantel and Fireplace in the Living Room—Scale ¼ In. to the Foot



Main Floor Plan—Scale 1/16 In. to the Foot

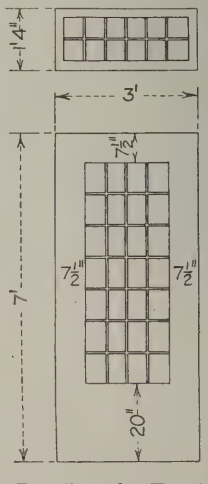


Foundation Plan—Scale 1/16 In. to the Foot



Detail of Upper Part of Porch Pier —Scale ⅜ In. to the Foot

Base—Scale 3 In. to the Foot



Detail of Front Door—Scale ¼ In. to the Foot

A Southern Home of the Bungalow Type—Floor Plans and Miscellaneous Constructive Details

with tile floor extends a short distance on either side. The front of the house is divided into living room and dining room, separated by French doors, while beyond is a central hall which gives access to three sleeping rooms, the bath room and to the breakfast porch. The latter is also reached directly from the outside and communicates with the kitchen. A serving pantry separates the kitchen from the dining room and affords a means of communication between the two. The attic has two rooms.

In the construction of the house the foundation walls and piers up to grade were laid in cement mortar composed of one part Portland cement and three parts sharp coarse sand. The piers, pedestals and the walls of the front porch and both terraces, including all walls of the sun parlor, are faced with rough texture Astrakan buff brick, which is also the material used in the construction of the elaborate mantel in the living room. All joints are half inch thick, the mantel having raked joints and the exterior work having flush joints. The floor of the front porch is of quarry tile, same as the terraces, laid on an earth "fill" and having a border of pressed brick. The hearths for fireplace and bed room mantel are of pressed brick supported on concrete arches. The fireplace and grates are lined with fire brick.

An inspection of the foundation plan will show the space excavated for the boiler room, this being 7½ ft. in the clear and having a floor of concrete 5 in. thick composed of one part cement, three parts sand and five parts screened gravel. On top of this is a 1-in. finish coat consisting of one part cement and two parts sand.

The sills, joists, studs, plates, rafters, etc., are of yellow pine. The sills for the outside walls consist of three 2 x 10's spiked together and for the inside wall two 2 x 10's. The studs are 2 x 4 in., spaced 16 in. on centers, and the rafters are 2 x 8 in., spaced 18 in. on centers. The collar beams are 2 x 6 in., and the first floor joists 2 x 10 in., spaced 18 in. on centers. All timbers are securely framed and spiked.

The exterior frame is covered with ⅞-in. sheathing boards laid diagonally on the walls. Over these is resin sized building paper and this in turn is covered with cypress siding laid 4½ in. to the weather. Over the roof boards was placed one thickness of asphalt roofing felt with 2½-in. lap, and the entire area covered with German tile, red in color, and made by the Ludowici-Celadon Company of Chicago, Ill. The tile are fastened in place with copper nails.

A Southern Home of the Bungalow Type—View in the Living Room, Showing Open Fireplace and Brick Mantel With Sun Parlor at the Right

There are double floors throughout the house, consisting of a sub-floor of ⅞ x 6-in. No. 2 common yellow pine and a finish floor of "B" grade yellow pine, ⅞ x 3¼ in., with the exception of the living room, the sun parlor and the dining room, which have finish floors of ⅜ x 2¼-in. quarter sawed white oak.

All interior finish, including casings, base boards, moldings, doors, etc., is of "B" grade yellow pine,

with the exception of the casement sash and French doors from the sun parlor to the terraces, which are of clear all-heart Louisiana red cypress. This applies also to exterior transoms. All windows in the house except those of the breakfast porch, which have removable sash, are of the casement type and are arranged to open out.

All casement windows have screens on the inside, hooked at top and bottom, and arranged to swing in at the bottom. All doors not of glass are of the six cross-panel variety. The glazing is of double strength glass and all casement sash are 1¾ in. in thickness.

Bed room No. 2 has a beveled plate mirror, full size, in the door of the closet. The doors between the bath room and hall and breakfast porch and hall have panels of Florentine glass.

The linen closet in the passageway to the bath room has five cedar shelves ⅝ in. thick. All clothes closets have shelves made of ⅞-in. thick dressed boards securely attached to the walls. Bed room No. 2 is provided with a cabinet mantel.

All walls and ceilings are plastered with three-coat work, the finish coat being composed of lime, putty and plaster of paris.

The bath room and kitchen are wainscoted to a hight of 4 ft. with cement plaster, carefully blocked off in the bath room in imitation of tile. The floor of the bath room is of ceramic tile, laid on a bed of cinder-concrete 3 in. thick. The concrete bed is composed of a mixture of one part Portland cement, three parts coarse sand and five parts screened cinders. The top finish consists of a ¾-in. layer of cement mortar, made up of one part cement and two parts sand.

The six columns of the front porch are of the type known as Kolls patent lock joint stave column, made by Hartmann-Sanders Company, Elston and Webster avenue, Chicago, Ill. The capitals of the columns and pilasters are of composition.

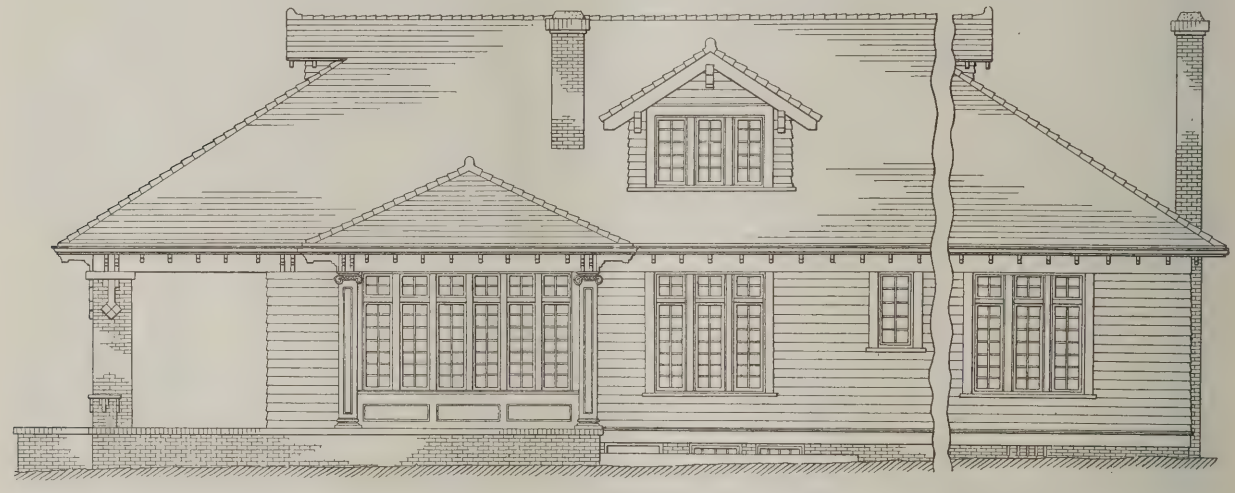
The plumbing fixtures are of the Standard Sanitary Mfg. Company's make, and all exposed plumbing throughout the house except in the kitchen is nickel plated.

In the boiler room is a 40-gal. galvanized iron boiler connected to a coil in the warm air furnace of the heating system so as to supply hot water to the bath room and kitchen. The boiler is also connected with a gas heater for supplying hot water when the heating system is not in use.

The house is wired for electric lights and bells in accordance with the rules and requirements of the National Board of Fire Underwriters and the local ordinances.

The heating of the house is by warm air, use being made of a No. 450 furnace made by the XXth Century Heating and Ventilating Co., Akron, Ohio. The cold air is taken in through pipes running from the exterior and interior. One-third of the entire area is brought from exterior and the remaining two-thirds from floor of hall and living room, thus giving an effective circulation of air throughout the house.

All exterior woodwork received three coats of paint and the exterior metal work three coats of special paint. All interior woodwork, excepting the bath room, was stained, then shellaced and varnished. The oak floors of the dining room, living room and sun parlor have a natural finish, three coats, and the pine floors of hall, the three bed rooms and passage from hall to bath, one coat of stain and one coat of floor varnish. All woodwork in the bath room, as well as the wainscoting, received five coats, the last two being ivory enamel.



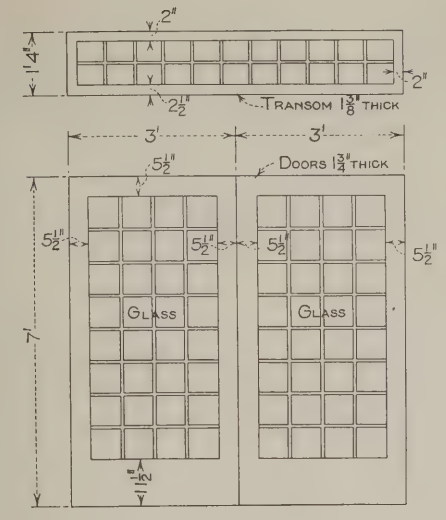
A Southern Home of the Bungalow Type—South Side (Right) Elevation—Scale 3/32 in. to the Foot

The southern home here shown is that of Mr. Isidore Lehman, on South State street, Jackson, Miss., and was constructed at a cost of $5360, in accordance with plans prepared by architect Emmett J. Hull, Daniel building, Jackson, Miss.

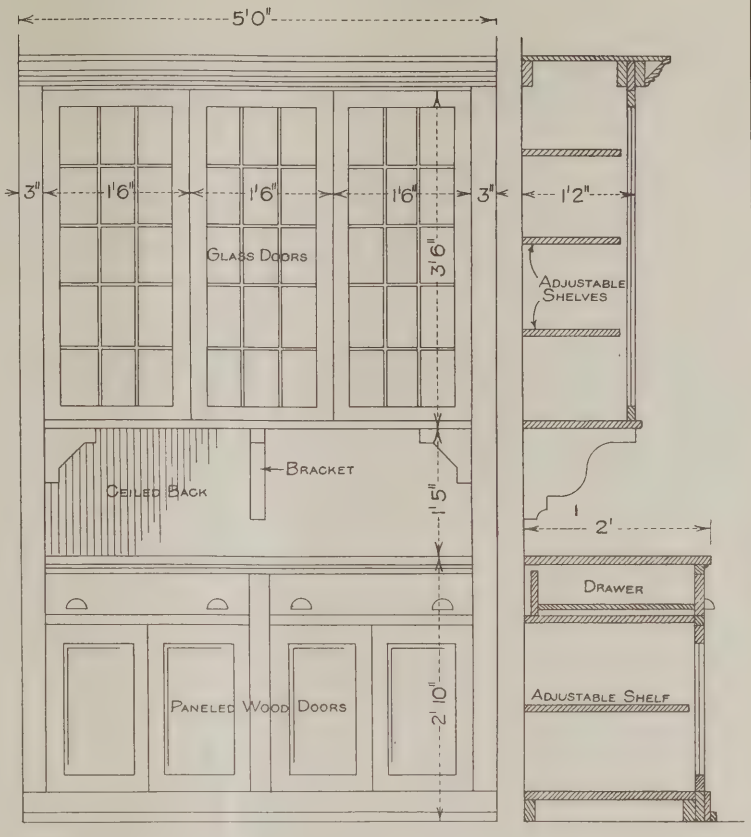
The cost figures do not include the architect's fees, but do include the warm-air heating, plumbing, wiring and electric fixtures.

Concrete Posts for Holland

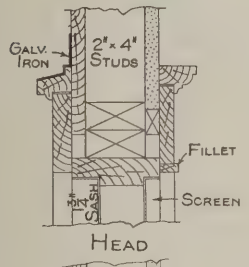
Because of the swampy condition of the western part of Holland it has been necessary to use wooden piles for foundations for houses, viaducts and other structures. Until lately the use of concrete in connection with these foundations had not been thought of, but a recent trial at Westerdok demonstrated the practicability of the reinforced concrete pile and, as a result, the system of building foundations in this part of Holland is rapidly changing.

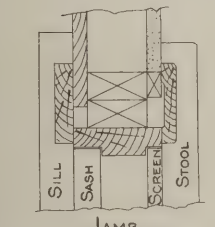


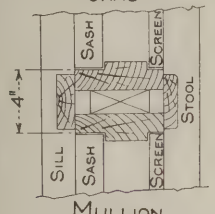
Elevation of French Doors Between Living and Dining Rooms—Scale ¼ In. to the Foot

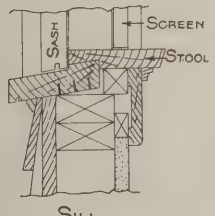


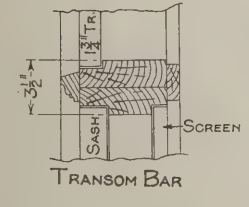
Elevation and Vertical Section of China Closet—Scale ½ In. to the Foot



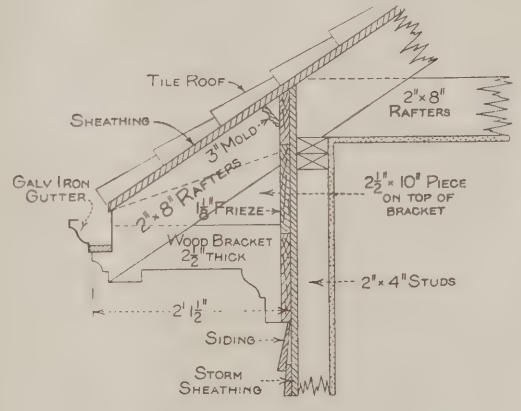




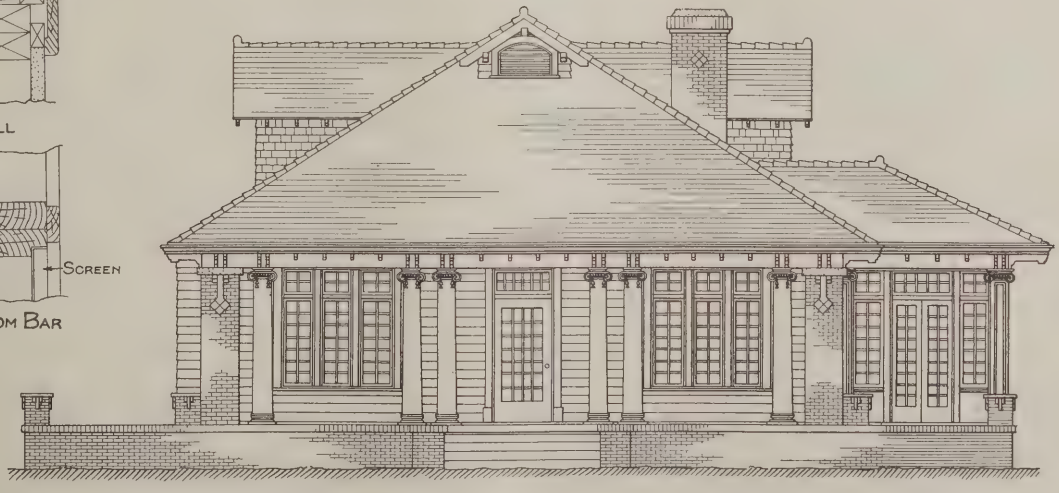




Vertical and Horizontal Sections of Casement Windows—Scale 1 In. to the Foot



Details of Main Cornice—Scale ½ In. to the Foot



Front Elevation of the House—Scale 3/32 In. to the Foot

A Southern Home of the Bungalow Type—Elevation and Miscellaneous Constructive Details

Oil-Mixed Concrete for Damp Proofing

Experiments in the Department of Agriculture Demonstrate Its Value in Many Kinds of Buildings

AFTER extensive laboratory and service tests the Department of Agriculture has secured results which appear to establish definitely the value of oil-mixed concrete for damp-proof construction. Detailed results of these tests, which were carried out in connection with the work of the Office of Public Roads, are contained in the new bulletin, No. 230, of the Department, entitled "Oil-Mixed Portland Cement Concrete." Briefly summarized, the conclusions to be drawn from them are that the admixture of certain mineral oils in small proportions, not to exceed 10 per cent. of cement used, does not lessen the tensile strength of mortar; that the decrease in the compressive strength of mortar and concrete is not serious; that concrete mixed with oil takes much longer to set hard, perhaps twice as long, but that the increase in strength is nearly as rapid in the oil-mixed material as in the plain concrete. The use of oil does not make the concrete impervious to heavy water pressure but practically non-absorbent under low heads.

Value of Oil-Mixed Concrete

The value of oil-mixed concrete is said to be particularly great in the construction of basement floors and walls, watering troughs, cisterns, barns, silos, and in all parts of concrete structures that are to be made damp-proof.

The oil should in no case exceed 10 per cent. of the weight of the cement and for the most part 5 per cent. is all that is necessary. Since a bag of cement weighs 94 pounds, 4.7 pounds of oil, or about 2½ quarts, should be added for each bag of cement used in the mixture. The sand and cement should be first mixed with the proper amount of water into a stiff mortar, to which is added the correct amount of oil, and the whole mass again thoroughly mixed until all traces of oil have disappeared. Particular care should be taken to insure that the oil is thoroughly incorporated in the mixture and the time of mixing should be practically double that when the oil is not used. For this reason a continuous mixer should not be used in oil-cement-concrete work, as it is difficult with this type of machine to increase the time of mixing sufficiently.

Kind of Oil Is Important

The kind of oil is also important and the following technical specifications are suggested in the bulletin in order to prevent the use of certain oils which might tend to impair the strength of the mortar or the concrete.

(1) The oil shall be a fluid petroleum product and shall contain no admixture of fatty or vegetable oils.

(2) It shall have a specific gravity not greater than 0.945 at a temperature of 25° C.

(3) It shall show a flash point of not less than 150° C. by the closed-cup method.

(4) When 240 cc. of the oil is heated in an Engler viscosimeter to 50° C., and maintained at that temperature for at least three minutes, the first 100 cc. which flows out shall show a specific viscosity of not less than 15 nor more than 30.

(5) When 1 part of the oil is shaken up with 2 parts of hundredth normal caustic soda, there shall be no emulsification, and upon allowing the mixture to remain quiet the two components shall rapidly separate in distinct layers.

Valuable for Basement Floors and Walls

For practical use the addition of oil will be found particularly useful in the construction of basement floors and walls. Many of these now in existence are continually damp and such a condition may be remedied by the application of an oil-mixed mortar coat to the old surface. A mortar composed of one part of cement and two parts sand and containing 5 per cent. of oil should be sufficiently non-absorbent for this purpose.

Watering troughs and cisterns made of oil-mixed concrete should also prove of considerable practical value in the conservation of water. In the construction of bars, where oil-mixed concrete is used, the interior will be noticeably drier than when ordinary concrete is used. Owing to their durability, cleanliness, and resistance to fire, concrete barns are becoming more and more popular, but they suffer from the disadvantage that during a long beating rain the side walls are inclined to absorb much moisture, which ultimately penetrates into the interior. The addition of oil to the extent of 5 per cent. of the weight of cement in the concrete used in the side walls obviates this objection. Barn floors can also be constructed in the same way with advantage. A damp-proof floor is warmer because of the lack of evaporation from its surface, and it is also more sanitary than an ordinary concrete floor because of its non-absorbent character.

There are, of course, any number of other types of buildings and structures of all sorts in which oil-mixed concrete may be used advantageously, or, if this is not necessary, a coat of oil-mixed mortar may be applied effectively.

Attention is called, however, to the fact that extreme care in proportioning, mixing, and placing the concrete is absolutely necessary if the addition of any water-proofing agent is to be of value. The process of mixing oil with concrete has been covered by a public patent so that any one is at liberty to use it. The methods of using this material are discussed more fully in the bulletin already mentioned.

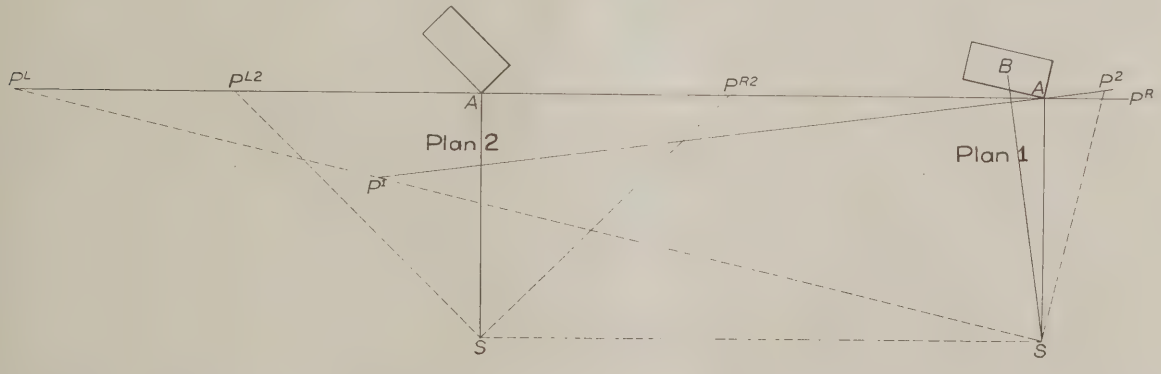
Elementary Perspective Drawing—IV

Use of Diagonals in Vertical and Inclined Planes and Method of Finding Their Vanishing Points

By George W. Kittredge*

IT will be readily seen that the methods employed in the systems herein explained can be carried to the extent of determining the position of points of the most minute detail, as the depth of window jambs, the projection of cornices, etc. As a valuable assistant, however, in respect to small details, as the projection and general outlines of moldings, window and door caps, etc., those who expect to practise perspective drawing should develop the faculty of free-hand sketching of objects of an architectural character, as they appear to the eye as hinted at the beginning. This will enable such persons to estimate with considerable accuracy small measurements which would require time and trouble and perhaps cause confusion to locate geometrically.

In beginning the study of either system of perspective it will simplify matters if the point of sight *S*, Fig. 5, be first assumed on a line dropped from the angle of the building (*A*) which touches the picture plane, thus making the points *S* and G^1 one and the same point. In fact, when the angle of the view or the design of the subject is such as to bring this angle approximately near the middle of the picture, this course is to be recommended in general practice. But when it is desirable to give a very full view of one side (and consequently a very much foreshortened view of the other) the point of sight should be taken opposite the center of the view, for the reason that the picture, when finished, is supposed to be viewed squarely in front of the observer; that is, from a point opposite the middle of the picture, and not obliquely, as from a point opposite one side of the center. Following the method already explained for finding the vanishing points, it will readily be seen that the more acute the angle made by one side of the building with the picture plane, the more distant must be the vanishing point for that side in the view, provided the point of sight is kept the proper distance away. These conditions will be made clear by reference to Fig. 6, in which *B* is the plan of a building and *S* the point of sight, so chosen as to give a very full view of the longer side of the building. Assuming now a line drawn from *S* to the angle *A* as the line of sight or axial, say, the picture plane must then be drawn through *A* at right angles to *A S*, and the position of the vanishing points found as before explained by drawing lines from *S* parallel to the sides of the plan, intersecting the picture plane as shown at P^l and P^r. If, however, a line drawn from *S* to the center *B* of the plan be assumed as the line of sight, and the picture plane be drawn at right angles thereto, as shown by the lower line, it will be seen that the left vanishing point will then fall at P^1, a point very much nearer to *A*, while the right vanishing point will be a mere trifle farther away, as shown by P^2.



Elementary Perspective Drawing—Fig. 6—Comparison of Distance to Vanishing Points in Different Angles of View

This can be beautifully illustrated by the use of a camera in the following manner: Find, if possible, an isolated building, and select a point of view as indicated in Fig. 6, but sufficiently far away so that the image of the building will occupy about one-third of the width of the ground glass. Bring the image as near the center of the ground glass as

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

possible and focus carefully. Now, loosening the tripod screw, turn the camera from side to side and observe the change in the direction of the vanishing lines of the building as the image is brought first as far to one side of the ground glass as possible, and then turned to the other extreme. It will be seen at once that a certain distortion exists when the image is brought to the sides of the ground glass, while it will appear most pleasing and most natural when nearest the middle.

When Distance to Vanishing Point Rapidly Increases

We have learned from the foregoing that the distance to one of the vanishing points increases very rapidly as one side of the building approaches coincidence with the picture plane. If, now, the plan, in any of the diagrams, be turned upon the point *A* so that both sides make equal angles with the picture plane (which, of course, will be 45 degrees), as shown at the left in Fig. 6, we shall discover that the distances from *A* to P^{l2} and from *A* to P^{r2} are equal, and that therefore the two vanishing points will be equidistant from the line of sight, and that this distance is equal to the distance of the point of sight *S* from the picture plane. We shall also discover that, for any given distance or position of the point of sight, the distance between the vanishing points is less in the case of the 45 degrees perspective than if any other angle of view be assumed. Experiment will also show that, as the building is turned from its 45 degrees, or central position, the distance between the vanishing points will increase slowly at first and more rapidly as one side approaches the picture plane. These facts become important in the economy of the drawing board when, as is often the case, large drawing boards are not always at hand.

Desired Angle of View Obtained by Inspection

In the general operations of the measuring point system, the desired angle of the view can usually be obtained from the plan by inspection, without the trouble of placing it in position with reference to the picture plane. This can be accomplished by simply placing a straight edge (to represent the picture plane) against the near corner of the plan, turning it one way or the other till the desired angle of view is obtained, when the angles can then be transferred to the point *S* by first drawing a horizontal line through *S*, thus bringing the lines drawn from *S* to P^r (right vanishing point) and P^l (left vanishing point) parallel to the sides of the building, as explained. From the foregoing it will be easily seen that with any given length of picture plane and horizon line, as, for instance, the longest that can be drawn across the drawing board, the nearer the line of sight is drawn to one end or the other of the picture plane the shorter will be the corresponding side of the building in the resulting view (and, of course, the longer will be the other side), while the nearer it is brought to the middle of the board the more distant can the point of sight be located. We may mention here a point which the student should consider at the outset, viz.: that in order to suit the convenience of the drawing board the point of sight is apt to be placed too near rather than too far away. Since the finished picture is apt to be viewed from a distance greater than the scale distance of the point *S* from the picture plane, there is less danger, so far as correct results are concerned, of getting it too far away than of getting it too near.

While the principles already explained are in themselves sufficient to cover the general requirements of perspective representation, there are yet many points necessary to a comprehensive understanding of the subject, as well as additional methods for producing certain results, which are worthy of the draftsman's consideration and will repay him for the time devoted to their study, among which may be mentioned the perspectives of inclined planes and of circles and cylindrical objects; methods for the division of lines or surfaces with fractional spaces, without recourse to the plan; for the indefinite extension of a series of objects, etc.

Inclined Planes

As next in order we shall take up the subject of inclined planes, the principles of which are particularly useful in their application to roofs, but which are equally applicable to stairs, inclined roadways and walks, theater floors, etc. In the description of Fig. 4 reference was made to the vanishing point of the lines forming the front and rear gables of the roof. Of course, as has been shown, all of the points of any roof can be found by the methods explained in either system of perspective without recourse to any vanishing points, except V^l and V^r of the natural horizon, but it is often advantageous to locate the vanishing points of oblique lines whether in a vertical or an inclined plane, which will be seen as we proceed.

Probably the simplest way of arriving at the position of the vanishing point of an inclined plane is to consider first the oblique lines drawn in the vertical plane with which it intersects. It has been shown in Fig. 2 that all parallel lines drawn in a horizontal plane vanish to one and the same point on the horizon, and that any other set or system of parallel lines drawn in this same plane, but oblique to the first system, vanish to another point on the horizon. As has been previously explained, all of the horizontal lines of a vertical plane, as those which may be drawn across the end or side of a building to designate the water table, the sills and caps of windows, the weather boards, etc., must also vanish to one point on the horizon, as V^r of Fig. 7, herewith presented.

Use of Vertical Lines

If we now draw a vertical line through the vanishing point of the said lines, as shown by V^r V^l, and turn the picture so as to bring the left side to the bottom, we shall see at once that the vertical line appears as a horizon to the vertical plane of the end of the building. Following what has been said in connection with Fig. 2 about horizontal parallel lines in the case of the two tracks crossing each other, we then discover that any system of lines drawn obliquely across the end of the building—that is, inclined—as *A B* and *E F*, indicating the frieze of the gable cornice, should by analogy vanish at a point (V^1) on this vertical line, which we may term, for convenience, the "vertical" horizon, but which is more properly termed the "trace" of the vertical plane. And, again, since *C D* is parallel to *A B*, it,

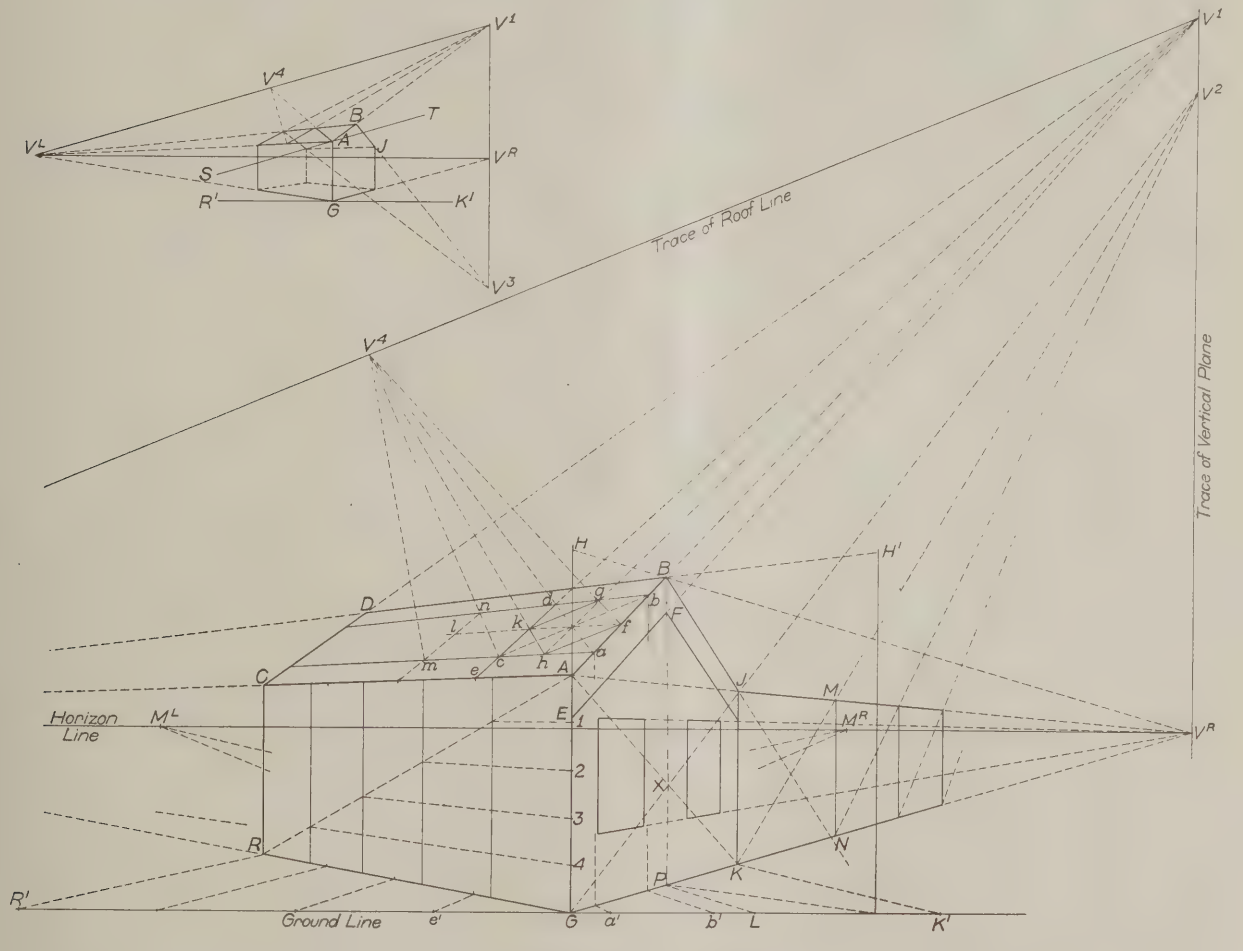
and any other lines which may be drawn parallel to *A B* on the plane of the roof, must all vanish at the same point, V^1. In other words, the lines of an inclined plane must vanish to a point exactly above the vanishing point of lines which might be drawn below them upon a horizontal plane.

The hight of V^1, of course, depends upon the inclination of the roof and is determined by first setting off the true hight of the peak of the gable upon any line which is in the picture plane, as shown at *H* or H^1, and then carrying it toward the proper vanishing point to meet at *B*, a line erected from that point of the plan (*P*), which represents the middle of the end, all as previously explained. A line drawn from *A* through *B* and continued to meet the vertical line erected from V^r, shown at V^1, will be the required vanishing point. By the same course of reasoning it will be seen that if *B J*, the line of the further side of the gable, be continued downward to the right, having the same pitch as *A B*, it will intersect the "vertical" horizon at a point, V^3, as far below V^r as V^1 is above it, which will be the vanishing point for all the lines of the cornice on that—the farther—side of the gable and for all other lines which are parallel to *B J*, as, for instance, the rafters on the farther side of the roof, in a drawing made to show the framework.

In order to make the drawing (Fig. 7) of sufficient size to show all parts closely, the vanishing points V^l and V^3 have been omitted. To compensate for these omissions, however, a small diagram is given in the upper left hand corner, in which all of the vanishing points are shown, and correspondingly lettered so that the positions of the points not shown in the larger diagram may be perfectly understood.

The reader will now note that the lines *A B*, *C D* and *A C* represent the intersections of the plane of the roof with the three vertical planes, or walls of the building, leaving nothing for the projection and depth of the eaves or cornice. These intersectional lines must be obtained first in actual practice, as shown, and the necessary projections and depth added afterwards.

The use of diagonals and their vanishing points is a feature which the draftsman can frequently employ very much to his advantage, especially when a sketch design is being completed in perspective, for much creative work is done in a perspective sketch even before plans are matured. It is quite familiar to every one that the middle of any rectangular figure can be most easily obtained by crossing the two diagonals of the figure. This can be done in the perspective representation of such a figure, as the wall of a building, just the same as though it were in elevation instead of in perspective. Thus in Fig. 7 *A J K G* is a rectangle representing part of an end wall; if the diagonals *A K* and *G J* be drawn, their intersection, *X*, will mark its middle point, and a line erected through this point will divide the wall surface vertically into halves and will pass through the peak of the gable. This is much simpler than



Elementary Perspective Drawing—Fig. 7—The Use of Diagonals in Vertical and Inclined Planes and the Method of Finding Their Vanishing Points

to set off half the width of the building on the ground line, as shown by *G L*, and then from *L* to draw a line toward M^l to intersect *G K*, as shown at *P*.

Should another wall of equal dimensions be built in extension of *G A J K* there would then be two rectangles exactly alike, and since their sides would be parallel by juxtaposition, their diagonals must also be parallel. Therefore, the diagonals of both would, in the perspective view, vanish to the same points on the "trace" of the vertical plane, one above and the other below the horizon, as in the case of *A B* and *B J*. If, therefore, it were necessary to represent this extension in the view it would only be necessary to extend one diagonal, as *G J*, to cut the trace as shown at V^2 and to then extend *A J* indefinitely toward V^r. A diagonal may now be drawn from *K* toward V^2, cutting *J* V^r at M, from which a perpendicular can be dropped to cut *K* V^r at *N*, thus making *K J M N* the equal of *G A J K*. This operation can be continued indefinitely, first drawing the diagonal as described above, then the perpendicular, all as shown by the lines beyond *M N*. This method is applicable to the spacing of columns, brackets or the lines of a running ornament, being careful, of course, to see that the first space, *G K*, is obtained from *G* K^1 of the ground line, and is an exact fraction of the entire space to be represented.

Application of the Method to Oblique Lines in an Inclined Plane

This method can also be applied to oblique lines in an inclined plane, as, for instance, to shingle designs, as shown in the roof surface A B D C, after the position of the horizon or trace for the inclined plane has been located. The method of locating this line will no doubt be interesting in view of the fact that its use is somewhat unusual. We have already seen that the vanishing point for any set of parallel lines which can be drawn upon a horizontal plane is to be found upon the real horizon V^l V^r, and likewise that the vanishing point for any set of parallel lines drawn in a vertical plane is to be found in the trace or "horizon" of vertical plane. It will therefore be quite natural to expect that the "horizon" for an inclined plane should be oblique, both to the trace of the vertical plane and to the natural horizon. This is true when the point of view is such that the line of sight is obliqued to the level lines of the plane, as is the case of the roof in Fig. 7. The level lines of the roof, of course, vanish to V^l, while those at right angles thereto, as *A B* and *C D*, vanish to V^1. Any set of parallel lines, therefore, drawn upon the roof obliquely between those two sets must vanish to a point between V^l and V^1—that is, to a point upon a line connecting the two vanishing points mentioned, called the trace of the roof, because no plane can have more than one horizon. Should this fact not appear quite clear turn the picture so as to bring the line V^l V^1 to a horizontal position, and draw through *A* a line parallel thereto (*S T* of the small diagram), representing a ground line, when the line V^l V^1 will appear as the natural horizon to the roof, *A B D C*, which roof will appear as a rectangle drawn in a horizontal plane and seen from a rather high point of view.

Suppose now that four diamond-shaped figures are required on the roof surface. The positions of the points, *a*, *b* and *e*, are obtained by measuring the horizontal distances between these points from the elevation and then setting them off on the ground line R^1 *G* K^1, in the usual manner, as shown by *a'*, *b'* and *e'*, after which the points are carried to their proper places in the view all as shown. From *a* and *b* lines are drawn to V^l across the roof, and a line from *e* is drawn toward V^1, producing the perspective of the first rectangular figure *a b d c*, the center of which is located by the crossing of diagonals as previously explained. From this central point lines are now drawn to both the vanishing points above referred to, thus locating the four points of the diamond, *f g k* and *h*. If the diagonal, *a d*, be now extended to intersect the trace of the roof as shown at V^4, then this point will be the vanishing point for the line *f g* and *h k*, and the corresponding lines for the other figures in the course and for all other lines which may be parallel to them. The other figures of the course may now be added by first drawing the diagonal from *c* toward V^4, cutting the line from *b* at *n*. A line from V^1 through *n* will now locate points *l* and *m*, corresponding to *k* and *c* of the first rectangle. Thus, by drawing first a diagonal toward V^4, then a perpendicular from V^1, the pattern may be continued indefinitely as in the case of the vertical wall. These operations will locate all of the points, so that those lines (*k g* and *h f*) which slant in the other direction, may easily be drawn without a vanishing point. They happen in the present case to be so nearly parallel to V^l V^1 that their vanishing point is too far away to be available.

Should it be required to divide vertically a receding surface, as for instance the side wall, *G A C R*, into an odd number of equal spaces, say five, or into any even number which could not be produced by repeating the bisecting operations above described, it may be very simply accomplished by first drawing a diagonal, as *A R*, then dividing the vertical line *A G* into the required number of spaces, as shown by the small figures 1 to 4, and then drawing lines from each of these several points of division toward V^l to cut the diagonal *A R*. Vertical lines drawn through each of the points of intersection on the diagonal will then produce the vertical divisions required as shown.

(*To be continued.*)

Concrete Floor for Factory Building

In connection with a factory building which has just been erected at Windsor, Ont., the method of floor construction is of more than passing interest. The walls of the structure are of brick, while the floor is of concrete, the latter being on a level with the concrete foundation. Below the floor level is a 3-ft. "fill" of gravel, which is laid as follows: A dam of sand was built around an area of convenient size, and this area was flooded with water and the gravel sprinkled with it. The hight was raised in this manner 1 ft. over the entire area of the building and the operation twice repeated until the desired 3-ft. raise was accomplished. The point is made that as a result of this method of washing the gravel a very hard fill was secured. On top of this is a covering of maple flooring fastened to sleepers embedded in the concrete.

The Modern Sliding Parlor Door*

Something About Partitions—Telling How to Install the Track and Giving Details for Hanging the Doors

By E. J. G. Phillips†

BEARING partitions which must support the joists and carry the load of the floor above should be trussed above the opening and the studs should be set with the two-inch face parallel with the partition as shown. Some builders will prefer to use 2x8's or 2x10's to head in the opening, and this is probably just as good or better where the space from the top of the opening to the ceiling is short. When the space is considerable, the shrinkage of the wide header may cause cracks in the plaster. In simple partitions, a considerable amount of space can be saved by setting the studs the narrow way and the partition will probably be just as satisfactory.

Partitions for single doors are constructed in a similar manner excepting that it is only necessary to provide a regular pocket on one side of the opening. At the opposite side, space for a false pocket 4 to 6 in. deep is required as shown in Fig. 5. This is necessary to use in adjusting the hangers to raise or lower the door as will be seen later.

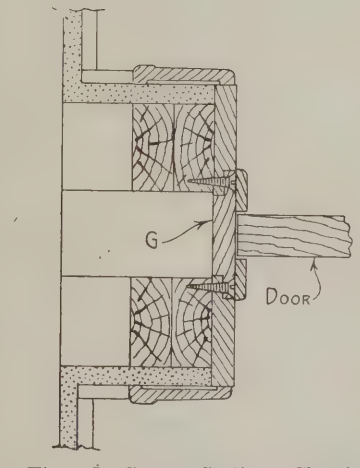


Fig. 5—Cross Section Showing Space for False Pocket

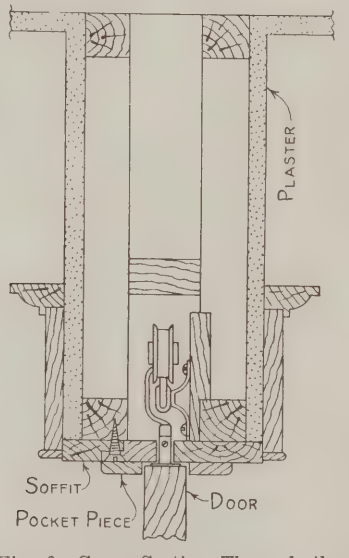


Fig. 6—Cross Section Through the Head with Track for Side Wall Attachment

The Modern Sliding Parlor Door—Some Details of Construction

Short strips to which the ends of the base board are to be nailed are shown at "C" in Fig. 2. Nail 2 x 4 in. bumper pieces "D," to the floor in the pocket for the doors to strike against when opened. These should be set back a distance equal to the width of the door, less the thickness of the jamb and the door stop. Provide the usual grounds for plastering and the framing is complete.

House door hanger tracks are of two general types: 1st, the non-adjustable single tracks for side wall attachment, and 2nd, the adjustable styles for overhead attachment. The latter includes the trolley types and the preference is with this class.

Fig. 6 shows a cross section through the head with track for side wall attachment. In this particular hanger the wheels have fiber treads and the track is made of hard maple reinforced with steel. A strip $\frac{7}{8}$ x $5\frac{1}{2}$ in. is nailed to the studs as shown. Special care should be exercised to have this strip straight, and when the minimum width of pocket (which is 3 in. for this hanger) is built, the strip should be gained about 7/16 inch deep for the studs, so the center of the track will be exactly over the center of the pocket. Screw the track firmly to this strip at the proper height, as given in the directions accompanying the hangers. It is very essential that these non-adjustable tracks be set level, as there is no way to correct the alignment after the walls are plastered. Nail a heading strip between the two lines of studding high enough to clear the hanger. This will assist in keeping the partition in line and prevent falling plaster from accumulating on the track.

A trolley type adjustable overhead attachment track is shown in Fig. 3. These tracks are made with a wood header from which the track can be removed. Three screws, which provide vertical adjustments, are used to attach the track to the

*Concluded from page 49 of the June issue.
†Engineer with Richards-Wilcox Co.

header. Two pieces of track are required for double doors.

Nail a 2 x 4-in. heading timber between the two lines of studding at the proper height to accommodate the door hanger track which is to be used. Builders, of course, have preferential methods of attaching this timber, some nailing it directly to the studding (this is especially convenient when studs are set the narrow way) and others nail it to cross pieces, which are in turn nailed to the studs. Be sure to have it level.

Hanging the Doors

Remove the wood header from the track and tack it lightly to the heading timber exactly midway between the studding and with the end to which the slotted plate is attached, extending back into the pocket. The opposite end should come exactly to the center line of the opening for double doors, and exactly in line with the side of the finished opening farthest from pocket for single doors. Mark through the bolt holes; remove track header and bore holes through heading timber to provide clearance for the adjusting screws and then nail track header to the heading timber.

Insert the hangers in the track (side of hanger which has the adjusting screw should be toward the edge of the door) and re-assemble the track to the header. Track adjusting screws are operated by inserting a screw driver through the opening in the bottom of the track.

After squaring up and sizing the doors, plow a groove ⅜ inch wide by ½ inch deep in the bottom of the door for the floor guide.

Remove the door plates from the hangers and screw to the top of the door. The plates should be exactly in the center of the door, considering the width, and the end of the plate should be in line with the edge of the door. Place the doors in position under the track, attach door plates to hangers and adjust the doors to provide the necessary clearance at the bottom. Double doors should be adjusted so the edges meet properly at the center and the front edge of single doors should be parallel with the jamb.

Fig. 6 shows the method of attaching the jambs and casing for side hung tracks. With double doors, a removable pocket piece 10 in. long is made in the head jamb or soffit over the center of the opening on the side opposite from the track, as in Fig. 6. This is used to lift the hangers on or off the track. For single doors it should be placed near the side of opening which adjoins the pocket.

Jambs and Soffits for Overhead Attachment

The jambs and soffits for overhead attachment tracks are detailed in Fig. 3. These members, it will be observed, are all made in two pieces, the removable sections or pocket covers, *"E-E,"* which are attached with screws, are provided to permit the removal of the track at any time after the walls are plastered. The joints are so located as to be covered by the door steps. Some carpenters prefer to plane down that portion of the soffit, which lies directly above the top of the door to about ½ inch thick. This gives more lap at the top of the door and makes more allowance for adjustment.

For single doors, stop or false pocket cover is necessary as at *"G"* Fig. 5, for the door to strike against when closing. This is similar to the removable sections of the jamb at the opposite side of the opening, except that it is in one piece. This piece is attached with screws and is removed when it is necessary to adjust the rear hanger. After removing this section, the door can be moved forward a few inches into the false pocket and in that way access to the adjusting screws of the rear hanger may be had.

Screw the floor guides in place flush with the door stops and for double doors set the overhead center stop into the soffit at the center of the opening, being careful to fit it into the wood tightly so the shock will not come on the screws.

After applying the casing and the head trim in the usual manner, the job is finished and if the work is properly executed and a reliable make of hanger is used it should be good for service as long as the house is used.

The Use of Sandstone in Building

One of the varieties of stone that has been in important use for structural and decorative purposes ever since the dawn of civilization is sandstone. This is of very wide occurrence, being found in almost every country, and it has such diversity of color and texture that it would naturally be chosen for architectural use, says *Stone.* Besides its beauty, sandstone has been commended to the builder by its great durability and its resistance to attacks by fire and the acids of the atmosphere. Many of the most notable buildings that have come down from antiquity are of sandstone. Temples and statues in ancient Egypt were cut in this material, although the patient craftsmen were just as willing to carve limestone, granite, or even the intractable basalt and porphyry.

In Persia and the various countries of Asia Minor, gigantic structures were reared in sandstone, the ruins of which have survived to awaken our admiration and wonder. The remarkable rock-cut temples and tombs of Arabia Petra are carved entirely from great cliffs of sandstone. The stone is a beautiful and delicate pink in color, with occasional markings in yellow, and the effect of rich carvings in such a material can scarcely be imagined.

In later times, sandstone was used very generally for cathedrals and churches in England and on the continent. This made it possible to produce effects not only in stone of yellow and grey but also in brown, pink and red, and striking contrasts were available. It is only within the past few years that the present generation has learned the lesson of the excellent effects of polychromatic construction which might have been drawn long ago from the work of our forefathers. The varying colors of marble and sandstone enabled them freely to apply polychromy, both structural and decorative.

Cornelius L. Cannon, building inspector of the City of Poughkeepsie, N. Y., died at his home in that city on Friday, May 28, after a short illness, aged 65 years. He was one of the oldest and best known carpenters and builders in that section, having followed carpentry since his boyhood. As a city employee he was most careful and efficient.

A Frame Church Building at Bowen, Ill.

A Design Well Suited for Execution in Any Section of the Country—Cost About $4400

THOSE readers who in the past have made inquiry regarding plans for church buildings suitable for erection in smaller places of the country are likely to be interested in the design illustrated upon this and the pages which immediately follow. The building is of frame construction with bell tower and embodies an arrangement that is compact and well suited to the requirements of a house of worship. There are two main entrances, both of which give direct access to the auditorium of the church, yet at the same time one of them communicates with the chapel so that the latter portion of the building can be reached without the necessity of going into the main body of the structure.

From an inspection of the floor plan presented on a following page it will be seen that the rostrum and choir are located in a corner of the auditorium and are reached by a separate entrance from the outside. The arrangement of the auditorium is such as to place the pews in a slight arc of a circle diagonally across the building, and by means of the rolling partitions between the auditorium and the chapel the two rooms may be thrown into one whenever such a course would seem to be necessary or desirable.

General View of the Frame Church at Bowen, Ill.

From the vestibule at the left a flight of stairs leads to that portion under the main building that has been excavated to contain the furnace for heating the church. Over the cellar flight rise the stairs leading to the bell tower.

According to the specifications of the architect, the foundation walls are constructed of local rubble stone laid up in lime mortar. That portion of the outside walls exposed above the grade line all around is of pitch faced range work neatly pointed with cement mortar. The inside walls are of hard brick. The chimney is of brick and starts at the bottom of the wall. The furnace flue is 12 x 12 in. inside measurement and is lined throughout with brick set on edge.

The framing timbers are of well seasoned white pine, the floor joists being 2 x 8 in.; the ceiling joists 2 x 6 in., and the rafters 2 x 4 in. There is a 2 x 6 in. collar beam at every fourth rafter. The trusses over the auditorium are built of three 2 x 10's, braced with three 2 x 6's. The girder over the choir opening is made up of three 2 x 8's. The general arrangement is indicated in the cross section through the chapel, auditorium and choir presented on another page.

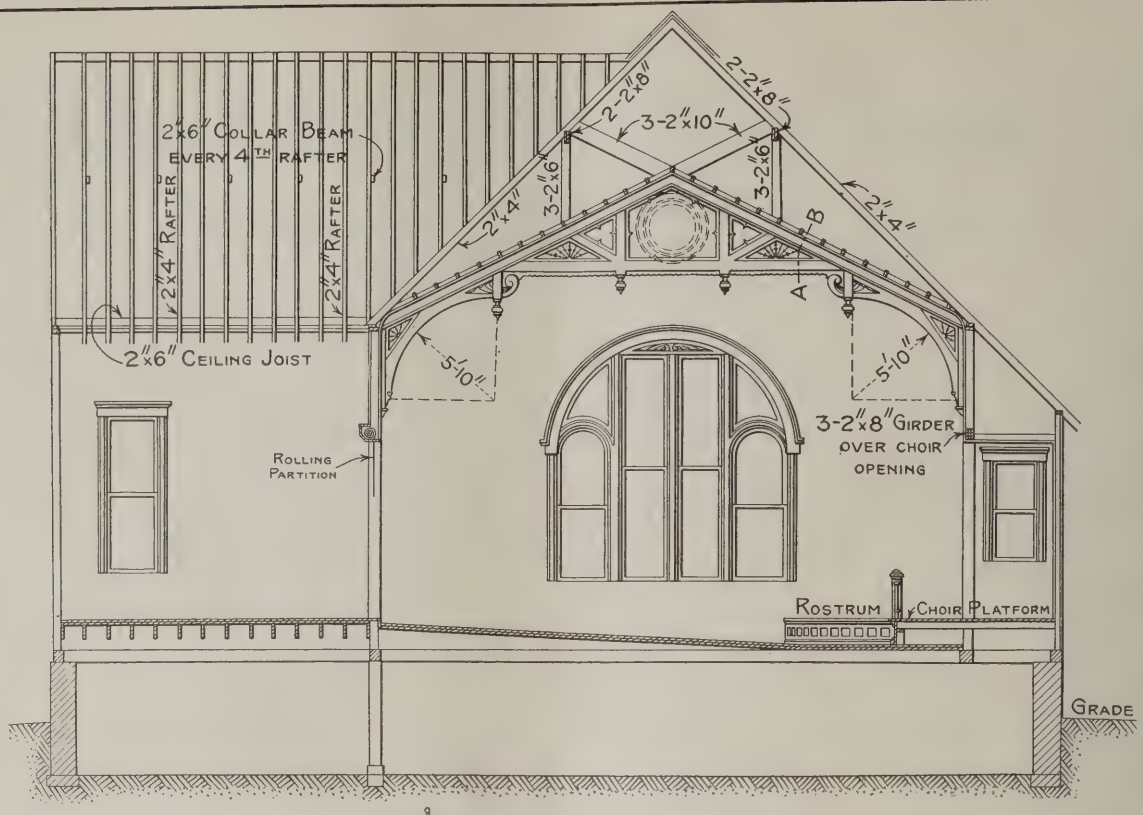
The roof trusses of the main building are constructed of selected yellow pine timbers, each member being made continuous by overlapping at the joints. The ceiling joists are run horizontally from truss to truss and the whole construction is put together with spikes, bolts and straps. The framing timbers of the main tower are indicated in the vertical section and also at the various plan views given on another page.

The floor of the auditorium is "bowled" and the joists are framed into girders supported on 6 x 6 in. posts. The first section of the floor next to the rostrum is level, but beyond this it rises in all directions at the rate of ⅝ in. to each foot.

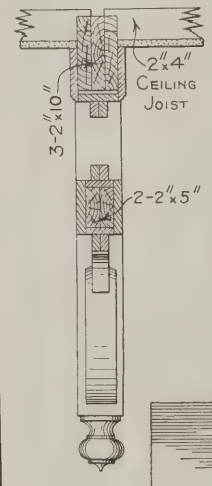
The outside walls of the building are covered with shiplap sheathing put on diagonally and covered with heavy building paper. Over this in turn is placed basswood siding with an exposure of 4½ inches to the weather. The exterior finish is white pine 1⅛ in. thick placed as shown by the drawings.

The roof rafters are covered with 1 x 6 in. boards placed 3 in. apart and covered with cedar shingles. The turrets and spires are finished with metal finials made by the W. H. Mullins Company, Salem, Ohio.

The floors are laid double, the lining one being of shiplap. The finish floor is of 4 in. Southern yellow pine and laid after the plastering was completed. The interior trim is of selected pine throughout, smooth wrought and finished natural.



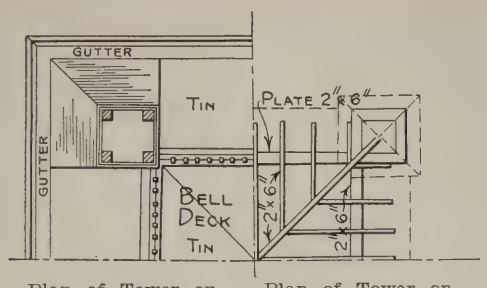
Vertical Cross Section of Building Taken on a Line Through the Chapel, Auditorium and Choir —Scale 3/32 In. to the Foot



Detail of Roof Truss on Line A-B of the Cross Section—Scale ½ In. to the Foot

Front Elevation of Church Building—Scale 3/32 In. to the Foot

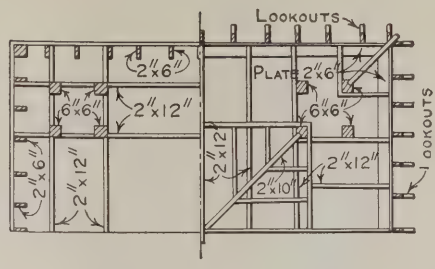
Elevation, Section and Detail of a Frame Church Building at Bowen, Ill.



Plan of Tower on Line C-C of the Vertical Section

Plan of Tower on Line D-D of the Section

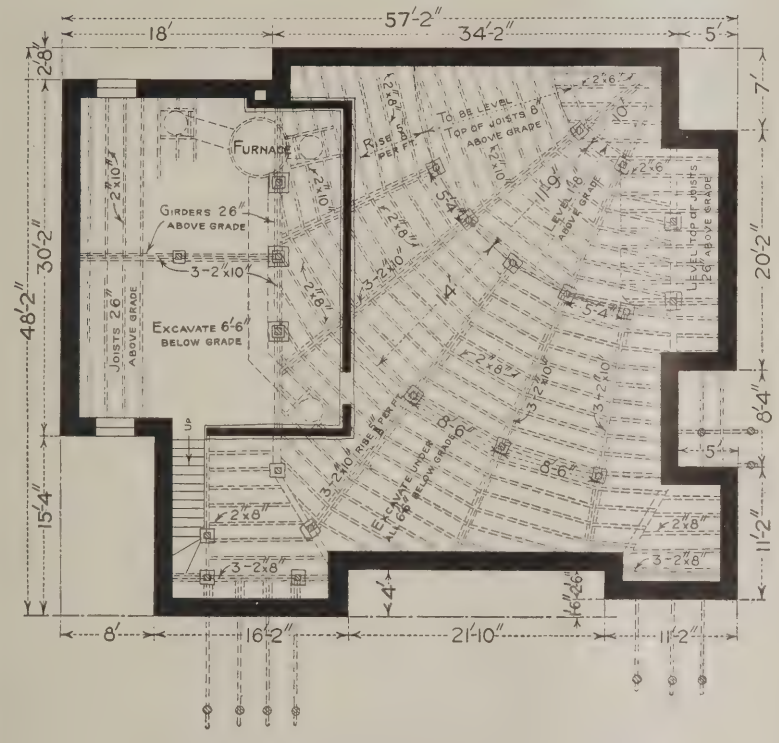
Scale ⅛ In. to the Foot



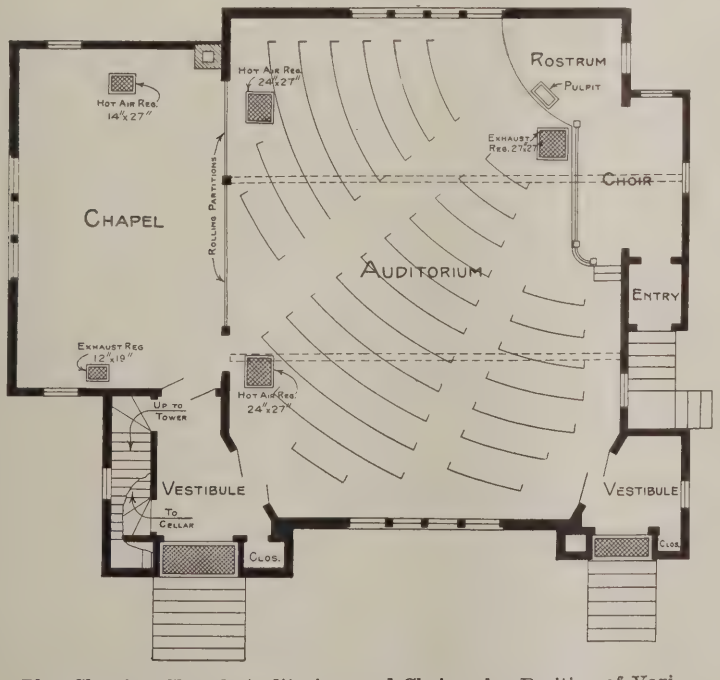
Plan on Line A-A of Tower

Plan on Line B-B of Tower

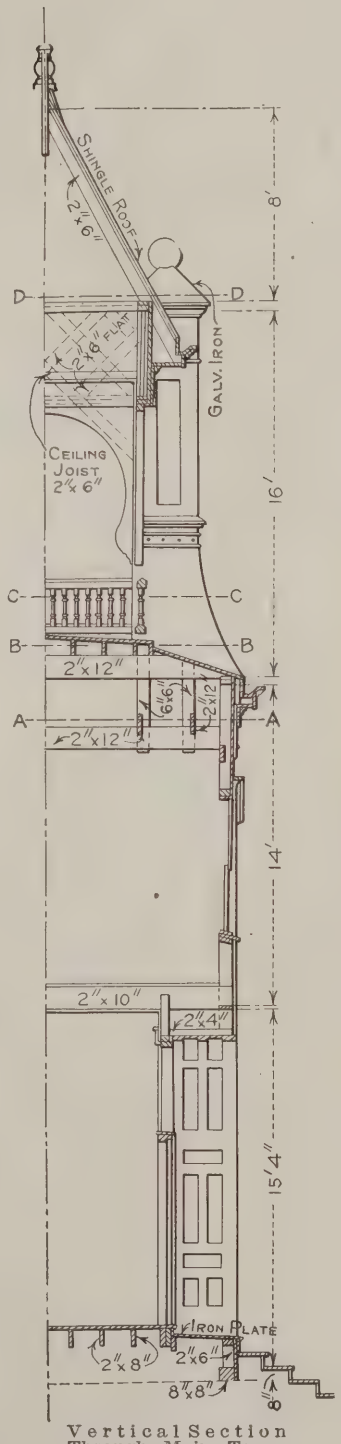
Scale ⅛ In. to the Foot



The Foundation Plan Showing "Run" and Sizes of Girders, Floor Joists, Etc.—Scale 1/16 In. to the Foot



Plan Showing Chapel, Auditorium and Choir; also Position of Various Registers—Scale 1/16 In. to the Foot



Vertical Section Through Main Tower —Scale ⅛ In. to the Foot

A Frame Church Building at Bowen, Ill.—Miscellaneous Constructive Details and Plans

The hardware is plain old copper sand blast finished bronze.

The outside doors are raised moulded and all others are flush moulded. The doors are panelled and the recessed jambs of the entrances are panelled to correspond with them. All windows and transoms are glazed with leaded stained glass of the designs shown on the drawings. The doors and windows are 1¾ in. thick.

The outside painting is three-coat work including the roofs of the towers and all metal work.

The church building here shown was erected in Bowen, Ill., under two contracts, the total cost being $4382. The contract for the structure itself was $4172 and the hot air furnace heating was $210. It was built from plans and specifications prepared by E. A. Payne, architect, of Carthage, Ill., and the work was done under his supervision.

Removing Iron Rust Stains from Stucco

In the case of a stucco house the iron work in various places rusted and discolored the stucco. The owner wanted to know how to remove this rust from the stucco and wrote the *Concrete-Cement Age* in regard to it.

The question was discussed by two experts one of whom offered the following suggestions:

"If these stains are purely of surface discoloration, it should be possible to remove them with a wire brush; if on the contrary, the entire thickness of the stucco has become stained, it will be necessary to put on a cement wash to cover the spots, or to cut out the stained portions and put on new stucco."

The other expert suggested this procedure:

"A solution of hydrochloric acid and stannous acid will remove iron rust from concrete, and will not injure the concrete if the treatment is administered rapidly and the face immediately washed with clean water. The solution mentioned has an affinity for carbonate of lime, consequently it should not be used where hydrated lime has been incorporated in the mixture. Rough finished cement stucco should be treated by spraying with the above solution as the result will be more thorough and the work more rapid than by the use of a brush.

"Very satisfactory results may also be obtained by diluting one of the commercial cement paints until it is thin enough to use in a spray pump, and painting the surface of the stucco by spraying the diluted paint upon it."

The Five Orders of Architects

The following extracts from a musty volume of the 18th century on the duty of the architect, contained in a recent issue of the London *Builder*, may provoke a smile on the part of American readers:

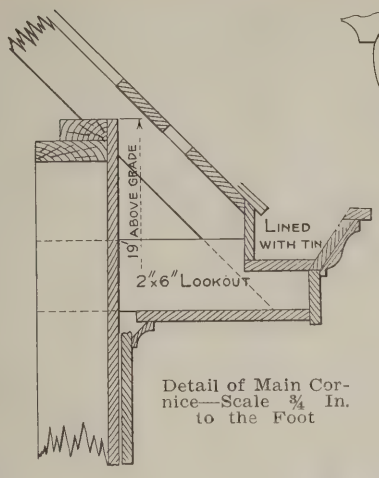
"As there be five Orders of Architecture—namely, the Tuscan, Dorick, Ionick, Corinthian, and Composite, of which all elegant structures be composed or ornamented—so likewise are there five orders or different kinds of architects, each differing from one another, yet all of them are paid or recompensed in like manner by those requiring their services, and the payment is at the rate of £5 per centum on the moneys expended on the erection of the structures devised by the architects.

"And the *First Order of Architects* is that called the Art Architect, who hath much conceit of his calling. He is oft-times dressed in curious fashion in a coat of velvet, and weareth a beauteous tie and a soft hat. His hair falleth over his forehead in curls and quaintly toucheth his collar. Those who employ him fear him, for he who crosseth his fancy he treateth as a felon or else sheddeth salt and bitter tears. His devices for buildings are oft-times exceeding quaint, and at times inconvenient to those who occupy the dwellings he deviseth. Yet is there thought and meaning abundant in all. He deviseth hearts upon doors and chimney-corners, the fires whereof oft-times smoke, yet their appearance is exceeding quaint and primitive. He quarrelleth with the decrees of the local surveyor, as no such an one existed in the time of the Heptarchy. The latches upon his doors one pulleth with a bootlace, and he thinketh of a pigeon-cot and sundial even in the forecourt of a City office. Thy garden space he filleth with clipped yews and lily ponds, and the pegs for thy washing will he design to teach thy maidservant culture.

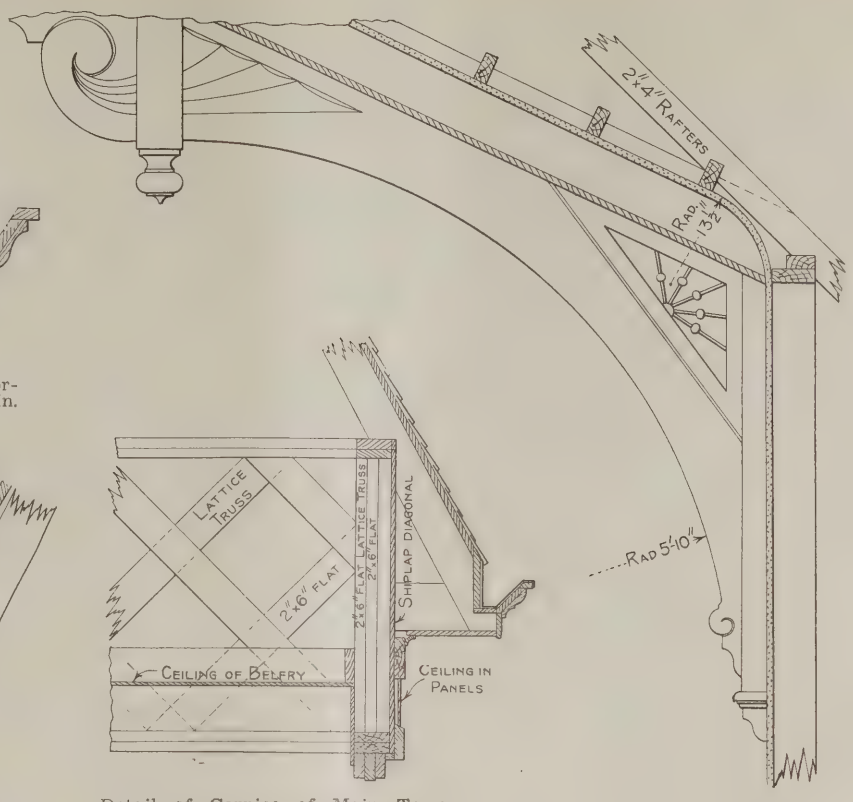
"Now, the *Second Order of Architects* is that called Practical, and none would know them from stockbrokers by outward seeming. Unlike the architect of the first order, he of the second order buyeth thy chimney-pieces ready-made and knoweth where thy wife wantyth the draining-board of a sink that her maid may place unwashed crockery thereon without hurt. He falleth in readily with thy wishes, saying this is the whole duty of one of his calling. Yet mayhap thou wilt discover the dwellings he deviseth are exceeding commonplace and like to those raised by the builder without aid, and thou mayest find him more practical in word than in deed.

"The *Third Order of Architects* is the Competitive Architect, and the manner of his working is altogether different from that of the architect of the first and second order. For whereas these are chiefly concerned with the devising of dwellings, the Competitive Architect's brain is even like unto a seething caldron of mighty thoughts. He draweth out schemes for public buildings which are not straightway given unto him, but only if they have been matched against many others and adjudged better than they are. He burneth the midnight lamp, and sweat rolls down his forehead even on to the paper whereon he worketh. He is balanced in the scales of hope and of fear, and his excitements are many. For, as Holy Writ hath it, many are called but few chosen, and oft-times the architect of the third order cannot discharge the reckoning of his washerwoman. Yet fixeth he his eyes on the stars and his mind is filled with great thought. When he succeeds he oft-times watcheth princes lay the corner-stone of his buildings while many applaud, and his name waxeth great in the land.

"Now, the *Fourth Order of Architects* men call Speculative and very different is their method. For the first three orders have no thought of the where-

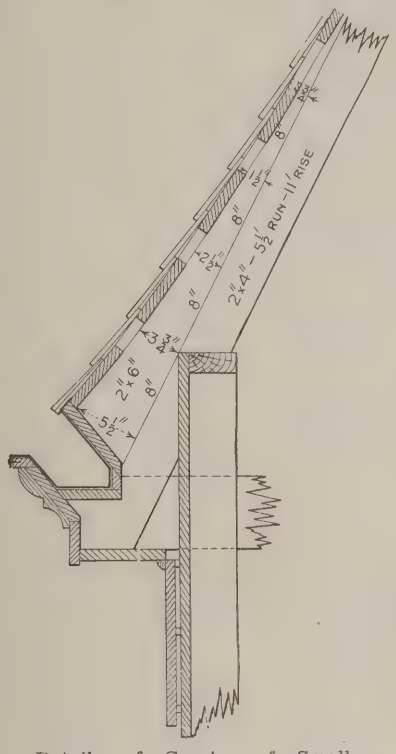


Detail of Main Cornice—Scale ¾ In. to the Foot

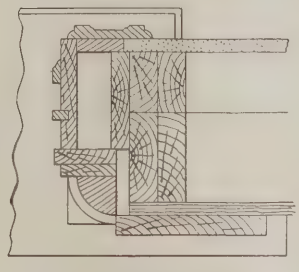


Detail of Foot of Truss—Scale ½ In. to the Foot

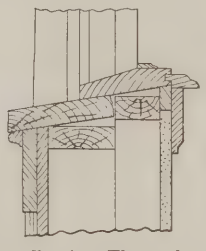
Detail of Cornice of Main Tower—Scale ⅜ In. to the Foot



Details of Cornice of Small Tower—Scale ¾ In. to the Foot

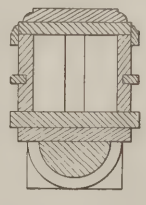


Section Through Window Frame on Line B-B—Scale 1 In. to the Foot



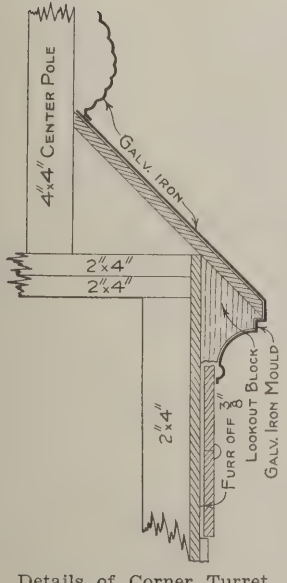
Section Through Window on Line C-C

Belt Course and Section on Line D-D

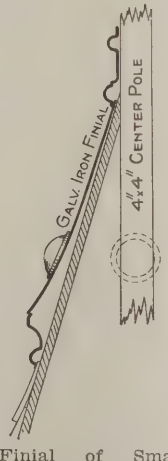


Section on Line A-A of Window Elevation

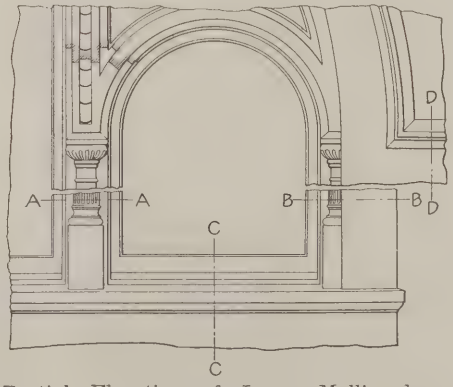
Scale 1 In. to the Foot



Details of Corner Turret of Small Tower—Scale ¾ In. to the Foot



Finial of Small Tower—Scale ¾ In. to the Foot



Partial Elevation of Large Mullioned Window—Scale ⅜ In. to the Foot

Miscellaneous Constructive Details of a Frame Church Building at Bowen, Ill.

withal from which payment must come, but wait in their chambers for the knock of the client. But those of the fourth order see a fair piece of land and show those who desire money how by building therein they can make more. Yea, balance sheets are the weapons wherewith they fight, and they will even tell one where money can be had at interest if more can be made by borrowing thereof. As other men, some among them are good and others bad, who lead the unwary into pitfalls and grow fat with the five per centum on what has been expended. Yet the fourth order has its uses, nor may man condemn them without judgment.

"The *Fifth Order of Architects* is that called Official, and hath this difference from all others. For whereas the four orders we have mentioned live even upon five per centum or starve because it is lacking, the Official order is payed even by salary by public bodies who employ them continuously. So care sitteth not beside them, but neither does the hope of great rewards brighten their years. And have they the bitterness spoken of in Holy Writ of serving masters manifold, who are appointed not because of their knowledge of Art, but simply by the pleasure of the ratepayer. And they get them grey hairs and troubles attending many committee meetings, nor are those who serve many gratefully treated. And, as among the other orders, some are cunning and fashion great devices, while others have not the skill of the artist.

"And the aforesaid we have mentioned are the five Orders of Architects who use the five Orders of Architecture that the children of man may have habitations, for, since mankind must increase and multiply, so must they have buildings that their bodies be not destroyed by the rigour of the elements."

Effect of Architect's Approval

In a recent suit against a firm of builders for damages claimed for defective performance of a contract for the erection of a factory building, the Appellate Division of the New York Supreme Court decided that it was no defense that the work was done under the supervision of the owner's architect, who was present and knew the class of workmanship that was being used, and that he approved of it. The important parts of the opinion of the Appellate Division read as follows:

"The contract, with the plans and specifications made a part thereof, entered into detail for the construction of a modern manufacturing plant with heavy walls and concrete floors supported by steel girders, and it is not disputed in this action that the building which was constructed under these plans and specifications was a failure, that it began showing signs of weakness almost immediately, and that in less than two months it became necessary to reinforce the building in many particulars in order to make it safe to occupy, and these repairs cost plaintiff approximately the sum of $15,000, for which sum the court has awarded damages against the contractors, who appeal from the judgment.

"The complaint alleged that the workmanship was not up to the standard required by the contract, and that the cement used in the laying of the brick walls did not meet the specifications, and the defendants urge that the bricks specified by the contract were not of the quality which should have been used; that the architect, under whose supervision the work was to be done, was present and knew of the class of workmanship being put in, and that the mortar used was likewise impliedly or expressly sanctioned by the architect; and that if the building thus constructed under the supervision of the architect was not what was required by the plaintiff the fault was in the plans as construed and approved by the architect.

"The learned trial court has considered all of these contentions, and has delivered an opinion in the case which we believe fully disposes of them, and finds the plaintiff has been damaged in the sum of $15,000. We are of the opinion that under the authorities controlling in this state the judgment is entirely right. There can be no question that the workmanship is not up to the requirements of the contract. It shows evidence of such bad faith, and reckless disregard of the requirements of such a building in which human beings are called upon to earn their daily bread, that considerations of public policy would demand that the defendants should not be permitted to sustain the defenses urged, even though the architect was empowered to waive the conditions of the written contract; for no one could successfully maintain that work of the character shown in this building could have been furnished in good faith. Piers designed to sustain weights ranging from 13 to 23 tons to the square foot were so constructed that the load must have fallen on a mere fraction of the apparent surface of the pier, and, judging from the photographs in evidence, no one connected with the work could have escaped responsibility for criminal negligence had the building fallen before the repairs were made."

A. L. H. STREET

The Discovery of Mahogany

Like the use of a great many of the factors connected with the arts and the sciences, the discovery of the beauty of the grain of mahogany for furniture was accidental, says a London contemporary. The story goes that a certain West Indian captain who had brought back to England some planks of mahogany as ballast, decided to give the wood to his brother, a Dr. Gibbons, then building a house in King Street, Covent Garden. But the planks were so hard that the carpenters objected, and the plan for using them fell through.

Some time later, Mrs. Gibbons wanted a small box made, and the doctor sent the mahogany to a cabinetmaker. In his turn the cabinetmaker objected to the hardness of the wood, but the doctor persisted so much in his request that the order was finally executed.

The finished box polished so nicely that the doctor ordered a bureau made of the same wood. The cabinetmaker displayed that in his shop window before delivering it. The Duchess of Buckingham saw it and begged enough wood from the doctor to have it duplicated, and mahogany furniture soon after same into favor.

Care and Use of the Cabinet Scraper

Its Place in the "Kit" of the Woodworker— Some Valuable Hints on Sharpening the Tool

By Charles A. King*

THE most elusive tool with which the amateur or professional worker in hard wood has to deal is the cabinet scraper. It is practically indispensable in preparing the surface of wood for sandpaper, as under ordinary conditions it is difficult to entirely prevent tearing the grain with a smoothing plane, causing "grain lifts" which cannot be removed easily with sandpaper. These and "jumps" caused by the unskillful beginning and ending of strokes of the smoothing plane will disappear under skilful manipulation of the scraper.

A scraper may be made of a broken saw blade, but as it should be of harder and tougher steel than most saws, it is generally better to buy one made for the purpose. It should be of a size which may be grasped easily, say between 3 in. and 3½ in. wide and about 5 in. long, and sufficiently flexible to respond to the endeavors of the worker.

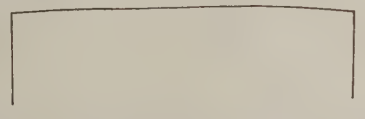


Fig. 1—How Some Woodworkers Sharpen a Scraper

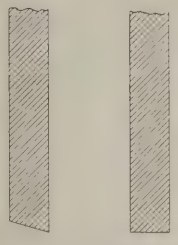


Fig. 2—A Beveled and a Square Edge

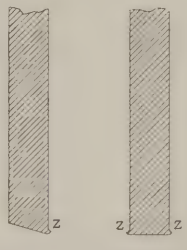


Fig. 3—Showing How the Corners Should Be Turned

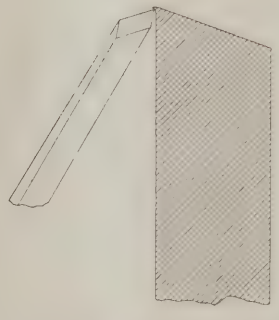


Fig. 4—Showing How a Chisel May Be Used As a Burnisher

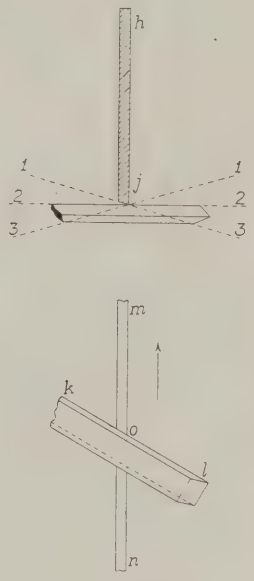


Fig. 5—Details of the Operation

Care and Use of the Cabinet Scraper

Many woodworkers sharpen a scraper by simply filing its edge to the form shown in Fig. 1, making it beveled or square as indicated in Fig. 2. In this condition a scraper is only partially sharpened, as the workman has stopped short of the part of the process which gives the tool its highest efficiency. The edge should be oilstoned until its corners are perfectly keen; then with a burnisher, one or more corners should be "turned" until they appear similar to either of the sketches in Fig. 3. This can be known by feeling with the thumb rather than by eyesight, though the best proof is to try the cutting quality of the edge. If it has been skillfully turned, it will cut a clean shaving and not tear the surface of the wood as will edges like those shown in Fig. 2, which are simply filed or oilstoned.

A burnisher for the purpose of sharpening scrapers may be made of an old file, or of any suitable shaped piece of fine highly tempered steel, ground and oilstoned perfectly smooth. A chisel, used as shown in Figs. 4, 5 and 6, is quite satisfactory. As the scraper may cut into the burnisher if the latter does not slip easily over its edge, either one or both may be lubricated by being drawn over an oily rag.

The first attempt at sharpening a scraper should be made upon one with a bevelled edge, as good results may be attained more easily than upon a square edge.

The principle applied in burnishing or turning the edge of a scraper may be understood by studying Figs. 4, 5 and 6. The top view, or end of the scraper, *h, j,* of Fig. 5, and the numbered lines at right angles to it, represent that view of the angles and strokes of the burnisher while held as shown in Fig. 6. In the front view, the edge of the scraper is shown by *m, n;* the line *k, l* indicates the approximate acute angle *n, o, l* with the edge of the scraper. As this acute angle is the essential element of the entire process, it must be maintained. Note the dotted lines in the front view, Fig. 5, as these indicate the edge of the scraper to be turned and the corner of the chisel burnisher to be used.

*Manual Training Department of the State Normal School at Plymouth, N. H.

If the burnisher is carried at about this angle, with a firm and even pressure the entire length of the edge in the direction indicated by the arrow, the particles of steel composing the corner will be pushed over into the obtuse angle, *l, o, m.*

The angle of the first stroke 1, 1 should be the same as the bevel of the scraper; the second stroke 2, 2, made at right angles with the face, should usually be enough to finish turning the edge of a bevelled scraper, the stroke 3, 3 rarely being necessary. Repetition of these strokes will generally do little good, as the edge may be obtained by one stroke at each angle.

If a square edged scraper is being sharpened the process would be the same, excepting that the stroke 1, 1 would be omitted, 2, 2 being the first stroke and 3, 3 the second; the bevels of the stroke must be carefully maintained and a somewhat heavier pressure is necessary. If the burnisher is carried around too far, or the stroke has been made unskillfully, the edge may be turned too much. Often this may be remedied by holding the scraper as in Fig. 4, and carrying the end of the burnisher under the edge in the manner indicated. This will turn the edge back so that a light stroke made at 3, 3 in Fig. 5 will give a satisfactory edge. After the scraper has become dulled by use, its edge should be turned back preparatory to resharpening, by laying it flat upon the bench, cutting side up. The burnisher should be placed horizontally in contact with the uppermost side of the scraper, bearing slightly upon the cutting edge. A few strokes back and forth lengthwise of the scraper in the direction parallel with the edge will frequently restore the original corner. By turning this corner over again another working edge may be obtained. Often this will be unsatisfactory, in which event it will be necessary to file and resharpen again.

A little practice will be necessary to acquire the touch which will give the best results both in sharpening and using the scraper. The angle with the surface of the board at which the tool should be carried depends upon the angle at which the edge has been turned, and can only be decided by trying.

In Fig. 7 is shown a common method of grasping and using a scraper. The left hand maintains the angle and pulls forward, while the right hand applies sufficient force downward and forward to cause the tool to cut as deeply as may be practicable. The hands may be changed and the cut made in the opposite direction. It will be seen that the force of the stroke is concentrated upon cutting a shaving of medium width, instead of endeavoring to make a cut as wide as possible. The worker will soon learn to grasp the tool in the way by which he can accomplish the most satisfactory results.

While either the bevelled or the square edged scraper may be used for any purpose within the scope of the tool, the former is more suitable for flooring and other coarse work, as a coarser edge may be obtained. The square edged scraper, having a finer edge, is better for use upon the better grades of cabinet work, furniture and inside finish.

While the above instructions may seem somewhat complicated, it will be found that if they are carefully followed they are not as complex as they seem. At any rate, the home worker will find himself abundantly repaid by the ease with which the surface blemishes may be removed from his work.

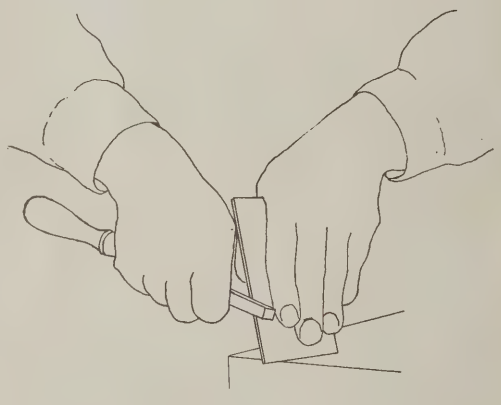


Fig. 6—Showing How to Hold the Burnisher

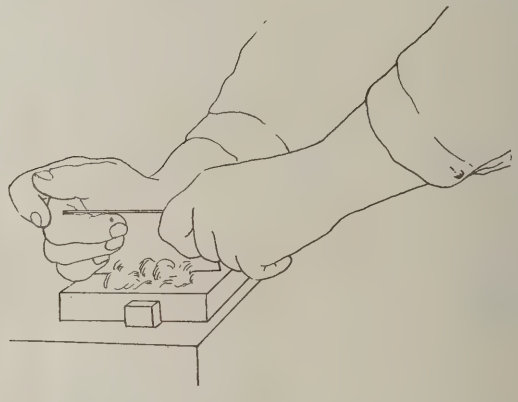


Fig. 7—The Usual Method of Holding a Scraper

Care and Use of the Cabinet Scraper

Utah Building Contracts

Under a law which took effect in Utah March 19, 1915, when a building contract involves $500 or more the owner must exact of the contractor a bond in an amount equal to the contract price, binding the builder to faithful performance and to prompt payment of labor and material claims. Material men, subcontractors and mechanics are entitled to inspect the bond, to ascertain the security afforded them. Anyone furnishing labor or material to the contractor has a right of action on the bond forty days after completion of the work or forty days after any default on the part of the principal contractor. The owner's failure to take the bond required by the act subjects him to liability for all amounts due from the contractor to material men, subcontractors and laborers.

The last section of the law provides, however, that the liability of sureties on such bonds shall be limited to the reasonable value of materials and labor furnished, less payments made on account thereof, not exceeding the amounts for which it was agreed such materials and labor would be furnished.

Plumbing Equipment of Swimming Pool

Description and Details of Construction of a Bathing Pavilion in the City of Louisville, Ky.

ARCHITECTS and builders, especially those giving particular attention to concrete work, are likely to find interest in the details which follow relating to one of the largest open-air swimming pools in the country, recently opened in Fontaine Ferry Park, in the city of Louisville, Ky.

It is 200 ft. long by 55 ft. wide, and carries a depth of water ranging from 3 ft. to 10 ft. 6 in. The construction of the pool is of reinforced concrete, the bottom being finished with white cement and the sides with white enamel tile. The pool proper is open to the sky, and surrounded by the dressing rooms, over which are constructed a promenade for spectators.

General View of Open Air Swimming Pool As It Appears Free from Water—Designed by D. X. and J. C. Murphy, Louisville, Ky.

At the shallow end of the pool, which is 3 ft. deep, a spectacular feature in the shape of a series of cascades is constructed, this also being of reinforced concrete. It is over this series of cascades that the water has its visible entry into the pool, a constant flow being maintained at all times by means of a 4-in. T heading, with perforations, extending clear across the top of the series of steps.

The actual supply of water to the pool is furnished by six 7-in. wells, drilled about 50 ft. deep. By pumps operated by an electric motor, the water is drawn at the rate of about 105 gal. a minute from each well, or over 600 gal. a minute from the six, and discharged into a receiving tank 12 ft. deep and the same in diameter.

At the top of this receiving tank a 12-in. overflow pipe fills a second tank 9 ft. in diameter and 12 ft. deep, which is the container for the warm water. Two 50-hp. boilers raise the water to the desired temperature, and it flows through four 8-in. pipes from tank to boilers, and back again. The temperature to which the water is raised is regulated by a thermostatic control, according to the circumstances, the idea being to keep the water in the pool at about 68 deg.

From the warm water tank the water flows through an 8-in. pipe to the deep end of the pool, which is filled in this way. Just before this supply pipe enters the pool a 6-in. lateral is taken off and conducted to the top of the cascades, at the shallow end of the pool, 200 ft. distant, to supply the flow over the four lips, or steps, referred to above. The pool having been filled, the flow from the cascades causes it to overflow constantly at the deep end,

through a 6-in. return pipe, from which it is forced by an independent centrifugal pump at the pump-house back into the tank, and to circulate again.

This, however, does not mean that the same water is used over and over again. Every twenty-four hours the pool is emptied entirely by means of a 12-in. drain at the bottom of the deep end, which is opened by a gate-valve, and the water thus taken out passes to the Ohio river, with the storm water collected from the building, through a special line of 15-in. pipe nearly 2,000 ft. long. Also, from time to time the return pipe which takes care of the overflow is closed and the surface water in the pool is permitted to overflow into the scum-gutter, which is provided with a 2-in. drain every 40 ft. all around the pool, to take care of any impurities which may collect on the surface.

Moreover, the arrangement of the entrances is such that every person entering the pool must perforce take a shower bath, for the reason that all entrances are into the showers, and not into the pool direct. There are five of these showers, each about 10 x 4 ft., with twelve 3-in. shower heads in each room, or sixty in all. Three of the rooms are for men and the other two for women. The concrete floors of the showers are 6 in. below the level of the entrances and of the floors on both sides, and the 2-in. overflow drain at the hight of 6 in. guarantees that this depth will be always full of water. The warm water for the showers is supplied by a 1¼-in. pipe taken off the cascade supply pipe.

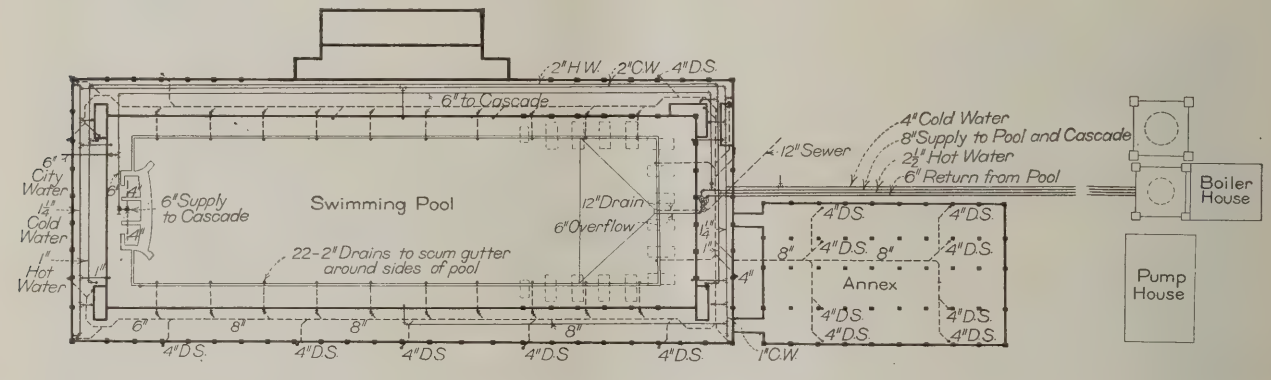
The toilets, five in number, the urinals, of the same number, and the drinking fountains, all discharge their waste into the separate sanitary sewer system of the park. Water for these purposes is taken from the receiving tank through a 4-in. pipe, as, of course, it is required to be cold rather than warm, especially for the fountains.

The two tanks referred to, which are of wood, and were built by the W. E. Caldwell Co., Louisville, Ky., are on steel towers 50 ft. high, in order to give the desired pressure. All supply pipes leading to and from the tanks are exposed, and are therefore provided with valves at the foot of the risers, so that the entire system can be emptied before cold weather sets in.

The cascades, which are about 35 ft. wide over all and 18 ft. high above the water line, and about 26 ft. wide inside, with a 13-ft. fall, are also provided with drainage, in the shape of a small brass pipe inserted in each lip, of which there are four. These drains are left open all the time, so that all water, whether from the regular supply or from rain or snow, will drain from one step to the next, and so to the bottom of the pool, and out.

There are several appurtenances of the pool, not strictly a part of the plumbing or heating work, as for example the four ladders, two of which are at the deep end of the pool, one on each side of a high diving tower, and two at the sides, in the shallow water. They are made of 1½-in. wrought-iron gas pipe, with 1½-in. oak treads. The bottom of each ladder is sunk into the concrete about 6 in., and the top is bent over and the ends again sunk into the concrete walk at the edge of the pool to the same depth, in order to give the desired firmness to the ladders.

There are two springboards, both at the deep end of the pool. They are 20 in. wide, of 1½-in. oak planks, and 9 ft. long. The planks are screwed to the three cross pieces by screws ⅜ x 1½ in. For a length of 5 ft. 6 in. the board is of double thickness, the two thicknesses being bolted together by 4-in. bolts. The springboards are anchored to the concrete structure of the walk by specially made stud bolts ½ in. thick at the bottom and increasing to ¾ in. at the top, and 1 ft. 6 in. long, four to each board. These bolts are sunk 10 in. in the concrete beneath them. The boards are also supported for about 3 ft. 6 in. of their length by wedge-shaped affairs, made up of two-by-fours set on edge and bolted together. They are covered with cocoa matting. The bolt holes in the boards are all made elliptical, in order to give room for the play of the upper and lower thicknesses. Every detail of their construction was designed with a view to making them real springboards, and they have been found eminently satisfactory.



Plumbing Equipment of Swimming Pool—Plan Showing Position of Boiler and Pump Houses

Two slides are provided at the shallow end of the pool for the amusement of those who do not care for diving. These are faced with copper, and the only plumbing work consisted of a line of perforated brass pipe run to the top of each to keep a steady stream of water running down them.

The pool was designed by D. X. and J. C. Murphy, architects, of Louisville, Ky., and the H. C. Snyder Co., of the same city, handled the construction.

Apple wood, used almost exclusively for saw handles, is also much used for many so-called briarwood pipes, and particularly for the large wooden type used in printing signs and posters.

The Quantity System of Estimating

A Strong Plea for Adoption of the System in American Building Practice—Advantages to the Contractor

By D. S. Ballantine

WHILE interest in this important subject is manifestly increasing, it is at the same time apparent from some quarters that the fundamental purpose of the Quantity System is not thoroughly understood. In your issue for May, for instance, is outlined a system of estimating by Albert G. Duke which, although very commendable and quite adapted to our existing methods, is totally inadequate in the case of the Quantity System, the intention of which is to absolve altogether contractors bidding in competition from the present practice of scaling the drawings by furnishing them a bill or schedule of the quantities instead of copies of the drawings and specifications as hitherto.

Surely nothing could be more preferable and advantageous to the contractor, for it cannot be denied that we are today unwisely laboring under a system which is detrimental to our best interests, a system that has long since been abandoned in other countries and superseded by another infinitely more practical, businesslike and beneficial.

Contractors Will Benefit by Adopting the System

From personal experience of the Quantity System—generally referred to as the London system—I can assure the reader that by its adoption the contractors of this country will greatly benefit themselves and generally raise the standard of their business. There is no sane reason why we should not wish to profit by the experience of others and establish a universal method of estimating on the principle of the quantity system as practiced successfully in London, revised and adjusted as may be found necessary to meet the requirements of this country and forming the basis of an American System as advocated by G. Alexander Wright of San Francisco and others.

The length of time, the labor involved and the precise method adopted by the Quantity Surveyor in the preparation of the "Bill" or "Schedule" are immaterial to the contractor and would not concern him any more than do the time and labor necessarily employed in preparing the drawings by the architect.

A comprehensive and intelligible "Bill of Quantities," defining the exact amount and description of the materials and labors, guaranteed to the contractor and forming part of his contract would be of inestimable benefit. The necessity of taking off his own quantities and the consequent expense, loss of time and inevitable risk of errors are avoided. A few minutes' perusal of the drawings at the offices of the architect in order to familiarize himself with the style and nature of the proposed structure, a visit to the site, pricing the bill and extending would constitute the entire work of the estimator.

All Bidders on an Equal Basis

All bidders, so far as the quantities were concerned, would be competing on an equitable basis, and the wide discrepancies in quantities which under present conditions are unavoidable could not occur. The intention and meaning of the drawings and specifications if supplemented with a "Bill of Quantities" would be certain and indisputable and a double interpretation so often the cause of friction and possible litigation would be almost impossible.

Better construction must also result, assuring a more satisfied architect, a pleased client and the contractor's reputation seldom in question.

There are other advantages to be gained from the Quantity System, too obvious to the experienced contractor to need mention. The quantities are checked with very little trouble as the building progresses and all variations or errors adjusted and agreed upon.

It is to be observed that everywhere in a varying degree there are some evidences of slipshod and inferior workmanship, the probable result of an effort on the part of the contractor to make good some deficiency in his estimate at the expense of the structure and in view of the wide range often seen in competitive bidding today one might ask "Is ever the lowest estimate not deficient?"

How the System Can Be Established

By a concerted and earnest effort on the part of the more representative contractors of the country, through their associations, the Quantity System might be well established, and I think it reasonable to assume it will receive the support of the architectural profession. Considerable has been written and said in its favor, and from practical test it is understood to have been so far successful. All radical changes take time to accomplish, and their first efforts may not always wax enthusiasm. The cause is an excellent one, however, and must and will succeed, and it should receive the support of every contractors' association throughout the country and the interest of the individual member.

By establishing classes for the training and preparation of Quantity Surveyors a great deal would result toward furthering the scheme, and it would be interesting to many to hear through your valuable columns that some such move is being made in that direction.

A Semi-Detached Four-Family House

Interesting Details of Construction Relating to a Style of Apartment House Adapted to Many Localities

UPON the facing page we present floor plans and elevations of the semi-detached four-family house which constitutes the basis of our colored supplemental plate this month. Its character is such as to well adapt it for erection in many localities, there being upon the first floor five rooms and bath for each family, while the upper story is divided into accommodations giving each family six rooms and bath.

Foundation Walls and Footings

According to the specifications of the architect the footing courses of concrete are to project 6 in. on each side of the foundation walls and are to be 10 in. thick and 24 in. wide. The foundation walls are to be of brick 12 in. thick, or concrete walls of the same thickness may be used if desired. The cellar floor is to be cemented and the walls whitewashed. The outside of the foundation walls is to be waterproofed with hot asphalt and tar.

The superstructure is of frame, the first and second floor beams being 3 x 10-in. yellow pine, while the roof beams or rafters are 2 x 8-in. yellow pine, and all placed 16 in. on centers. The main plate is to be 6 x 8 in. and halved at the corners. The studs are to be 2 x 4 in. placed 16 in. on centers and doubled at corners and all window and door openings.

The exterior frame is to be covered with sheathing boards placed diagonally, and over this a layer of heavy building paper to receive spruce lath nailed vertically 16 in. on centers. To the latter is to be attached the wire lath to receive the stucco finish. The porch posts and balusters are to be square and provided with brackets, as shown on the elevation. The roof rafters are to be covered with 1-in. sheathing boards, which are to carry a covering of tar and gravel roofing and be guaranteed for five years.

Floors, Plastering, etc.

The floors are to be tongued and grooved maple and blind nailed at each bearing. The interior trim is to be of plain design without base blocks, but to be mitered at the corners. The kitchens are to have a wainscoting of beaded ceiling and the same material is to be used for ceiling of porch.

The plastering throughout is to be three-coat work and to have a hard white finish.

All tops and sides of exposed doors and windows are to be flashed with tin and the same material is to be used at the sides of the roof parapets.

The chimneys are to be built of common brick and cement mortar and lined with 1-in. thick fire clay tile pipe.

There are to be separate soil lines and traps, also fresh air inlets for each house. The main lines are to be 4-in. and the vents 3-in. extra heavy cast iron. The branch vents are to be 2-in. cast iron. The fixtures are to be enameled iron for bath rooms and kitchen sinks, with all necessary appliances.

The house is to be wired for electricty and piped for gas, the fixtures being of the combination type.

All exterior trim is to be given three coats of linseed oil paint and all interior trim to be filled and varnished, including all interior and exterior doors.

The four-family house here shown was designed by Frank T. Fellner, care of *The Building Age*, 239 West Thirty-ninth street, New York City, or 413 Caton avenue, Brooklyn, N. Y.

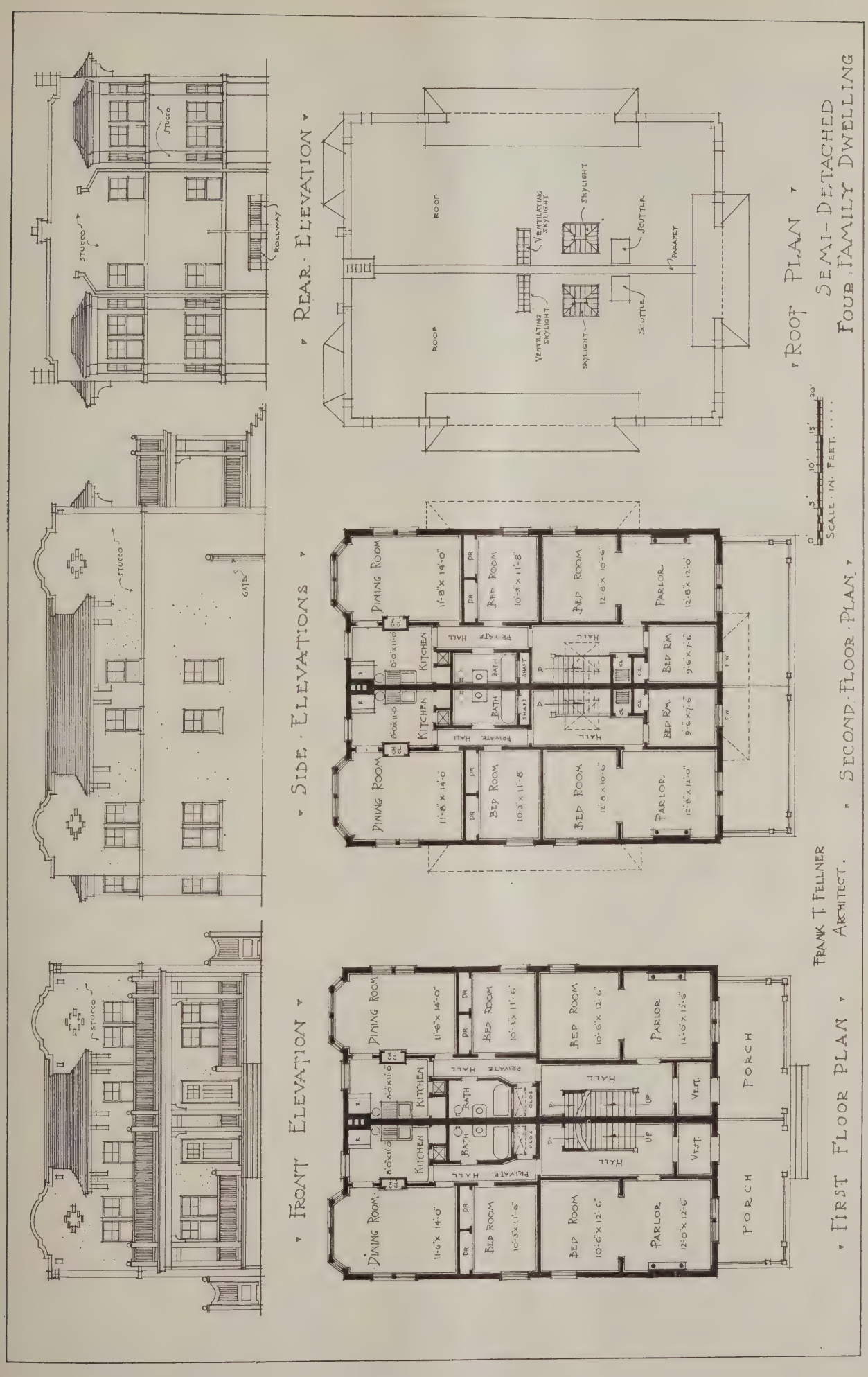
Strangely Built Churches

Like all other structures, churches must at times be constructed of very unusual material, especially when the usual kind of material is not accessible. In Santa Rosa, California, is a church that is constructed from the wood of a single redwood tree. In San José, in the same state, is a church which is merely the hollowed out trunk of a redwood tree. It will accommodate a congregation of twenty-five. A great giant eucalyptus was similarly hollowed out in Gippsland, Victoria, Australia, and furnished room for fifty worshipers. An Eskimo congregation built its church of blocks of snow.

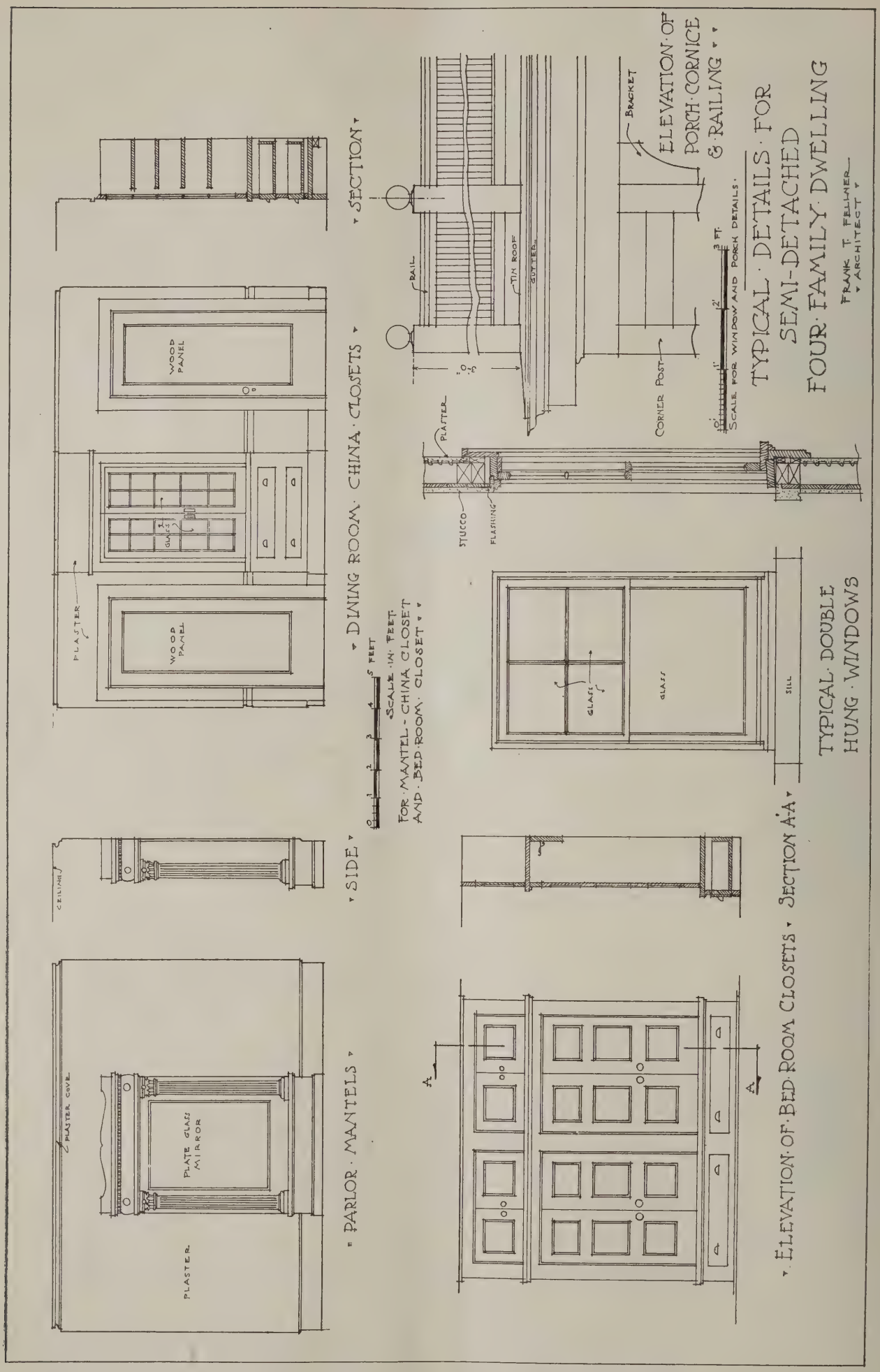
A lone missionary on Blacklead Island, within the Arctic Circle, was constrained by the lack of timber to erect a house of worship with whale's ribs, as the frame work, over which were stretched some forty seal skins sewed together. All went well till a pack of famished Eskimo dogs attacked and partially consumed the edifice. A quaint church at Momford, Canada, is constructed of a peculiar form of limestone. It has the appearance of rough sandstone but is composed of fossils, with leaves, twigs, shells, etc., thickly massed together. Blocks of white coral compose a church on the island of Mahe, near Madagascar.

Jacob Graff, who some 25 years ago was one of the best known architects and builders of New York, died at his residence in Brooklyn on May 25 at the age of 83 years. He was perhaps best known in connection with the preparation of the plans for the old Grand Central Terminal, which was a few years ago replaced by the present mammoth structure. At the time the original work was undertaken it was considered a very imposing structure.

The recent activity in new building construction in Brooklyn, N. Y., has been such as to create much encouragement as to the total of operations for the year. In two weeks plans for more than 350 houses were filed to cost $2,465,975.



Floor Plans and Elevations of Four-Family House Forming Basis of Our Colored Supplement



Miscellaneous Constructive Details of Four-Family House Forming Basis of Colored Supplement

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

W. N. TWELVETREES, a prominent British engineer, developed the following method for designing a beam in which the breadth is to be some definite proportion of the depth.

Let $n = \frac{h}{b}$, then $b = \frac{h}{n}$.

To design so $b = \frac{h}{2}$ $\quad n = \frac{h}{1/2h} = \frac{1}{0.5} = 2$

$b = \frac{2h}{3}$ $\quad n = \frac{h}{2/3h} = \frac{1}{0.67} = 1.5$

$b = \frac{3h}{4}$ $\quad n = \frac{h}{3/4h} = \frac{1}{0.75} = 1.33$

$$M = Rbh^2 = R \times \frac{h}{n} \times h^2 = \frac{Rh^3}{n}.$$

Applying the method to the example under consideration:

Let $R = \frac{f}{6} = \frac{1300}{6} = 217.$

First.—Design so the breadth equals one-half the depth.

$$h = \sqrt[3]{\frac{nM}{R}} = \sqrt[3]{\frac{2 \times 288{,}900}{217}} = 13.84 \text{ in.}$$

$$b = \frac{13.84}{2} = 6.92 \text{ in.}$$

Use commercial size 7.5 in. $\times$ 14.5 in.

Second.—Design so the breadth equals two-thirds the depth.

Substituting in the formula $n = 1.5$ find $h = 12.6$ in.

$$b = \frac{2 \times 12.6}{3} = 8.4 \text{ in.}$$

Use a commercial size beam 9 in. $\times$ 13 in.

Third.—Design so the breadth equals three-quarters the depth.

Substituting in the formula $n = 1.33$ find $h = 12.08$ in.

$$b = \frac{3 \times 12.08}{4} = 9.06 \text{ in.}$$

Use commercial size beam 9.5 in. $\times$ 12.5 in.

The student will have noticed that in all cases the exact size computed cannot be used and it is necessary to take a commercial size enough larger so the loss in dimensions through cutting will give a beam the size of the computed beam, or slightly larger. Small beams will run from ¼ in. to ⅜ in. smaller than nominal size but beams of the size here considered will seldom run less than ½ in. smaller in each dimension than the nominal size and if the superintendent of construction is not careful the loss will be even greater. The writer is acquainted with designers who use the nominal size always in their designs, assuming that the maximum fiber stress allowed is really less than the wood can stand. It is not good practice.

Assuming that the fiber stresses are based on the use of wood freely exposed to weather then the following increases in fiber stress are allowable for long-leaf yellow pine:

Class A (moisture contents, 18 per cent.)—Structures freely exposed to the weather, such as railway trestles, uncovered bridges, etc., let allowable stress equal $1 \times f$.

Class B (moisture contents, 15 per cent.)—Structures under roof but without side shelter, freely exposed to outside air, but protected from rain, such as roof trusses of open shops and sheds, covered bridges over stream, etc., let allowable stress equal $1.15 \times f$.

Class C (moisture contents, 12 per cent.)—Structures in buildings unheated, but more or less protected from outside air, such as roof trusses of barns, enclosed shops and sheds, etc., let allowable stress equal $1.4 \times f$.

Class D (moisture contents, 10 per cent.)—Structures in buildings at all times protected from the outside air, heated in the winter, such as roof trusses in houses, halls, churches, etc., let allowable stress equal $1.55 \times f$.

For all woods other than long-leaf yellow pine the increases to be one-half those given. The shearing stress, however, cannot exceed one-tenth the fiber stress used for Class A structures.

Building ordinances in American cities do not recognize any difference in allowable stresses dependent on the moisture contents, so the fiber

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 47 of the June issue.

stresses permitted in cities apply to all structures. It would be better if the city ordinance requirements were based on Class D structures with proportionate decrease for structures in other classes.

The following table gives the allowable fiber stresses for wood in the city of Chicago (1914). Each designer should use the stresses permitted in the largest city nearest to the place where the building is to be erected.

	Maximum Fiber Bending Stress and Tension with Grain	Compression with Grain	Compression Across Grain	Shear with Grain
Douglas fir and long leaf yellow pine	1300	1100	250	130
Oak	1200	900	500	200
Short leaf yellow pine	1000	800	250	120
Norway pine and white pine	800	700	200	80
Hemlock	600	500	150	60

The first column gives the name of the wood. The second column gives the maximum bending fiber stress and this is the maximum stress allowed if the wood is to be used as a tie in straight tension—something rarely possible because of the difficulty in making proper connections so the nails, screws or bolts will properly transmit the entire pull on the piece.

The third column gives the compressive stress per square inch on wood posts having a least breadth one-fifteenth the length. For lengths greater than fifteen times the least dimension the compressive stress must be reduced, by a formula given in the ordinance, long slender pieces bending under load and causing additional strain on the concave side.

The fourth column gives the allowable stress per square inch on the underside of a beam on the supports. The reaction is to be divided by the stress given in the column in order to obtain the number of square inches bearing surface. The student should pay attention to this column for it explains the reason steel and iron post caps are used instead of the old-fashioned wooden bolsters. If the load on a column is carried straight down on the ends of fibers the full bearing capacity of the wood can be utilized. When a bolster is set between the foot of a post on one floor and the top of the post on the floor below, the compression across the grain of the wood in the bolster governs the carrying capacity of the post, or the bolster will crush.

The fifth column gives the allowable shearing stress with the grain, the use of this column having been explained in the examples when a test was made of the weight-carrying capacity of a beam so it would not fail in shear.

There is a shear parallel with the grain and if through some unavoidable circumstance it ever becomes necessary to design so a wide beam overhangs the sides of a support this shear will act. It should not exceed the safe shear with the grain.

There is a shear across the grain, that is, a tendency for the beam to be cut at the edge of the support. Provided the allowable compression across the grain is not exceeded, i. e., sufficient bearing surface is provided, the effect of this shear is negligible.

The use of hangers and stirrups is common today. They save headroom but increase the insurance rate for the reason that metal is affected by intense heat. A large piece of timber will char on the surface and must be exposed to an intense flame for a long time before it begins to burn. The heat that will merely char a timber and do it little harm will heat iron and steel to such an extent that the stirrup will be weakened and permit the suspended beam to drop. A study of a bending moment curve shows that at the bearing end of a beam there is practically no moment so the area of a beam may be reduced nearly one-half at the supports without impairing the bearing capacity. If the strength of a stirrup is reduced one-half by fire the beam may drop.

Many types of stirrups are on the market and before adopting anything other than a plain bent strap of steel or wrought iron the designer should require the manufacturers to furnish records of tests on the stirrups they propose to supply.

(To be continued.)

Efflorescence on Brick and Rough Cast Walls

Answering the query of a correspondent who wanted to be informed how the efflorescence on brick and "rough cast" walls, commonly known as "saltpeter," could be removed and prevented from appearing after removal, a recent issue of *The Painters Magazine* contained the following interesting suggestions:

Before the so-called saltpeter can be removed successfully, it is necessary to investigate the cause of its appearance. This crystalline efflorescence is composed mostly of water soluble salts, that may have been present in the lime mortar, in the sand or in the water. The salts are often also present in bricks that are imperfectly burned or composed of inferior clay. Finally, it is possible that these salts may find their way into the walls through moisture in the foundation. In every case, it is the rule that after a short period of dry warm weather, the salts come to the surface and form a whitish deposit of a granular nature. The remedy must adapt itself to the cause of the trouble.

If it is caused by moisture arising from the foundation of the wall, the remedy lies in the isolation of the foundation from moisture by proper drainage, because if this is not done, the efflorescence will appear again during the first wet spells after its removal. The efflorescence in any case can be removed by brushing off with very dilute muriatic acid, to be followed by a thorough washing with clear water. This done, the surface should be protected by at least two, if not three, coats of good oil paint. If the walls are of brick, the joints should be puttied after the first or priming coat has been applied.

A contract has been made by a utility company with the Local Government Board for Scotland to build about 8,000 houses on the Admiralty land at Rosyth at an approximate cost of a million pounds sterling, the equivalent with foreign exchange at par being $4,866,500.

The Two-Family House Built of Hollow Tile

What a Building Contractor, Who Has Made a Study of It, Thinks of This Material for Use in House Construction

By Edwin G. Zorn

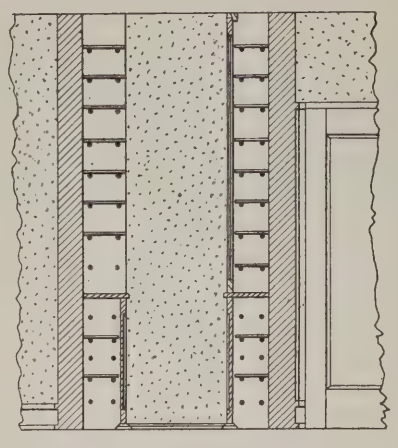
FOR prospective builders who are desirous of securing the advantages and privileges that come with the owning of a home, and yet feel that they cannot invest a large sum in a residence whose only financial return is taxes and interest, the two-apartment building offers an attractive investment. The large number of this type of structures being erected, especially in our larger cities and towns, is ample proof that many people are taking advantage of this fact.

With this constantly increasing demand for a building that combines the satisfaction of living in one's own house with the receipt of an income from the rent of the other apartment, has come a corresponding pressure which is being felt by both architect and contractor for buildings that are an improvement in construction and design over their predecessors. In other words, there is a tendency on the part of each successive builder of a two-apartment building to want something better than his neighbor.

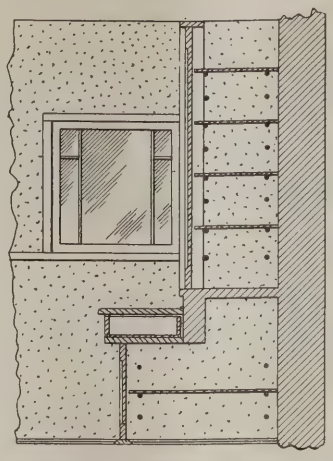
This desire is not born of jealousy or social ambition, but has good, sound economic reasons behind it. An apartment that possesses a well-finished interior with every modern convenience brings the highest rent, while a building whose construction requires little in the way of repairs, little effort to maintain sanitary conditions, the smallest amount of coal to heat it and a low insurance rate, is the most popular with the man who is figuring on investing in a building of this type.

Two-Family Hollow Tile House of M. E. Bovee at Evanston, Ill.—The Garden Front Showing Immediate Surroundings—Architect, Walter Burley Griffin of Chicago, Ill.

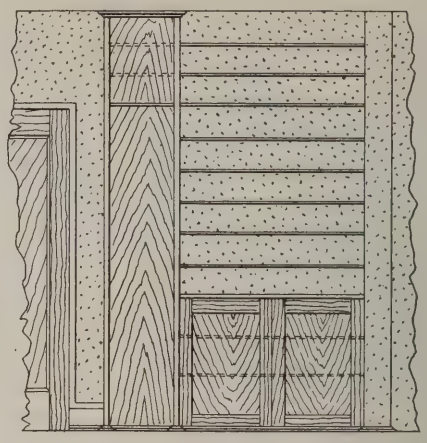
To every one, the two-story frame building with two apartments is a familiar sight. Its origin dates back many years. In fact, wood has been the



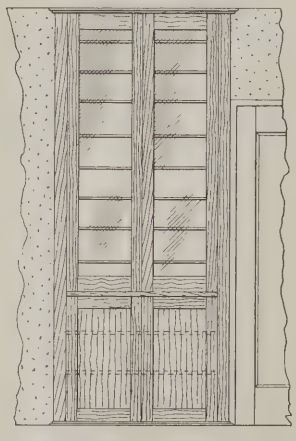
Section Through Kitchen Pantry on Line O-P of the Plans



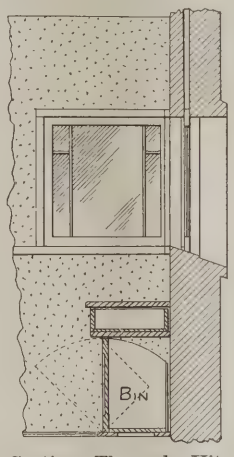
Section of Kitchen Closet on Line K-L of Plans



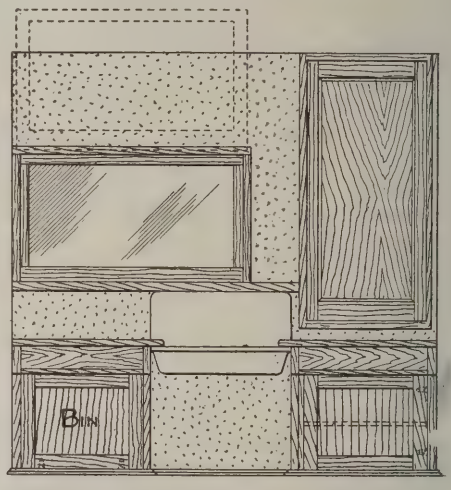
Elevation in Pantry on Line N-M of the Plans



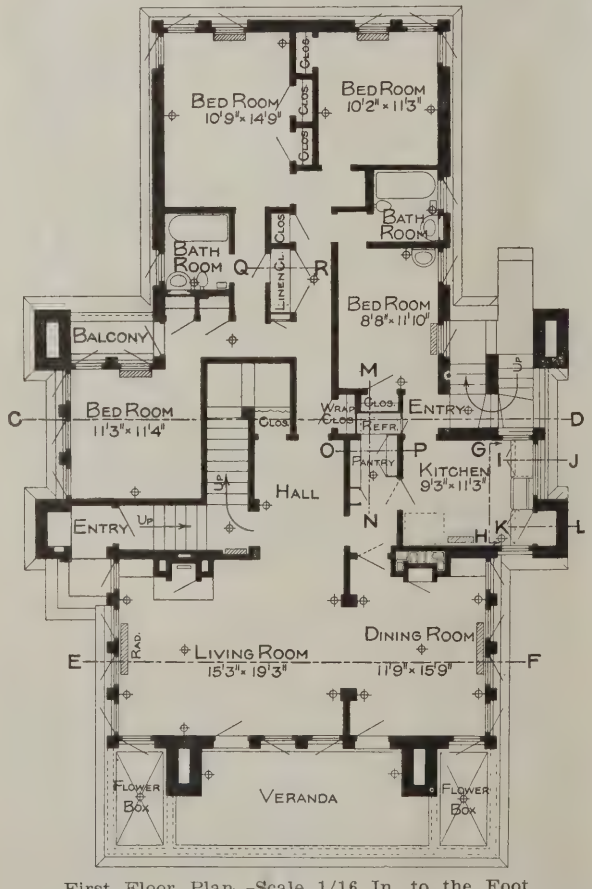
Elevation of Closet at M of the Plans



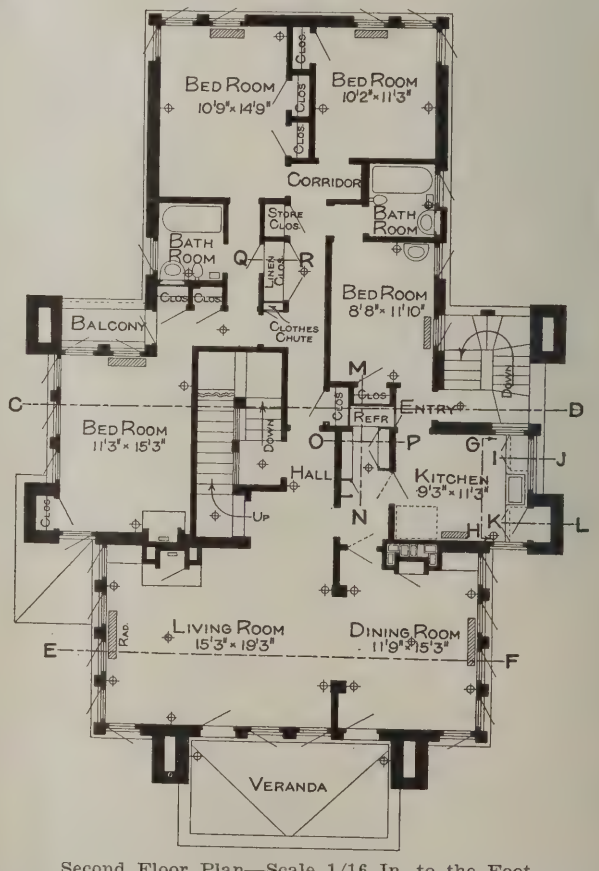
Section Through Kitchen Wall on Line I-J of the Plans



Elevation in Kitchen on Line G-H of the Plans



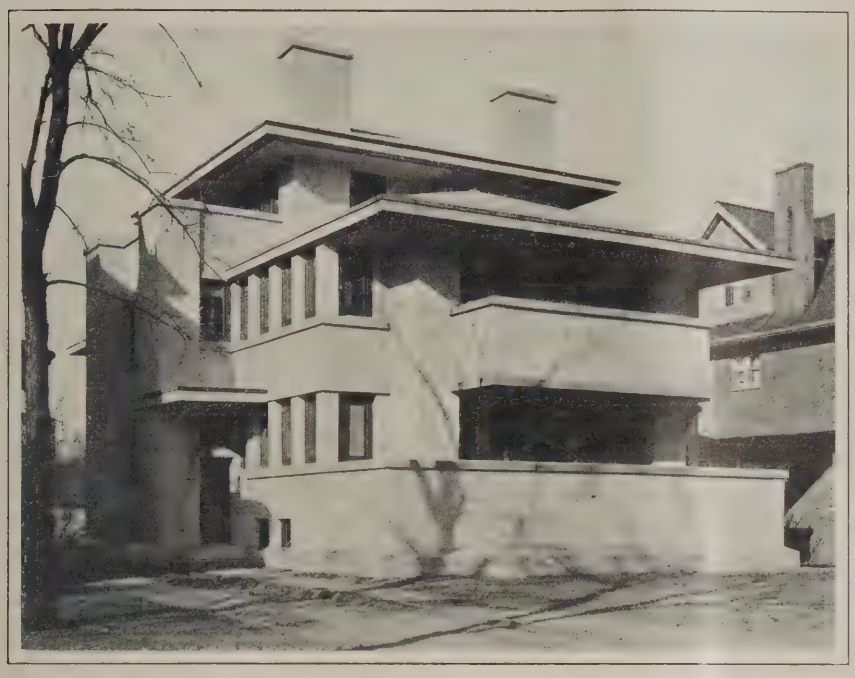
First Floor Plan -Scale 1/16 In. to the Foot



Second Floor Plan—Scale 1/16 In. to the Foot

Plans and Details of the Two-Family House of Hollow Tile Shown on the Previous Page

prevailing material in construction of this type of building in the past. The two-apartment house built of brick is also a type that is well known among those who have made building their life work and duly considered all its various details.



The Two-Family House of Hollow Tile—Front View of House Shown on the First Page of This Article

There is another type of two-apartment building, however, which does not come under either of the classes above mentioned, but for which there is a constantly increasing demand in the way of information and knowledge concerning its merits from an economic and structural standpoint. It is the two-apartment house built of hollow clay building tile, of which the accompanying illustrations are examples.

In talking with a Chicago contractor recently, it was learned that he was living in a two-apartment building which he had erected for himself. Just how he came to use hollow tile and what he thinks about it as a material to be used in the construction of this type of building, is rather interesting, especially since it comes from a man who has had an opportunity to observe the behavior of all classes of material under varying conditions.

Prior to the spring of 1914, this contractor had known but very little concerning hollow tile in home building, but during the brickmakers' strike, which was in progress at that time in Chicago and vicinity, he was compelled to change the plans for his home, which he was about to build of brick, and use some other material or abandon his project. He finally decided on a hollow tile construction with a coating of stucco. He found that he could put up this building, using hollow tile, at a cost of about five per cent more than if he used a frame construction, and about five per cent. less than it would have cost him had he followed out his original plans and built with brick. The very first step he made using a hollow tile construction brought him a substantial saving.

Living in one of the apartments and having an opportunity to observe the building very closely, he has learned many interesting facts about hollow tile. For instance, a friend who erected a two-story building of brick in the same section of the city burned twenty tons of coal during the past winter to heat both apartments, while this contractor - owner used but thirteen tons to keep his house warm and comfortable, and yet his building is in a more exposed location than that of his friend. In both instances, a hot water heating system is in use, and with bituminous coal, which is burned in these boilers, at the Chicago price of $7.00 a ton, the contractor who built his house of hollow tile, saved $49.00 in one winter on this item alone.

The reason hollow building tile makes a house that is easily warmed in the winter and kept warm, is because of the intervening air spaces in the tile. It is a fact which has been gleaned from experiment and experience, that air conducts heat much more slowly than a solid material. While a wall of solid masonry is said to be about the best pro-

The Two-Family House Built by the Contractor Mentioned in This Article

tection against extreme changes in temperature it is possible to get, it is a fact that such a wall slowly but surely assumes the same temperature as the outside air with each variation in temperature. During a protracted cold snap, for instance, a solid masonry wall will gradually become cold until the entire wall is the same temperature as the cold air out-of-doors. When this condition has been brought about, the cold wall begins to absorb a large amount of the heat from the air on the inside of the house, which means that the heating plant has to work that much harder, requiring more fuel to keep the rooms warm and comfortable because of the chilling effect of the cold walls.

Hollow Tile House Cooler in Summer

During the hot summer months this condition is reversed, the solid walls being heated by the warm outside air, which in turn heat the air on the inside of the house, making it a less comfortable place in which to live. In a hollow tile wall, in which a large volume is given over to insulating air spaces, a minimum of heat or cold is permitted to pass through the wall. This being the case, less heat is required to keep the inside of the house warm in winter, because there is no loss of heat through the walls, and in the summer, the cool night air can easily be retained in the house during the day, because the heat from the warm outside air cannot penetrate the wall of hollow tile.

It does not, however, follow that because such a wall is largely made up of air spaces, that it is an unfit construction, owing to a lack of strength. The proof is sufficient and conclusive that a hollow tile wall will carry any strain imposed upon it in a house of ordinary construction. Where a hard burned tile is used, it is not unreasonable to expect it to bear a load of 1500 lbs. to the square inch—a weight which is not even approached in buildings six stories in hight.

A disagreeable feature of the two-apartment house, and in fact all apartment buildings, and one which demands constant vigilance for sanitary reasons, is the presence of vermin. The coming and going of tenants makes the receiving of these pests possible at any time. Where the owner of a two-family building occupies one of the apartments, this menace strikes closer home. In buildings as usually constructed, studding or furring and lath are used to receive and hold the plastered wall. It is behind these walls and in the spaces provided by this construction that vermin thrive and multiply most rapidly. Where hollow tile is used, the plaster can be applied directly to the surface of the tile which is grooved to receive and hold it. This construction eliminates the breeding place of vermin, making their existence practically impossible and their extermination easy.

Applying Plaster Directly to Tile Wall

The question has been raised by many builders as to the advisability of applying plaster directly to a tile wall because of the possible presence of dampness. The contractor above mentioned, who built his own house of hollow tile, states that although he has watched very carefully for signs of dampness or discoloration on the plastered and decorated walls, he has failed to find any. It is not uncommon for building tile to run as low as ten per cent. in absorption. Just how this feature of the tile compares with other materials may be realized more vividly when it is known that ordinary common brick absorbs all the way from twenty-five to thirty per cent. of its weight when immersed in water. In hollow tile construction, the creeping up of moisture from the foundation or its absorption from the outside air or rain, is eliminated because of the imperviousness of the tile. Also the fact that the inside tile wall always assumes the same temperature as the interior of the house, while the insulating air spaces prevent the outside air from cooling the inside wall and thus condensing the moisture present in the inside air on the walls, is accountable for the total absence of "sweating" on the hollow tile wall.

Stucco as a Finish

Although brick are often used to face a building of hollow tile, many builders prefer stucco as being both an economic and substantial finish. Where stucco is used, it is applied directly to the surface of the tile which, like the interior wall, is grooved to receive it. In this way an everlasting bond is formed between the stucco and the wall of the building, making a covering that will last as long as the house.

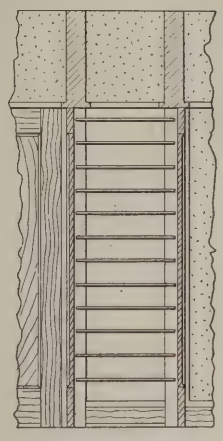
Aside from the many advantages of hollow tile in the construction of the two-apartment building that appeal to the man who is investing his money in this type of building, are those which mean dollars and cents to the contractor who is erecting the building.

Because of the size of the unit, hollow tile lays up much faster than brick. In fact, from observations on several different jobs, it has been found that a mason can lay up in hollow tile the equivalent of from four to six thousand brick per day. When it is considered that the average bricklayer does not lay more than twenty-five hundred brick when he is working hardest, and with the high wages demanded by this class of labor, this increased capacity amounts to no mean saving on a job of hollow tile, no matter what may be its size.

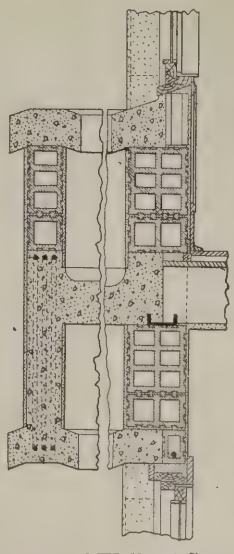
How to Secure Hollow Tile Jobs

It is surprising, but nevertheless a fact, that many contractors know little or nothing regarding the successful handling of a hollow tile job. For this reason they are not able to "land" an operation of this character when it comes by chance, because of their inability to figure closely enough, which in turn is due to lack of knowledge on the subject.

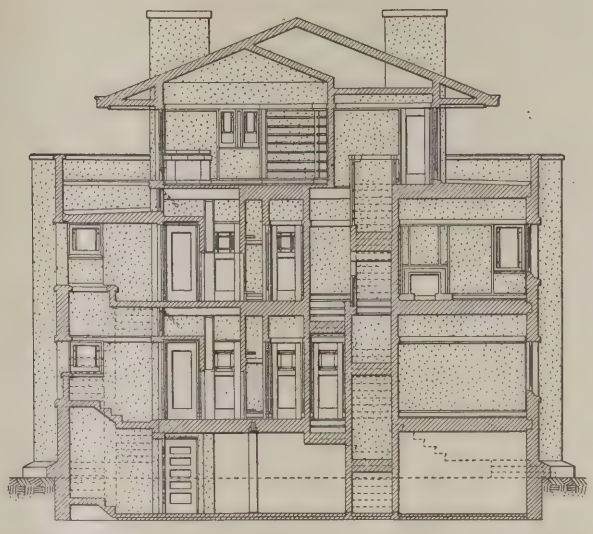
A case in mind is that in which a Chicago firm of contractors for a long period was unable to secure any hollow tile jobs, because they could not figure accurately enough on this class of work as could other contractors who had some experience with it and who knew just where it would save money and enable them to get the work at a profit. This firm was not only unable to secure any of the hollow tile work, but became embittered toward it and substituted other types of construction wherever possible. They were finally persuaded to look into the use of hollow tile more closely, and after erecting a few buildings using that material, they became expert in estimating that class of work. During a recent period of building depression, this firm enjoyed a season of prosperity



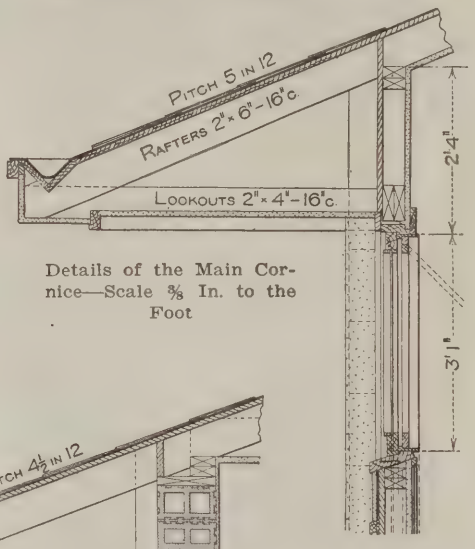
Section Through Linen Closet on Line Q-R of the Plans



Detail of Walls at Second Story — Scale ⅜ In. to the Foot.

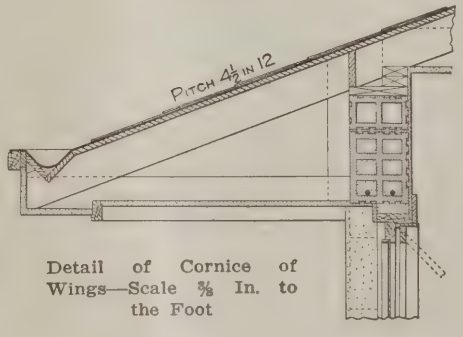


Cross Section of House on Line C-D of the Plans—Scale 1/16 In. to the Foot



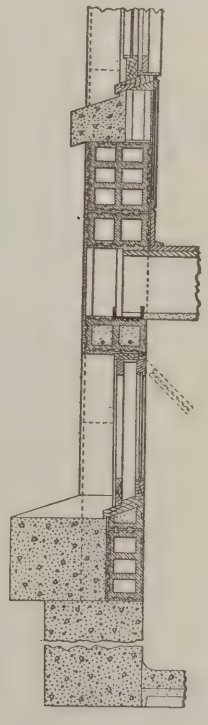
Details of the Main Cornice—Scale ⅜ In. to the Foot

Cross Section of Building Through Living and Dining Rooms on Line E-F of the Plans—Scale 1/16 In. to the Foot



Detail of Cornice of Wings—Scale ⅜ In. to the Foot

Vertical Longitudinal Section of Building—Scale 1/16 In. to the Foot



Detail of Wall of East and West Wings — Scale ⅜ In. to the Foot

Miscellaneous Details of Two-Family House of Hollow Tile Shown on First Page of This Article

because they were able to secure several jobs of hollow tile at a good profit.

The use of hollow tile in residence construction has long since passed from the experimental stage. It has come to stay, and like all other recent improvements in building construction, is rapidly gaining in popularity. Its economic features alone are sufficient to warrant a most careful investigation on the part of every contractor with a view of acquainting himself with the essentials of doing successfully and profitably any job involving this construction on which he may have an opportunity of bidding.

The building public is demanding more and more the use of hollow tile, especially for homes and residences, and the contractor who is equipped to take care of that class of work is the man who will reap the profits.

The two-apartment house shown on the first page of this article, and plans and details of which appear on succeeding pages, was designed by Walter Burley Griffin, of Chicago, and erected in Evanston, Ill. The building has a 12 in. concrete foundation and walls of 10 in. hollow tile.

Slate Production in 1914

The quarrying of slate is an important mineral industry closely connected with the building trades, and it is interesting to note that the value of slate produced in the United States in 1914, including slate sold in squares for roofing and as slabs for milling and other uses, was $5,706,787, according to A. T. Coons, of the United States Geological Survey, in the chapter on slate from the report "Mineral Resources, 1914." For the last twelve years the value of the slate output has remained practically stationary, fluctuating slightly with changes in trade and financial conditions. As compared with the output in 1905, ten years ago, which was valued at $5,496,207, the output in 1914 shows an increase in value of only $210,580, or nearly 4 per cent. The largest output ever reported was in 1908, when the value of $6,316,817 was nearly 10 per cent. greater than that of 1914. The average price per square of roofing slate in 1914 was the highest ever recorded—04.08. This represents an advance of 39 cents in ten years. Pennsylvania, Vermont, Maine, Virginia, New York, Maryland, New Jersey and Utah, named according to rank of output, were the States producing slate in 1914. Pennsylvania produced over 63 per cent. of the total output and Vermont about 25 per cent.

Nearly 73 per cent. of the value of the slate produced represented roofing slate, which is sold in "squares," each square containing a sufficient number of pieces of slate to cover 100 square feet on the roof. The output of roofing slate in 1914 was 1,019,553 squares, valued at $4,160,832, the average price being $4.08 per square.

Pennsylvania's output represents about 59 per cent. and Vermont's 29 per cent. of the value of the roofing-slate production of the United States. Virginia was the only State whose output showed an increase.

Milling slate, including slate used for blackboards, school slates, electrical work, table tops and sanitary and other structural work, decreased from $1,714,414 in 1913 to $1,545,955 in 1914. There was an increase in the material sold for blackboards and a decrease in school slates and other mill stock.

Northampton and Lehigh counties, Pa., produced all the blackboard and school slate.

Mediæval Masonry

What the ancients accomplished in the way of masonry construction is a topic of never-ending interest among those architecturally inclined, and in the course of a lecture delivered by Banister Fletcher, not long since, at the Victoria and Albert Museum in London, there was presented a very graphic description of the evolution of rib-vaulting and supporting buttresses which has thrown such a glorious mantle of fine roof-tracery and wall sculptures over the Gothic cathedrals of Europe. The weight of the building, which had previously been distributed equally over supporting walls and columns, was now gathered up and brought down on to isolated supports and piers.

This skilful design of mediæval master masons was due, in large measure, to new conditions of labor and to the material at their disposal. Egyptians, Greeks, and Romans built with huge blocks of stone or marble, with little mortar, till Imperial Rome required enormous public buildings that could not be roofed by the old system. Then Roman necessity became the mother of the invention of concrete, which had such a strong cohesive quality that the vaults were almost self-supporting on the walls and columns. By another turn of the architectural wheel concrete fell into disuse, and there were no gangs of slaves to move huge, monolithic blocks, so a new system arose, fashioned out of small stones bound in thick beds of mortar.

Building became an experimental science of effectively balancing small stones on one another. Here we have the beginning of that thrust and counter-thrust which was so elaborately applied in piers, buttresses, etc., which gave their counter-thrust to the outward thrust of the roof vault.

The use of small stones introduced a new problem in vaulting. In the Roman method great stones superimposed upon one another were at rest and rigid; in the Gothic system the balancing of small stones against one another produced a structure not at rest, but in equilibrium. Rigidity was replaced by elasticity. The old Roman building stood solid on the ground, the new Gothic structure soared lightly into the air. The pagan Pantheon at Rome, with its wonderful concrete dome and a single window, stands rigidly solid with its unbroken encircling wall.

The Christian cathedral of Rheims, in all its panoply of lacework pinnacles, statues of kings, triple portals, and great stained-glass windows, soars upward in its original state, borne aloft by buttress and pier, but now alas, the fortunes of war have left but a battered semblance of its former self.

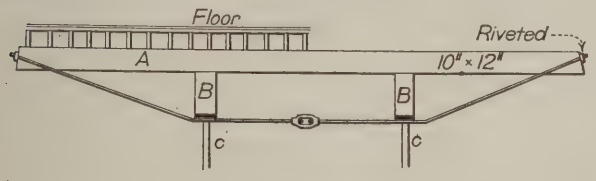
Granite or limestone masonry, well dressed, weighs 165 lbs. per cubic foot; mortar rubble weighs 154 lbs., dry rubble 138 lbs., and well dressed sandstone masonry 144 lbs.

CORRESPONDENCE

A Department Where Those Interested Can Discuss Trade Topics—Every Reader is Invited to Participate

Spring Floor for a Dance Hall

From D. P. B., Redford, N. Y.—The specifications for the dance hall should tell "G. S. N.," North East, Pa., whose inquiry appeared in a recent issue of the paper, just what to do. If he has no specifications it is extremely difficult to tell what is



Spring Floor for a Dance Hall

required. Some time ago I put a spring floor in a dance hall 39 x 52 ft. in size, which gives entire satisfaction. I used three trussed beams 39 ft. long, laid 13 ft. joists on these and put in two rows of bridging to a bent. The bridging was dressed 2 x 4 in. stuff put in edgewise. The floor was doubled, the top one being laid diagonally.

The beam was trussed on the under side as indicated in the accompanying sketch, where B represents a piece 2 ft. long with a plate of iron on the bottom. The shores C C are hinged so they could be raised out of the way. When used for dancing the girder A is crowned about an inch, which raises the shores from the bottom support so they dance up and down, guarding against any accident. Solid timber is better than built-up. When the floor is unequally loaded as in the case with a live weight, undulations are developed until a person on the under side would think the floor would come down. There are two 1-in. rods used to each beam. The beams should be 10 x 12 in. and the joists 2 x 10 in. If these are placed 18 in. on centers it will be sufficiently close for all practical purposes.

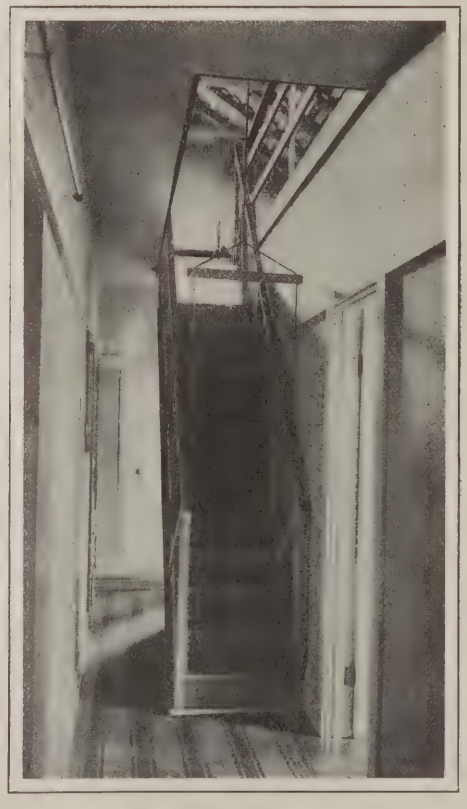
If a great deal of degree of spring to the floor is wanted, a spring may be put in between A and B with a plate of iron under A, for the spring to work upon. If the room below is to be used for a hall or store room the material may be planed.

A Disappearing Stairway

From Charles Alma Byers, California.—In the majority of homes to-day the attic, as such, is practically unknown. This space next to the rafters is usually closed, with no means of access to it, except possibly a small manhole or scuttle in the ceiling somewhere for use in case of an emergency. And yet, with but little additional labor and expense, the attic may well be made a most convenient and appreciable feature of many a home. If floored, it will constitute an excellent storage room, and can even be used, if necessary, as a rainy-day play room for the children. In fact, there are any number of purposes to which it can be put, if the arrangement is such as to render it easily reached.

Probably one reason why the attic has come to be almost unknown to-day is because it seems quite difficult to find a satisfactory place for locating the stairway that should lead to it. Since the place is a sort of dark, gloomy and unkept hole, it is deemed advisable to keep it concealed, and therefore an open stairway can hardly be made to fit in with such plans. At least, such seems to be the problem in many cases. Herewith, however, is reproduced a photograph showing how the problem has been solved most admirably by one builder, and the suggestion contained therein should prove more or less valuable to others.

In this case the only possible location for a stairway leading to the attic was in the hall, and that



A Disappearing Stairway

meant that it must ordinarily be too conspicuous. The disappearing stairway, however, has eliminated this difficulty entirely, and at the same time provides a most satisfactory means of access to the place. The stairway is of independent construction.

The upper portion is securely fastened to the attic

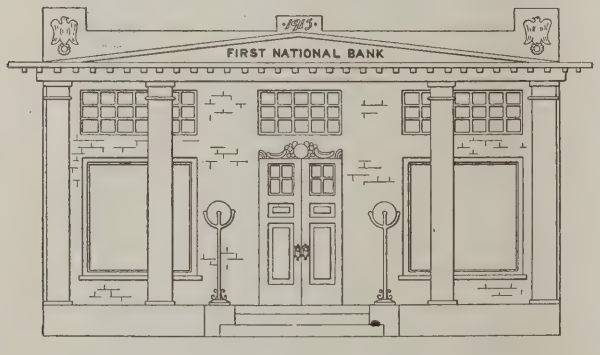
flooring at one end of the long opening cut in the hall ceiling, and the other end is lowered at will to the floor level. This latter end has strong cable ropes fastened to each corner; and these cables extending up to the rafters of the attic and through two sets of pulleys—the second set located near the rear—suspend a heavy weight that acts as a counter-balance against the weight of the stairway. In one wall of the hall is a small opening concealed by a door, where there is another cable that controls the balance, and by which the stairway may be either raised or lowered. When lowered the stairway is perfectly rigid, and when raised the covered back or underside creates a ceiling for the opening. It will thus be seen that the stairway may be entirely concealed when not in use, and yet it fills the function for which it is intended in every sense of the word, making the attic a readily accessible place.

Patterns for Hardwood Floors

From D. P. B., Redford, N. Y.—In reply to "C. D. K.," Christiana, Pa., will say that his best plan will be to secure a catalogue from some of the shops doing detail work. He will find under the heading of "Parquet Flooring" a variety of designs for such floors as those about which he is making inquiry. These shops make such floors to order to fit any room much better than it can be done by an individual. There are so many designs that any I should send might not please him. They are pieces of art and the price runs to 50c. a sq. ft. and upward. In case the correspondent fails to run down anything satisfactory I will send a few of he so desires.

Front Elevation for Small Bank Building

From J. B. G., San Diego, Cal.—I am sending forward the front elevation for a small bank building in case "A, B.," who inquired in an earlier issue,



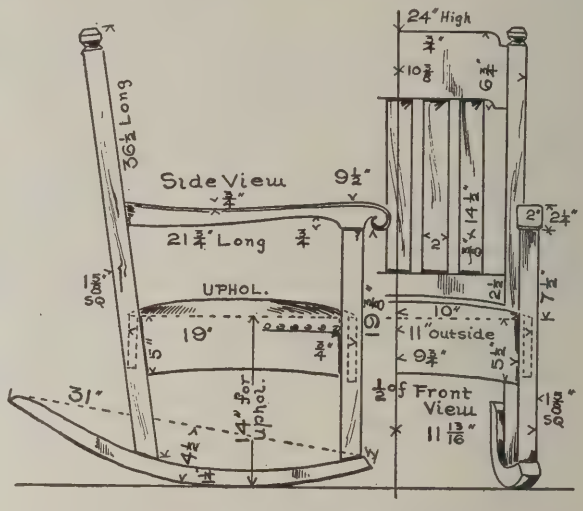
Front Elevation for a Small Bank Building

has not already made a choice from those which have recently been published. I have been reading *The Building Age* for nearly two years now, and I enjoy it very much.

Details of a "Mission" Rocker

From C. E. P., Provo, Utah.—Will some interested reader of the paper give me through the Correspondence column details of a Mission rocker.

Answer.—The side and partial front elevation of a Mission rocker presented herewith will doubtless carry out the idea of the Utah correspondent. While he does not state the style of seat he has in mind, the sketch gives the hight for either a spring upholstered seat or for a saddle wood seat. Either way the builder of a rocking chair should always get the front and back posts much longer than standard or intended and fit to the rockers when the chair should be tested, not so much for proper hight but for an easy balance. If it is "tricky,"



Details of a "Mission" Rocker

throwing one back too suddenly, remove the rockers and refit by taking off from the front posts; if it is resisting, take off from the back posts until it meets with the approval of various persons of different weight and build, who experience an even comfortable balance. It is then a simple matter to mark the given hight to cut off the legs, lowering the chair to the measure given on the drawing.

This is a very simple chair to construct and can be worked out more readily by enlarging on drawing paper to full size according to the manner of measured detail of front and side view given. From these two drawings the seat plan can readily be laid out.

If for a saddle seat stock should be jointed and glued up sufficient to have a ½-in. overhang above the seat rail for outside shape and be 1¼ in. thick. Allowance for the kind of seat may be figured out when making the drawing. Corner blocks should be used front and back for either kind of seat. The seat rails should be ¾ in. thick and mortised into the center of the posts.

PAUL D. OTTER.

Concrete Roof for a Root Cellar

From G. A. B., North Tonawanda, N. Y.—I have under way a job of constructing a root cellar under a barn and would like to have some suggestions from Mr. McCullough or other practical experts on reinforcing the roof so that it will carry loads of grain having a combined weight of about 6 tons. A few posts can be placed below to shorten the spans, but should be in such position that a team can enter. The barn and the retaining walls are of concrete. Referring to the accompanying sketches A B B are old walls and must be drilled or chiseled for the rods and supports. I would like to be informed as to the arrangement and size of reinforcing material to produce a good concrete job.

Answer:—In commenting upon the above query

Mr. McCullough offers the following suggestions and accompanying sketches:

Run a beam through the length of the platform supported on two columns. The columns will be 14 x 14 in. outside dimensions. In each corner of the column will be a ⅝-in. round rod set vertically within one inch of the surface of the concrete, these rods to be tied together at intervals of 4 in. with to be 24 in. There must be ½ in. of concrete over the steel in the top of the beam and slab and ½ in. of concrete under the steel in the bottom of the beam and slab. In the bottom of the slab use ⅝-in. round rods placed 6 in. on centers. These rods need not go to the center of the beam, but can go over the edge of the beam about 8 in., although if they run clear across the job will be stronger. Across the middle, over the top of the beam lay ⅝-in. round rods 8 ft. long, on 12-in. centers. No rods bent in the slab.

The reinforcement for the beam consists of seven 1-in. round rods. One rod is straight in the bottom all the way. The other rods are bent, as shown in the sketches, that is in each span there will be one straight rod, three rods bent up at the ¼-span point and three rods bent up at the 1/3-span point. The measurement to the points for bending up will be at the mid-depth of the beam. It is not necessary to have each rod run the whole length of the platform. The bars can be long enough to go in

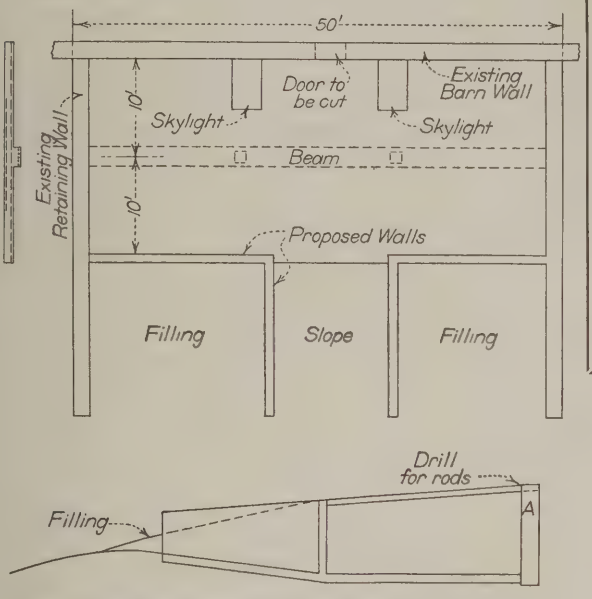


Fig. 1—Sketches Accompanying Letter of "G. A. B."

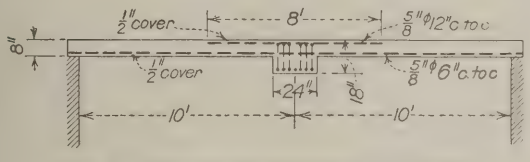


Fig. 2—Cross Section of Slab and Beam

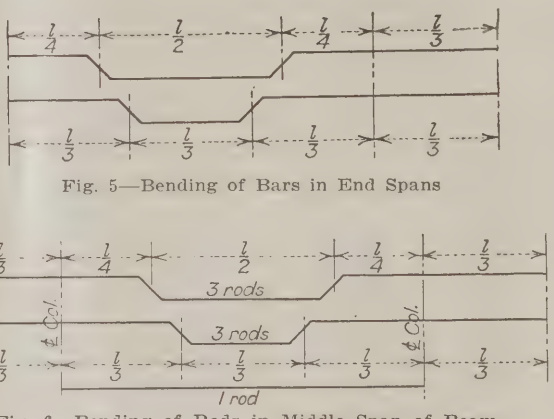


Fig. 5—Bending of Bars in End Spans

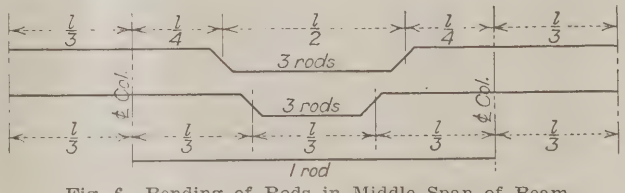


Fig. 6—Bending of Rods in Middle Span of Beam

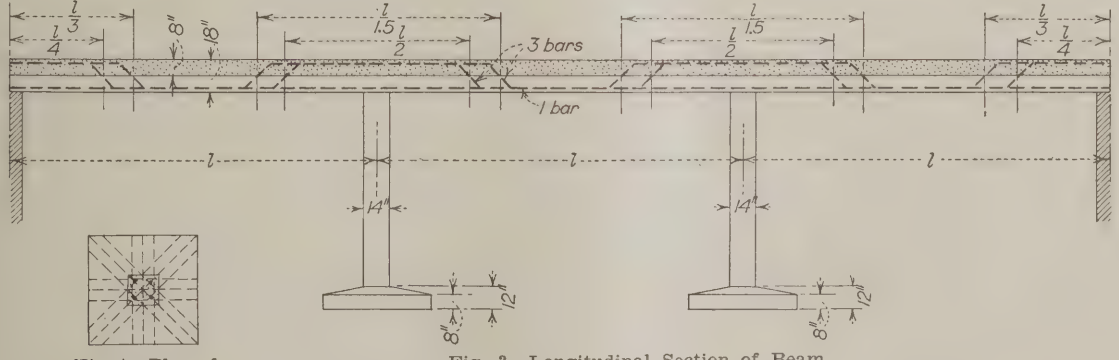


Fig. 3—Longitudinal Section of Beam

Fig. 4—Plan of Footing

Concrete Roof for a Root Cellar—Figs. 2 to 6 Illustrate Mr. McCullough's Comments

No. 10 wire. The columns stand on a footing 5 ft. by 5 ft., the edges 8 in. thick and the middle thickness at the column 12 in. Use for reinforcement in the footings 12 rods ⅝ in. diameter. Three rods to be in each layer, two layers going to the corners and one layer parallel with each side, making four thicknesses of steel under the columns.

The beam and slab must be poured at one time after pouring the columns to a level with the bottom of the beam. The slab should be 8 in. thick, the depth from the top of the slab to the bottom of the beam to be 18 in. and the width of the beam each span length. When they are thus cut the straight piece over the support should go past the post to the 1/3-span point on the other side. This is shown in the drawing.

The concrete should be made of 1 sack of first quality Portland cement, 2 cu. ft. of torpedo sand, 4 cu. ft. of broken stone or gravel, ranging in size from ¼ in. cube to 1 in. cube. Or it can be made of 1 sack of Portland cement to 5 cu. ft. of bank gravel. Be sure all the materials are clean. The water must be clean and free from grease. The materials must be well mixed and when poured into

the forms must be well spaded and tamped into place. The concrete should be mixed with enough water to make it pasty and sticky. It should not be so thin that the water will rise to the surface if the wheelbarrow stops for a moment. It should not run freely from the wheelbarrow but should be of a consistency which will render it necessary to use a shovel or hoe to pull it out.

Clearing a Stopped Chimney

From J. F. H., Indianapolis, Ind.—One day I was called to look after the chimney of a cottage in the country. The flue had become stopped and all efforts on the part of the owner to remove the obstruction proved unavailing, and I was called to cut a hole through the wall of the chimney and remove the obstruction.

Sounding with a pole from the top of the chimney showed that the obstruction was at the level of the second-story floor, just where the chimney made a slight offset to clear a timber of the old-fashioned frame structure. The obstruction was thus located about 22 feet below the top of the chimney. The stopped flue was fairly large, about 6 in. by 8 in., and from the appearance of the chimney I assumed that the stoppage was caused by bricks which had been dislodged by the wind, from the chimney top, a number of bricks being missing therefrom, and the entire top of the chimney showing great need of repairs, the mortar being badly disintegrated between the brick courses.

The pole confirmed the idea of a stoppage by loose bricks which had fallen into the chimney and wedged at the offset. The pole also indicated that the bricks were covered with some soft substance which apparently closed any openings between the lodged bricks, for not a particle of smoke could find its way between them. A nail driven into the end of the pole brought up a bunch of leaves, thus explaining the trouble.

The owner did not like the idea of cutting a hole into the chimney, so I cast about for means to remove the stoppage without cutting the chimney. I procured a rod of ½-inch-round iron about 16 feet long and a pair of tongs which would easily close over a brick the two-inch way. A couple of ferrules were afterwards procured, also a small screw-eye of ¼-inch iron and with a hole about ¾ inch in diameter.

The country store was next visited and two bamboo fishpoles obtained—one about 30 feet long, the other only about 18 feet in length. The rod of round iron was forged at one end, a small hook being turned up about 2 inches across. The other end of the rod was flattened, driven into the large end of the smaller fishpole and a ferrule driven firmly over the pole close to the end.

The longer pole was bored to receive one leg of the tongs, a ferrule driven over the end of the pole and wedges driven under the ferrule and around the leg of the tongs, prevented it from pulling out of the pole under strain. The tongs were then closed, and just above where the free leg came against the pole the screw-eye was inserted, screwed down close to the pole and left crosswise with the length of pole. A length of clothesline was then threaded through the screw-eye and attached by half hitches to the free leg of the tongs, being attached in the same manner that a fishline is made fast to a hook.

The free end of the line was carried to the small end of the pole and made fast there, with plenty of slack to allow the tongs to swing open as far as the width of chimney flue would permit. I then went to the top of the chimney, a couple of ladders having been arranged so an assistant could go up with me. The assistant handled the hook, while I took the tongs-pole. The hook was worked down through the layer of leaves until a brick was reached and loosened. The poles were marked so we would know the direction of the tongs opening and the projection of the hook. My assistant worked away until he freed a brick and found out which direction it was in; then I loosened the cord, permitting the tongs to open, and worked them around until they gripped the brick. Then a pull on the cord clamped the tongs firmly upon the brick, and it was hoisted to the top of the chimney.

Meanwhile, my assistant was busy digging out another brick and getting it where the tongs could reach it. Much trouble was met with in locating the next two bricks, so he went to a manufacturing plant nearby and borrowed a lamp guard and a couple of twisted lamp extensions. The cottage was fitted with a porch light, and we attached the extensions to its socket and lowered the lamp in its guard right down the chimney to the obstruction.

The rest was easy. In less than an hour the remaining bricks were loosened, some of them pulled up and the rest fell to the bottom of the chimney, whence they were removed through the clean-out hole. The damaged top of the chimney was repaired after three hours' work at this job.

An Ancient Stone Staircase

Whilst engaged in carrying out structural alterations at an old hotel at Poole, England, the workmen discovered what is considered to be a secret stone spiral staircase associated with the smuggling days. The premises date back 200 to 300 years. The staircase had been ingeniously constructed in the wall, with a stout beam on the outside. Entrance thereto is presumed to have been made through a cupboard placed on the right hand side, and from the ground floor to the first floor there are niches in the wall for the feet, above being a series of steps. In the side of the wall about four feet from the ground is a square framed cavity, through which contraband goods were passed.

There is also an old-fashioned door containing ancient lights, upon the glass in one of which has been scratched "William Milner, junior, November 8th, 1783, Custom House, Poole."

He Had Reached the Limit

Architect: "Now where would you prefer the drawing-room, sir?"

Mr. Newlyrich: "Look here, young man, I've let you put up a smokin' room, when I don't smoke; a music room, when I couldn't play a mouth organ; a nursery, when I ain't got no nurse; and a pantry, when I don't pant; but I'm goin' to put the kibosh on the drawin'-room, when I couldn't even draw a straight line."

Typical Country Plumbing Installations

Equipment of a Country Residence—Details of Soil, Vent and Waste Connections to Modern Fixtures

WHEN plumbing is installed in a modern country residence large enough to deserve the classification of a "mansion" it is, as a rule, of the highest class, and designed with an eye to permanence and thorough efficiency. Therefore, such work offers every opportunity for the exercise of engineering ability and skill in construction, and is worthy of special study.

While the architectural features of such a building do not of necessity control the principles upon which the plumbing work must be constructed they always control the application. For instance, a building of a rambling character may require that the plumbing system be divided into several sections, so that it may be drained without unduly long horizontal runs of soil and waste pipe. Otherwise, such pipes might become stopped frequently through the precipitation of the solid matters carried owing to the sluggish flow consequent upon long runs and insufficient pitch.

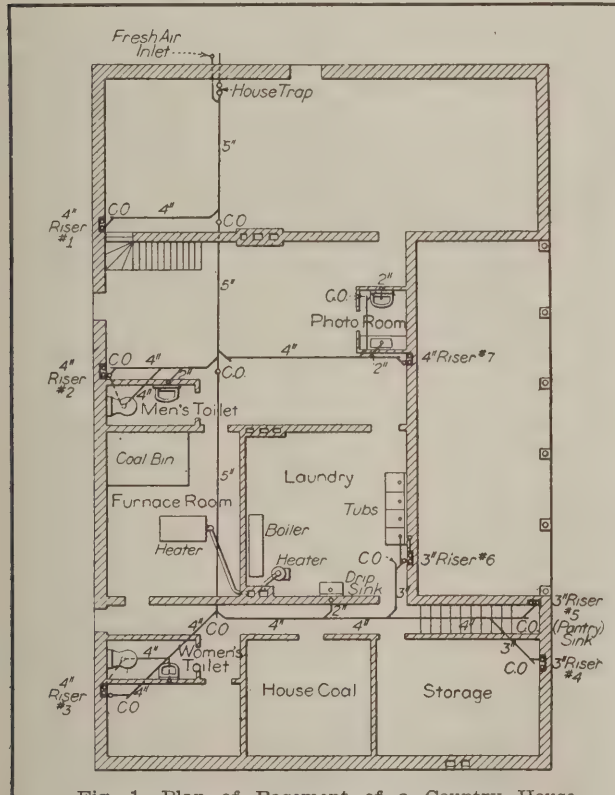


Fig. 1—Plan of Basement of a Country House, Showing Arrangement of Fixtures and House Drains

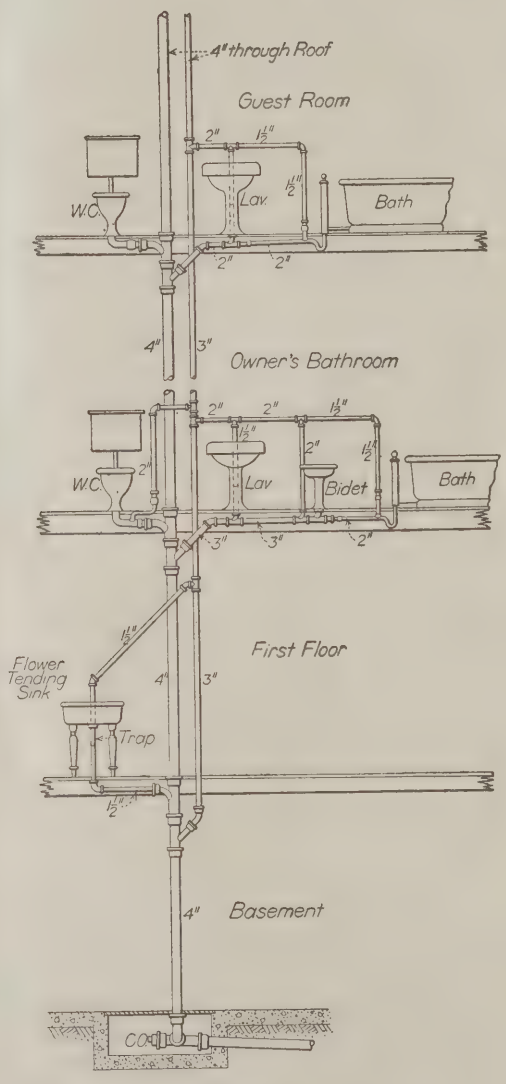


Fig. 2—Elevation of Stack No. 1 with Connections from Fixtures on Various Floors

Typical Country Plumbing Installations—Equipment of a Country Residence

A country house of a very common type is illustrated in plan in Fig. 1. This is a somewhat large and roomy residence of brick construction, with a wing at either end. One of the wings contains the kitchen and servants' quarters; the other, public rooms on the first floor and bedrooms on the second and third or attic floors. The laundry is situated in the basement, as are also toilet rooms for men and women servants, and a photographic room with a special sink and a lavatory. Hot water is supplied by a regular tank heater connected with a horizontal boiler of 200 gallons' capacity.

The sewage from house and outbuildings is discharged to a septic tank placed at some distance from the house and delivering into a subsurface disposal bed in two parts with control valves.

The floor of the basement is of concrete, and as

there are fixtures at the opposite end to which the house drain is carried to connect with the septic tank, the soil and waste pipe had of necessity to be carried under the floor. So as to provide easy access to the house drain it was carried in a straight line from the house trap to the point where it was necessary to connect the branch pipes serving the farthest fixtures. The plan will show that the intervening connections were made by means of long Y fittings, and that cleanout openings were provided on the main pipe behind these branches. Thus a stoppage at any of them could readily be reached.

Form of Cleanout Openings

These cleanout openings take the form of a long Y set with the branch looking up to the floor. Then it is extended until the branch pipe reaches almost to the floor level, when a cleanout screw is calked into the hub and an access plate is left in the floor, as shown in Fig. 3. At the end of the straight run of house drain a cleanout is placed. This is also provided with an access plate in the floor, as indeed are all of the cleanouts shown at the foot of the stacks. This is good practice, and often saves great expense should any article be inadvertently allowed to pass into the pipe and a stoppage occur.

In cases where there are no fixtures to connect in the basement it may be preferable to carry the soil pipes on the basement walls or suspended from the ceiling. When this is done they are accessible for repair and the cleanouts are also more accessible, but the practicability of carrying such a long run of piping as is shown in the accompanying plan otherwise than under the floor is doubtful in most cases. If it is desired to provide the greatest safeguard against future trouble a brick or concrete trench should be constructed in which to carry the soil pipes. This may also be used for the main water pipes, if it is desired to conceal them.

A point worth close attention in such work is the protection of lead or wrought iron pipe from the effect of concrete, especially cinder concrete. Cast iron does not seem to be affected appreciably by contact with lime, moist cinders or cement concrete, but wrought iron and steel, or lead pipe are corroded to a serious extent and should always be protected by a covering of asphalt.

Connections for Vertical Pipes

The vertical soil and waste pipes should not be connected directly into the horizontal branches by means of bends. The plan shows that all of these enter the branch of a Y, of which the end hub is provided with a screw cleanout. Thus access is possible throughout the part of the system covered by the concrete at its most vulnerable points. Should it be necessary to carry all or any part of the soil and waste pipe in a horizontal direction above the floor level the pipe should be supported at every hub either by a heavy hanger or by a pier built of brick or constructed with an iron band encircling the pipe and held firmly by a substantial vertical support of iron pipe. Such hangers are shown in detail drawings accompanying the plan.

The main house trap is placed just inside the wall and to a tee calked in the main house drain behind it is connected a 4-in. pipe carried to the outside and finished above the ground line with a return bend. Cleanouts are calked into the hubs of the trap and proper access plates are left in the floor above these. The fresh air inlet may be taken to a point at some distance from the house to prevent any odors from being carried back when fixtures are discharged. Instead of a return bend the pipe may finish in a wall, or some ornamental feature of the surroundings in which an iron box with proper means of connecting the pipe can be placed.

Alternatively, and what is better still in the opinion of many sanitary engineers, the fresh air inlet pipe can be continued to the roof level. This insures that drain odors will never be discernible and does not at all interfere with a proper circulation of air through the system.

Support for Base of Risers

The base of all the risers should be supported properly. The bends used to make the turn from the vertical line to connect with the horizontal Y already mentioned should be of the long turn pattern. In the plan the stacks are seen carried in chases. This is not always done and the type of building construction used will determine its necessity or desirability. If the house is exposed to severely cold weather it may be necessary to protect the soil and waste pipes from frost when carried thus in chases in an outside wall. For this reason it may be found desirable to keep them inside of the walls and to conceal them by having the finishing wall furred out sufficiently. If this is impracticable the chases should be large enough to admit of properly insulating the pipes by asbestos or other covering. It must be remembered that while the discharge from the fixtures passes through the vertical pipe in a comparatively short time, the walls of the pipe may be brought to a very low temperature if there is a draft passing up the chase or if the frost has penetrated the outside walls sufficiently. In such a case ice may build up inside of the pipe at each discharge and so stop its passage.

Good Example of Varying Conditions Often Encountered

The elevation of Stack No. 1 in Fig. 2 is interesting, and offers a good example of the various conditions that must be looked for in a country house plumbing system. At the base the long turn bend enters a Y placed in a concrete cleanout box with an iron plate cover. A 3-in. vent pipe runs parallel to the soil pipe to the roof, and is connected into it below the lowest waste connections. This happens to be from a porcelain sink used in tending and watering the table plants in the house. The waste pipe from this sink enters the vertical pipe through a sanitary tee. A regular Y might be used, but in the vertical position the sanitary tee gives entire satisfaction. The vent pipe from the sink is a continuation of the waste pipe. It is connected to the 3-in. vent pipe at some distance above the level of the sink, and the fittings used are for the most part 45 deg. ells.

The bathroom on the floor above is that of the owner. In it there are a closet of a high-grade type connected to the lead bend by a floor flange, a pedestal lavatory, a porcelain bath tub and a bidet. The latter fixture is not commonly placed in bathrooms used other than by the owner's family. On the third floor there is another bathroom with a

similar equipment, except the bidet, and with an arrangement of waste and vent piping practically identical with that on the second floor. In both cases the soil and vent pipes pass up between the closet and the other fixtures. In some respects this is an advantage, as it allows of a simplification of connections.

The horizontal branch pipe for the first floor bath and lavatory connections is of 3-in. diameter. It enters the vertical stack through a Y and is continued beyond the bidet in 3-in. wrought iron galvanized pipe. This might well enough be cast iron if space will permit of it, but the wrought iron pipe occupies less room, and there is less danger of any leak developing such as might occur through the loosening of a calked joint by reason of expansion and contraction where much hot water is used.

The lavatory branch is vented on the continuous principle. The vent for the bidet is taken off close to the fixture branch, while the bath trap is vented from the crown. The water closet enters the main stack through a sanitary tee placed above the bath tub branch and the vent pipe, which is of 2 in. diameter, is taken from the lead bend. It is a matter of controversy as to which is the best position on the bend for the vent connection. Structural difficulties often prescribe its position on the horizontal part where it is illustrated. Where such do not exist it is doubtless better to make the connection at a point closer to the seal of the trap it is intended to ventilate and this is as a rule the point on the vertical part of the bend just below the floor level.

It is not necessary to ventilate the upper closet bend. It is so close to the stack that there is not any liability to self siphonage by the discharge, while the fact that it is the highest fixture on the stack safeguards it from the effect of the discharge from other fixtures. In rooms where the fixtures are arranged differently, and where the closet is on the same side of the stack as the other fixtures, it may not be possible to connect the branches into two separate fittings on the vertical stack. In such a case one of the special branch fittings which has one opening for the closet and one or more for the other fixtures in the room may be used with advantage. If the closet is very close to the stack it may be advantageous to use one of the branch fittings which has a vent connection incorporated in its construction. This admits of as close construction as it is possible to obtain. The appearance and utility of these fittings may be seen in Fig. 4.

There is only one bathroom on Stack No. 2, and, as it is identical with the arrangement shown on the third floor room on Stack No. 1, it is not necessary to describe that. On Stack No. 3, shown in Fig. 5, there is only one bathroom on the second floor. The toilet room in the basement is connected close to the base of the stack, however, so it may be called an integral part of this elevation. The vertical stack enters the branch at the base by a long turn bend as on the others.. A cleanout is placed in the end of the Y, which receives it and a 4 x 2 in. Y is placed at the base of the stack to connect the bottom of the vent pipe, which runs parallel with the soil pipe. A double Y branch receives the toilet room fixture wastes and the waste pipe of the lavatory is continued as a vent pipe connecting into the 3-in. pipe running beside the stack. The vent from the toilet room closet is connected to the closet bend on the vertical part and a short piece of lead pipe connects it with the iron pipe carried to a tee on the vent from the lavatory. This dis-

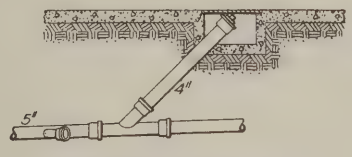


Fig. 3—Method of Fitting Clean-outs in Drains Under Floor

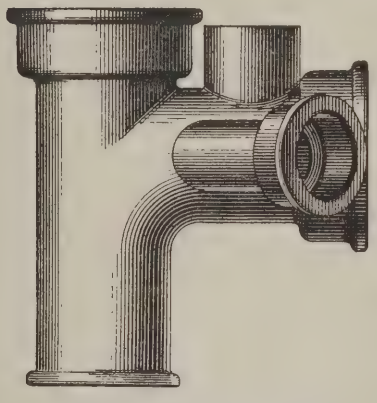


Fig. 4—Sanitary Tee with Waste and Vent Connections

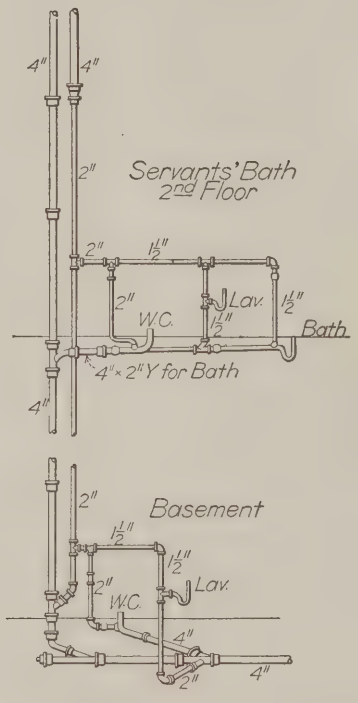


Fig. 5—Elevation of Stack No. 3, Showing Connections to Bathroom and Basement Toilet Room

Typical Country Plumbing Installations—Equipment of a Country Residence

poses of the vent and waste connections to this room.

As all of the fixtures in the bathroom on the second floor are in a line and at one side of the risers, a 4 in. x 2 in. Y is inserted in the horizontal 4-in. line, as shown. The closet is connected through a 4-in. lead bend connected to the iron by a cast-brass ferrule wiped to the lead pipe and with a vent connection of 2-in. lead pipe wiped into the bend close to the vertical part. A 2-in. wrought iron pipe is carried from the hub on the Y branch fitting and receives the waste from the lavatory and that of the bath tub. The trap for the bath tub is of the ordinary half-S variety and is vented from the crown by a piece of 1½-in. lead pipe connected to the iron pipe by a piece of brass pipe of iron pipe weight, threaded and wiped to the lead pipe.

The lavatory is vented by a continuous connection. This is the best and simplest method of making waste and vent connections for fixtures so placed.

The top of the stack is finished above the roof level, as shown in the detail in Fig. 5. The 3-in. vent pipe may be connected back into the 4-in. pipe before it reaches the roof if preferred, and this is done through a reverse Y branch for preference. A simpler but less effective connection may be made by means of a tee, but the 45 deg. angle should be maintained wherever possible.

(*To be continued.*)

What Are Porous Bricks?

The definition of porosity with respect to building bricks has recently been the subject of some discussion of the law courts of Germany and their decision in the matter is of wide interest. In regard to the matter a correspondent of the London *Building World* offers the following comments:

"With the exception of engineering bricks, all ordinary building bricks are somewhat porous; that is to say, they will all absorb water, though the amount so retained in the pores varies greatly with different bricks.

"In the south of England the average amount of water absorbed by bricks during complete immersion is about 12 per cent. of the weight of the brick. North of the Trent and in Wales somewhat denser bricks are usual, and the average water absorption is seldom over 8 per cent. of the weight of the brick.

"Bricks made by the semi-dry process—that is, by compressing the clay in the form of a damp dust, absorb only about 5 per cent. of water, though they vary greatly in this respect. Engineering bricks absorb less than 1 per cent. of their weight of water. For all ordinary purposes, therefore, it is not desirable to designate bricks which absorb less than 15 per cent. of their weight of water, on immersion, as particularly porous.

"During the past few years the use of hollow blocks and hollow bricks has extended rapidly. These are much lighter than solid bricks and effect an important saving in railway carriage, but they must be distinguished from porous bricks. The weight alone is not a sufficient guide, as hollow bricks are now made which are indistinguishable in appearance from solid bricks. When cut or broken their hollowness is easily seen. On the Continent, porous bricks are defined as having a weight which is notably less than common bricks, but this definition will have to be abandoned now that hollow bricks are made in large numbers.

"The large, hollow blocks used in fireproof floors, etc., are usually made of a highly porous material. This not only reduces the cost of carriage and the weight of material in the structure, but it facilitates the manufacture of blocks accurate in shape and free from twists.

"A simple test for porosity consists in holding the tongue lightly in contact with a brick. If a distinct suction is felt the brick will be very porous; if no appreciable suction is apparent, but the moisture rapidly dries from the surface, the brick is but slightly porous. Engineering and non-porous bricks will not absorb water, even if poured on to them.

"A much better test consists in weighing a dry brick, immersing it in water for twenty-four hours, wiping it dry with a few rapid strokes of a clean cloth, and then re-weighing it. The weight of water absorbed will indicate the porosity. It is true that the water may not penetrate all the pores, but the test is sufficiently accurate for most purposes.

"The bricks used in architecture should be moderately porous, as, otherwise, water condenses from the air, and the resultant water collects in drops on the inside of the walls, spoiling the wall paper and giving the impression that the building is damp. If the pores are sufficiently minute the bricks may be as highly porous as possible. The more porous they are the better will the walls "breathe." Bricks with large, coarse pores should be avoided, as they admit rain water too easily, and walls in which they are used often remain permanently damp."

Exhibits of Home Equipment

Although the American citizen is reputed as a great traveler many people remain in ignorance of the comforts for their homes which they could readily enjoy. Some do not know because they do not leave home and others who travel do not come in contact with or see the equipment which they could readily afford for their own homes. This has been the occasion for the expenditure of considerable ingenuity in gathering together under proper conditions displays of building materials and equipment with a broadcast invitation to all people residing within convenient distance to visit the exhibition, so as to gain knowledge of the latest offerings of the market. There is still room for considerable enterprise in gathering displays of this character in a manner different from anything which has heretofore been done. It has been found profitable by some manufacturers to prepare a line of samples which can be transferred from one city to another and exhibited so that not only the trade which purchases such goods but the general public as well may have a better opportunity to become familiar with them. There is need of something more sweeping in the nature of an exhibit than is even thus afforded. In building equipment this, it would seem, could be best supplied if a number of manufacturers whose products naturally overlap were to unite in carrying the market to the people.

Heating Trade Wants Six-Inch Studs

A Tendency in Building Construction That Is Likely to Receive More Consideration in the Future

THE fact that builders have given too little consideration to the matter is back of a movement which has been inaugurated for the use of 6-in. studs in order to permit the installation of larger risers for warm-air heating systems. The fact that for six months of the year the comfort and health of the home-folks depend on the heating, entitles it to more consideration than it has had, particularly at the hands of speculative builders. For the multitude of dwellings in which the occupant has no voice in their construction or equipment the heating is unsatisfactory, the fuel consumption extravagant and the period of service of the apparatus reduced as the result of forcing.

The complaints in reference to warm-air heating have led to a consideration of the cause, with a view to affording relief to the furnace maker, the heating contractor, and the occupant of the building. A third of a century ago, as a makeshift, an oblong pipe was run up in partitions to reach some rooms that had no brick flue through which a round pipe could be used to carry the warm air. That makeshift has grown to be universal in use, and as might be expected only a makeshift in service. Its size is limited, and its use has been such as to almost make it the custom, regardless of the size and exposure of the room to which it leads.

Furnacemen Advocate 6-In. Studs

Naturally, as the number of such installations increased the complaints became exceedingly annoying to furnace makers and furnace men alike, and with their expert knowledge of what will remove the cause for complaint and insure satisfaction, they are preparing to advocate the general use of 6-in. studs where warm-air pipes are to be run.

At the convention of the National Association of Sheet Metal Contractors in Denver on June 9-11, John H. Hussie, Chairman of the Warm-Air Furnace Committee, broached the subject of a Model Code, and the part recommending 2 x 6-in. studding created much opposition. It was the contention of several members that this provision invites the hostility of the building contractor and paves the way for the steam and hot-water heating contractor.

This was not the sentiment, however, of men who realized the need of improving the service of warm-air heating systems, but rather the expression in reference to the magnitude of the task involved and the possibilities that might be realized.

Action of Warm Air Heating Association

At the meeting of the National Warm Air Heating and Ventilating Association in Detroit, June 9, composed of furnace manufacturers, the same matter became the principal subject for discussion. A code was considered that provided a method of determining the size of a warm-air riser in relation to the heat lost through the glass and wall exposure of the room, that also prohibited the use of a riser having a width more than two and one-half times its depth.

Professor Arthur C. Willard of the University of Illinois read a paper on "Testing Warm Air Furnaces for Efficiency and Commercial Ratings," in which, on the point of the dimensions and areas of riser stacks in relation to the area of cellar pipes, he made it clear that in common practice riser areas, sizes and shapes are too small in their relation to the cellar pipes and detrimental to economical and effective heating. In response to a question as to frictionless fittings, he showed how defective they were by stating that an ideal construction—never realized in practice—would entail a friction equal to that of a pipe having a length equal to fifteen times the diameter of it. He was supported in his contention by Dr. William F. Colbert.

Six-Inch Studs Recommended

Professor Willard recommended the association to advocate the use of 6-in. studs in buildings in order that effective service from furnaces might be insured and the association voted to approve of this recommendation.

A. W. Glessner stated that exhaustive and elaborate tests had shown the riser might have an area one-third less than the supply.

Professor Willard stated that the correctness of the recommendations of the committee were susceptible of ready demonstration, and proceeded by drawings and calculations to show that friction and shrinkage in volume due to cooling and the effect of change in velocities by reason of changes in shape at different points would permit of no such great reduction in riser areas as commonly followed and as had been suggested, but that a 10 per cent. reduction would be the safe limit.

Architects Frequently Specify 6-In. Studs

It is a matter of fact that in the work of architects 6-in. studs are frequently specified to provide for adequate warm-air risers, and in their best work provision is often made for round risers as large as 14-in. in diameter for heating commodious chambers or sitting rooms on upper floors of high-class residences. These architects and the heating contractors who work under them fully appreciate the inadequacy of the partition riser as well as its bad form. The position taken by the experts of the warm-air heating industry indicate that it is time for builders to give more thought to the provisions in the buildings they erect, for comfort during the cooler six months of the year.

Details of an Unusual Truss Roof

What an English Writer Has to Say Regarding Its Construction and the Covering for It

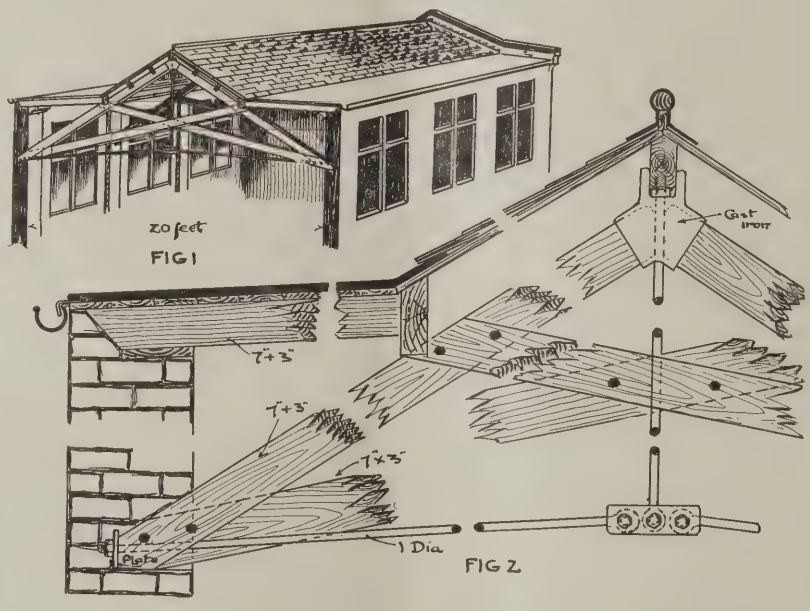
By John Y. Dunlop

THE roofing of buildings is always a subject of special interest to architects and builders owing to their very greatly varying character and the features of construction which are involved. A rather interesting example of truss roof construction is indicated in the illustrations upon this page, yet at the same time it is of simple form.

The principal rafter and the long angle struts are half checked and bolted at the joints. The camber tie-rod is allowed to pass through the center of the joint at the floor of the rafter and is connected at the point by a threaded end and nut which rests on a bearing plate.

The apex of the couple is formed with a cast-iron shoe which receives the principal rafters and king bolt and also forms a rest for the ridge piece.

The roof covering is nailed on to the purlin on the upper part of the roof, while the lower part is formed by fixing ceiling joists which rest on the wall head and intersect with the purlin above the angle strut. Details of the various joints are clearly indicated in Fig. 2 of the sketches. The joints are all very simple in design, with a view to making the roof as inexpensive as possible. The lower portion of the roof is covered with asphalt, which overlaps a lead apron piece and is formed with a skirting on the sloping side of the roof.



The Finished Roof and Some of the Details of Construction

Such roofs should be laid with a slope of not less than 1 in 40 and with a fall toward the gutter.

Artificial asphalt must not be used, as it is very apt to become soft in hot weather and perhaps crack in cold weather or with the slightest inequality in the settlement of the building. The upper portion of the roof is covered with slate, which is clean, non-absorbent and practically unaffected by atmospheric agencies.

This is perhaps an isolated case, but it may prove of interest to American readers.

Registration of Architects in New York State

During the last session of the Legislature an Act was passed on May 3 "to amend the general business law to regulate the practice of architecture" in New York State and hereafter architects doing business within the borders must be registered. A board of five examiners appointed by the Regents of the University is to make rules for the examination and registration of candidates for certificate of qualification. The examiners are architects who have been in active practice in New York State for not less than ten years previous to their appointment.

Any person may apply for examination or certificate of registration who has satisfactorily completed the course in an approved high school or the equivalent thereof, and subsequent thereto satisfactorily completed such courses in mathematics, history and one modern language as are included in the first two years in an approved institution conferring the degree of bachelor of arts. The candidate shall also submit satisfactory evidence of at least five years' practical experience in the office of a reputable architect or architects, commencing after the completion of the high school course.

The Board of Examiners may also accept satisfactory diplomas or certificates from approved institutions covering the course required for examination.

Any person securing a certificate by fraud or misrepresentation or upon proof that the holder of such certificate has been guilty of felony in connection with the practice of architecture may be fined not less than $50 for the first offense and not more than $100, and for a subsequent offense may be fined not less than $200 nor more than $500 or imprisonment for not more than one year, or both in the discretion of the Court.

How Courts Read Building Contracts

Reconciliation of Inconsistent Provisions—Guaranty of Results—Specific Clauses Which Have Been Passed Upon

By A. L. H. Street

INCONSISTENCY between different clauses in building contracts and specifications, and between plans and specifications, has afforded the basis of innumerable legal disputes, and the reports of the appellate courts of the country abound with interesting decisions which have been handed down in such cases.

The cardinal principle by which judges decide disputes of this nature is that effect is to be given, if possible, to the intention of the parties, ascertained from a consideration of all parts of the agreement, and not by interpreting isolated clauses, without regard to their relation to other provisions.

Cases of this kind are illustrated by contracts which include detailed specifications, and general requirements which are susceptible to broad interpretation. For instance, a contract for the erection of a building provided specifically for the materials and method of construction to be adopted in building a foundation wall, but there was a further provision requiring "the whole to be made perfectly water-tight and guaranteed." The United States Circuit Court of Appeals for the Third Circuit decided that this contract did not make the contractors guarantors that the cellar of the building would be water-tight, except as that result might follow from adherence to the plans and specifications. (Bush vs. Jones, 144 Federal Reporter 942.) The court said:

Guaranty of Water-Tight Construction

"It is claimed that the contractors by virtue of the last provision were bound at all hazards to make a water-tight job; that being, in terms, what they had not only undertaken but guaranteed to do. But to this we cannot accede. The guaranty was not absolute but qualified. It extended to their own work only, and only so far as this was involved to the result. The specifications, which were the work of the architect, and for which they could not be expected to assume responsibility, directed how the work should be done, and by this they were controlled. So far as this was calculated to make a water-tight cellar, they unquestionably guaranteed that it would be such. But that is all. It was not as though they were left to their own judgment; that which they were to do, as appears above, being specified in detail. No doubt, if there was any margin of discretion—as, for instance, with regard to the thickness of the mop coat of asphalt on the outside of the foundations; or in the manner of turning and joining the felt therewith 'until perfectly water-tight,' as it was said; or in grouting in 'thoroughly' with asphalt the slot left for the purpose in the divided wall on the west line—it would come within the guaranty to see that these things were effectively done; and if the wall would be water-tight or otherwise, according as they were or were not, they would be correspondingly liable; but outside of this, not. The owner having assumed to say by the specifications what was to be done, the contractors were relieved so far as they complied therewith. They guaranteed, not the sufficiency of this to produce the desired result, but merely the effectiveness of what they themselves did under it."

Contractor to Make Cellar Watertight

But the New York Supreme Court decided, in the case of Early vs. O'Brien, 64 New York Supplement 848, that, under the peculiar wording of the specifications in that case, the contractor was bound to make the cellar of the building watertight. The drawings covering the cellar showed a floor 6 in. thick, but not the proportions of material to be used. The specifications required the floor to be water-tight, and to be warranted by the builder to be such, and expressly provided that the specifications and drawings should co-operate. The court held that the indication in the drawings of the proposed thickness of the floor was controlled by the provision of the specifications, and the contractor was bound to make the cellar water-tight, even if it was necessary to make it thicker than 6 in.

The following statements from the court's decision distinguishes the case from the Bush case cited above:

"Here neither the plans nor the specifications provided in detail for the method by which plaintiff [the builder] was to build this cellar floor. Nothing prevented the plaintiff from making a perfectly water-tight floor in the cellar. The plan showed a cellar floor, and then by the specifications the plaintiff agreed that he would construct such a cellar floor as would be perfectly water-tight, with concrete or asphaltum, to be laid on top with Portland cement. He had his option to build that in any way he pleased of the materials named, so long as he made it a waterproof floor. He undertook to sublet this part of his contract, by which a subcontractor agreed to make the cellar floor in the following manner: Two inches of concrete, one layer of asphalt and pitch, and over that 4 in. or 5 in. of concrete made of Portland cement, sand and gravel. Before it was finished the water burst through and substantially destroyed it. Upon what

principle can it be said that the plaintiff complied with his obligation to construct a water-tight cellar floor by making a sub-contract to provide such a floor which was never completed?"

In the later case of Dwyer vs. City of New York, 79 New York Supplement 17, the same court recognized the rule laid down in the Bush case, by holding that a general clause which required the work to be "performed in a thorough and mechanical manner, and rendered thoroughly water-tight," merely required the contractor to make the work water-tight so far as construction in accordance with the plans would produce such result.

"Where it is provided that the work shall be done in a 'good and workmanlike manner,' or in the 'very best manner,' those words must relate to the things specified to be done," and do not require the contractor to do more than follow the plans and specifications. In announcing this rule in the case of Lancaster vs. Connecticut Mutual Life Ins. Co., 5 Southwestern Reporter, 23, the Missouri Supreme Court decided that a contractor was not responsible for the fall of an old party wall, due to the insertion of a girder in it, the defect inhering in the plan, and not in the manner of doing the work.

Duty to Obtain Building Permit

A clause in a building contract, which involved the construction of a vault extending under a street required the contractor to pay "all city charges" arising in the construction of the building. This provision was held not to require the builder to obtain the necessary permit from the city authorities for the excavation under the street, but merely to pay the cost on it being obtained by the owner. (New York Supreme Court, Dieterlen vs. Powers, 53 New York Supplement, 837.)

A contract for the erection of a county court house and jail provided for use of the "best selected Wilkeson stone." At the time the contract was entered into there was only one quarry open which produced stone of that name, and the county's architects delayed the work by refusing to permit stone from any other quarry to be used. The Washington Supreme Court said, in this case (Long vs. Pierce County, 61 Pacific Reporter, 142):

"The specifications quoted described a quality and grade of stone and not a particular quarry. The contractor, therefore, had the right to procure Wilkeson stone wherever such stone could be found, and if, as a matter of fact, he was damaged by the action of the county in denying him the right so to do, he should be permitted to recover his damages."

When Contract and Specifications Differ

Of course, where a contract, as finally signed, provided that the finishing coat for certain stucco work should be of freshly burned shell lime, and thoroughly washed, the contractor was bound to perform the work in accordance with such provision, although the specifications upon which he made an estimate called for a plain cement exterior coat, without the white finish. (New York Supreme Court, L'Hommedieu vs. Winthrop, 69 New York Supplement, 381.) The court said: "We must assume that the plaintiffs knowingly executed the contract with the specifications thereto annexed, and consequently they were bound to the performance of the work in accordance therewith."

It was decided by the same court in the Dwyer case above cited that the supervising architect on a building was not authorized by the following quoted clauses to change the plans originally adopted: "Such details in a large scale or full size as may be necessary to more fully explain the general drawings will be furnished to the contractor at the proper time during the performance of the work. * * * The various drawings and the specifications are intended to cover a complete and first-class job in every respect. Anything omitted in this specification and shown on the drawings, or vice versa, is to be done by the contractor without extra charge."

A contractor was not entitled to extra compensation for carrying a foundation below the point shown by the drawings, in order to comply with a requirement of the specifications that the wall be constructed down to the natural, undisturbed earth. (Wear Bros. vs. Schmelzer, 92 Missouri Court of Appeals Reports, 314.) But the New York Supreme Court decided in the case of Langley vs. Rouss, 82 New York Supplement, 1082 (a suit by a builder to recover for extra work in shoring, sheath piling, sustaining an adjoining wall) he was entitled to rely upon a provision in the specifications as to the depths of independent foundations upon the property; and if such specifications were incorrect, and their falsity rendered the extra work necessary, the contractor was entitled to recover.

Blue Prints as "Plans"

The Nebraska Supreme Court has held that blue prints furnished by an architect, instead of the original drawings prepared by him, were "plans" within the provision of a contract which required him to furnish the plans for a building, and entitled him to compensation agreed upon. (School District of Lincoln vs. Fiske, 84 Northwestern Reporter, 401.) The court said: "We think the blue prints were 'plans,' as required by the terms of the contract, and that the question whether they were the original drawings and plans, or merely *facsimile* copies of the same is not material, particularly as the contract was one for services to be rendered by plaintiff, rather than for certain plans. Further, the Board accepted these blue prints, and never made any objection to them; nor is any complaint made even now that these plans were in any wise defective or incomplete."

Proper Way to Lay Shingles

One of our extreme Western contemporaries prints the following instructions for laying shingles in order to prolong the life of the roof:

Wet the shingles thoroughly twenty-four hours before laying and use 3d. zinc, copper or galvanized nails. One nail in each shingle 6 in. in width or narrower and two nails in all shingles wider.

For one-third pitch roof lay 4½ in. to the weather.

For one-half pitch roof lay 5 in. to the weather.

On the sides of buildings lay 6 in. to the weather.

Break all joints as far from the edges as possible.

The so-called Scotch pine is the principal tree in the Prussian forests. Its wood is much like that of the western yellow pine of the United States.

Hints on Painting Exterior Woodwork*

A Good Method for Priming the Work —Treatment of Pine, Spruce and Cypress

WHEN we had but one kind of wood to deal with, and that such an easy one as white pine, it was a very simple matter to get good wearing results when painting exterior work. Now it is rather difficult, owing to the fact that we have several kinds of wood to paint, and most of them not at all easy, like white pine; and each wood must have its own specific treatment. Take cypress, for instance, which is largely used now, and it will be found full of a substance like a gum, for when it is sandpapered on the bare wood it gums up the paper. For this wood we must use a primer containing, say, 80 per cent. of turpentine or benzol for thinning purposes; then 20 per cent. of raw oil. For white pine only the raw oil, with a very little japan dryers, was necessary. The oil serves as a binder, while the other solvent serves to cut the gum, and takes the paint into the wood. Over this primer any usual paint may be applied.

A Colonial House at Waltham, Mass., Which Would Serve as an Excellent Basis for Paint Discussion

Treatment of White Pine

For white pine a little turpentine may be added, though it is seldom necessary or even desirable. From 10 to 20 per cent. of turpentine will be enough. In years long gone by, it was thought that raw oil alone, with a little dryers, was the proper thinners, but now many prefer to add a little turpentine too, saying that it assists penetration, and this is true, particularly, in cold weather. The white pine we now have is different, as a rule, from the old time white pine, the latter being evenly soft and clear of sap, knots and streaks, in the best grades, while now it is hard to find a perfectly sound piece in the best grades. Again, in the olden days more lead was used in the priming, for now we think very little lead is best, or even no lead at all. Perhaps a medium course would be best, using as much lead as the wood will absorb, with enough oil to satisfy the wood. Much depends on the way the painter applies the priming coat, for it does better when it is thoroughly rubbed in and out, filling the wood and covering the surface in a uniform manner. For this purpose a round brush is better than a flat or wall brush, and a partly worn brush better than a new brush.

A Good Method of Priming

The following is a good method of priming exterior woodwork: To a gallon of raw linseed oil add one pint of turpentine, mixing both together

*A. Ashmun Kelly in *The Painters' Magazine.*

perfectly. With this mix not more than six pounds of white lead in oil, not less than four pounds, and add for dryers one ounce of powdered litharge. Mix and strain the paint, apply and rub well into the wood across the grain.

The second coat may be made from white lead thinned with a mixture of equal parts of raw oil and turpentine without any dryers. If the temperature of the atmosphere is above 60 degrees make a paint weighing eighteen pounds to the gallon, and if the temperature is below 60 degrees make it sixteen pounds. It will be well to allow both the priming and second coat to stand from one to two weeks to dry.

The Third Coat

Make the third coat as follows: Make up thinners by adding one pound of dry litharge to one gallon of raw oil and put on the fire and boil thirty-five minutes, then let it stand, say, twelve hours. Then pour off the clear oil, leaving any sediment at the bottom. This will give you absolutely the best drying oil possible. A little beeswax added will help; say at the rate of a quarter ounce for each gallon of paint that is to be made, the wax being boiled with the oil. Mix the paint so thin that it will readily run from the stirring paddle. A paint made this way will have a fine gloss, which will wear well, exposed to the weather, and under cover will retain its gloss for several years. The small amount of wax prevents the paint from running or chalking. The method involves a little more work and time than the usual way, but if a first-class job is desired it will well repay the effort made. The method takes rather less lead than the usual way.

Coloring may be added if desired. I believe that much of the chalking of white lead paint might be avoided by adding a very little fat oil to the paint, or by boiling the oil in the manner given, with the addition of a very little wax. At any rate, it is worth trying.

Primer for Basswood

In some places basswood is used for exterior work and the primer for this should be thin with oil and not much dryers added, so that the oil may have the necessary time for penetrating the wood. Redwood should be primed with a mixture similar to that used on cypress, say 30 per cent. of turpentine to 70 per cent. raw oil, and the addition of 10 per cent. of benzol, omitting that much of the turpentine, would be better still. The paint should be rather thin and should be well brushed into the wood, a rule in all cases of priming, however. In using benzol it is well to not add it until ready to use the paint, as it evaporates very readily.

Priming Cypress

Cypress should be primed just as soon as possible after it comes from the painter, for the dampness in the atmosphere will soon cause the fiber of the wood to rise, making it very rough. I have told something about the wood, but add here to it a few more remarks. While it is usually primed with lead and benzol or turpentine or both, yet some prefer to use only a coat of japan dryer, which they claim makes a good surface. Some use benzol primer only. Of course, nobody primes with oil alone, for that will result in the surface showing streaks of dry and undry paint, according to the make-up of the wood. Interior work had better be primed with a coat of very thin white shellac, but with grain alcohol; after which rub off with fine sandpaper and then apply the finishing coats of paint.

Of pine there are thirty-nine varieties, of which we have to paint a very few. It is rather difficult to get paint to stick well over hard or yellow pine, but Southern painters who do a good deal of this sort of painting say that the addition of a little pine tar to the priming coat, say one part of tar to seven parts of raw linseed oil, will cause the paint to stay put. This coat is mixed quite thin and it is rubbed into the wood. Then it is given a long time to dry and harden in, this being important, and the longer the time the better. The next coat of paint is rather thin, made from white lead, and if for a white or pale tint, then add a little black to it, to make the surface a uniform color and make it easy to get a solid finish on the next coat. This, too, is important, as otherwise the darker streaks of the wood will show through. Another important thing is to apply rather light coats all through, for heavy paint is more than likely to shell, peel off or blister.

To prime spruce the first requisite is that it stand exposed to the weather a month at least. This will give the wood time to show up and cracks or shrinking, which can then be remedied in the painting. Rain would do no harm if it should come on the bare wood, rather it would benefit it. When the wood is run through the planer the rollers press down the fibers and these will come up again if the rain gets at them, and so we can head them off, not allowing the rise to occur after the painting is done. Some turpentine or say 5 per cent. of benzol may be added to the priming coat for this wood. Some add a little ater to the primer to raise the grain.

The Hight of Sinks

Some time ago we referred in these columns to the very uncomfortably low hights at which sinks were placed in the kitchens and pantrys of apartment houses and of the results of a test vote showing the hight which was regarded as the most comfortable for the domestic. In connection with this matter the following extracts from the letter of a prominent architect are interesting:

I wonder whether or not your attention has ever been called to the growing dissatisfaction among women, who are the most frequent users of these fixtures, especially of kitchen sinks, with this "standard hight," and to the fact that such architects as are awake to new ideas are more and more specifying that these fixtures be set higher than thirty inches, generally thirty-four or thirty-six inches?

Women have strained their backs for years over low kitchen sinks, but are now rising in protest against a practice which is almost criminal in its indifference to the comfort of those who are forced to lean over when they might just as well stand straight. I presume it will be a generation before all the old sinks have been changed, but I sincerely hope it will not take that length of time to convince all the plumbers and plumbing supply houses that thirty-six inches is better than thirty for the hight of sinks and lavatories, and that washtubs, too, as a rule, have been set too low.

The plans have just been filed for a 16-story store and loft building to replace the well-known Eden Musee in West Twenty-third street, New York City, the estimated cost of which is placed at $400,000. The building will be fireproof throughout and will have a frontage of 75 ft. on Twenty-third street and the same on Twenty-fourth street, the depth of the structure being 197½ ft. The architect of the new building is William H. Birkmire, with offices at 1133 Broadway, New York City.

Cement Testing in Hampton Trade School

Besides building three modern stucco dwellings during the past year and doing many smaller jobs of repairs and alterations, the students in the building trades of the Hampton Institute (Va.) Trade School Department have started a semi-fireproof dormitory, 160 ft. long and four stories high. This building has reinforced concrete foundations, brick walls and Kahn system floors, Floretyle and concrete reinforced with Kahn bars. The first and second floors are in place, also the interior brick walls between second and third floors and the exterior walls from the second to third floors are now going up.

The picture, Fig. 1, shows students in the bricklaying department testing some of the cement to be used in the dormitory in a machine of their own construction. This machine consists of a 2 x 6-in. oak plank pivoted on a ½-in. bolt 1 ft. from the clips and 8 ft. from the load. The load is sand placed in the box with a trowel, as shown.

The dead load was first found by placing a short stick under the 8-ft. mark and on the platform of the scales, thus weighing the resultant at that point. When the specimen broke the box of sand was weighed and the sum of this and the dead load multiplied by eight gave the breaking strength of the cement in pounds per square inch. Day-old specimens of neat cement gave an average of 292 lb.; week-old, 500 lb.

Fig. 1—Cement Testing at Hampton Institute with a Home-Made Machine

The molds shown in the center are of cast iron, machined by the students in the machine department to give exact size. The pattern from which the castings were made was accurately modeled from the standard test shape. The clips to pull the specimens were made by the blacksmith students. The whole cost was about $7.

The primary object is educational. The student learns how cement is tested, the effect of varying proportions of sand on the strength of mortar and the increase of strength with age. Thus he sees the necessity for accurate measuring of mixtures and the reason for leaving forms intact until the cement has had time to attain strength.

Fig. 2—Stucco Home Built Entirely by Hampton Institute Students, the Group Picture Including Those Who Did the Various Parts of the Work

The picture, Fig. 2, shows a stucco house built entirely by students. The foundations were laid in January and it was finished June 1. In the construction of this house advantage was taken of the opportunity afforded to give trade training to the greatest possible number of students by assigning different classes to work on the building as the progress of construction brought work suited to their ability. All the students in the foreground of the picture had some part in the work and represent the following trades: Bricklaying, plastering, carpentry, steamfitting, plumbing, tinsmithing and electrical work.

The Manufacturers' and Builders' Association is the name of an organization just effected at Crookston, Minn., for the purpose of advancing the business interests of the city. An executive committee has been appointed to prepare plans for carrying out the work and for considering other matters vital to the success of the organization. Officers elected for the year are president, H. L. Larson; vice-president, J. J. Padden, and secretary, J. M. Cathcart.

New Officers of the Sheet Metal Contractors Association

At the eleventh annual convention of the National Association of Sheet Metal Contractors held in Denver, June 7-11, the following officers were elected for the ensuing year:

President .....Paul F. Brandstedt of Washington, D. C.
First Vice-Pres.....Julius Gerock of St. Louis, Mo.
Second Vice-Pres.....George Harms of Peoria, Ill.
Third Vice-Pres.....T. P. Walsh of San Antonio, Tex.
Fourth Vice-Pres.....Paul Biersach of Milwaukee, Wis.
Secretary.....Edwin L. Seabrook of Philadelphia, Pa.

Interesting reports of officials and committees were presented, and numerous papers dealing with vital questions were read. By unanimous vote Peoria, Ill., was selected as the place for holding the next convention.

New Schedule of Wages for Boston Carpenters

The new wage and working rules agreement that was recently made with the Master Carpenters Association of Boston has been ratified by the Greater Boston Carpenters District Council and the new schedule will date from July 1 of present year, when the carpenters will be paid 57c. an hour for a 5½-day week. Beginning July 1, 1916, the wage will be increased to 60c., and during June, July and August of that year the five-day week will be in force. Under the old agreement carpenters were paid 55c. an hour for a 5½-day week of 44 hours.

Building in Southern Greece

In discussing the building activity which has developed in southern Greece since the cessation of hostilities in the Balkan Peninsula, Consul Agent Ripley Wilson writes that the typical structure of Kalamata is square and two stories in hight, surmounted by a sloping tiled roof. The stone used for the foundations and walls is brought from quarries located a short distance from the city, several grades being obtainable. A brownish sandstone is used for facing, while soft and inferior pudding stone and a dark blue stone which resembles flint are used as a filler. Sand and gravel are carted from the bed of the river, which divides the town, or from the seashore a mile distant.

As the walls of a house are built up holes running entirely through the wall are left at frequent intervals. Into these holes are wedged short pieces of timber, which are made to support the scaffolding. By this method the builder avoids erecting costly scaffoldings having the ground as a base. When the walls have been plastered and all exterior work completed the supports are removed and the holes filled up.

Formerly heavy wooden beams were used as supports over window openings and doorways for all classes of girder work, but steel imported from Belgium and Germany is now generally employed for such purposes. Roofs are constructed with wooden rafters, struts, ridges, etc.

Split cane is sometimes used instead of ordinary roof board, on which to lay the tile that invariably form the covering.

The interior arrangements are extremely simple. Where lath is needed split cane is again used. The rooms and halls are finished and plastered and the walls sometimes tinted; never papered. Flooring and wainscoting are brought from Russia. There is no gas. Electric wiring may be arranged when the building is completed.

The only plumbing in the majority of houses is a drain which leads into the cesspool. This drain is usually flushed by water carried by hand, though in some of the hotels and in a few of the better residences water is pumped from the well (the latter about 30 ft. deep and 4 ft. in diameter is found in the courtyard of every house) into a tank at the top of the house. Lead piping is used to distribute the water.

The kitchen is the only room in the house containing any equipment. Here four or five fire pots and a stone or cement sink are built into the wall. A hood is usually arranged to catch the gas given off by the fire. Hinges, locks, latches and other articles of hardware are imported from Austria and Germany. A low grade glass used in all buildings is brought from Belgium.

The question of labor is not a serious one. Good men can be hired for from 95 cents to $1.25 a day.

Little or no distinction is made between a mason and a carpenter; good workman knows both of these trades, as far as local conditions require. He begins by putting in foundations and building walls and continues even to fitting windows and laying floors. Women are often seen breaking stone, or carrying sand, or working as helpers; they receive 30 to 50 cents a day.

New York Skyscraper Ideas for London

According to Architect E. Vincent Harris of London, who has recently been visiting this country, New York skyscraper ideas are to be used in the proposed Labor and Commerce building in London, which is to be the tallest office structure in the English capital. The building is to be erected by the British Government on the Thames embankment at a cost of about $3,750,000, and will be 10 stories in hight, which is some 20 ft. in excess of the hight permitted by the London ordinance, but in the present instance the authorities have made an exception. Mr. Harris came to the United States to perfect various details in connection with the structure which will have elevators and various ventilating and heating appliances designed on American lines.

It is stated that more than $500,000 in building permits are held up in the office of the building inspector of Oakland, Cal., because the new building ordinance framed by a commission of three experts has not been approved by the contractors of the city and by the building inspector.

New Publications

Designing, Heating and Ventilating Systems. By Chas. A. Fuller. 224 pages. Size 6 x 9 in. Illustrated with 78 figures and carrying 37 tables. Bound in cloth. Published by the David Williams Company, 231 to 241 West Thirty-ninth street, New York City. Price, $2.

This new work has been developed from a series of evening lectures given by the author before audiences composed of men in all grades of the heating profession, from the steamfitter to the college-trained engineer. The book treats both the theoretical and practical sides of the subject in a very comprehensive manner and at the same time covers the latest practice. The claim is made that with the assistance of this book the interested reader will be able to design any kind of heating or ventilating system, from the simplest dwelling house to that required in hotels, schools and other public buildings. The author places special emphasis upon such points as the transmission of heat from different types of buildings under various temperature differences; determination of radiating surface necessary for any required room temperature; piping systems and pipe sizes for vacuum and gravity steam systems; for gravity and forced hot water systems; heating surface, grate surface and stack capacities for all kinds of boilers under various kinds of service.

Under the topic "Ventilation" different methods are given for determining sizes and proportion of duct systems, for schoolhouses, hotels, theaters, public buildings and factories. Methods of selecting the best type of fans and necessary sizes for any service are given, together with information on estimating, static pressure and frictional resistance of air in ducts; the proportioning and various arrangements of indirect stack for ventilating systems.

The Model T Ford Car. By Victor W. Page. Size 5 x 7 in. 300 pages. Illustrated with over 100 specially made engravings and two large folding plates. Bound in cloth. Published by the Norman W. Henry Publishing Company. Price $1.

There are doubtless many readers of this journal who will be interested in the work above mentioned as it has been written especially for drivers and owners of Ford cars by a recognized automobile engineering authority as well as an expert who has driven and repaired these cars for a number of years. He writes for the average man in a practical way from actual knowledge. All parts of the car in question are described and all repair processes illustrated and explained. Every phase of the subject is treated in a non-technical yet comprehensive manner so that those readers of *The Building Age* who are owners of Ford cars can readily understand how to do their own repair work in case they so desire. The matter is embraced in five chapters, the first of which deals with the various parts of the car and their functions, the next considers the engine and auxiliary groups, a third relates to details of the chassis parts, the fourth is given up to driving and maintenance and the fifth to overhauling and repair mechanism.

Concrete Steel Construction: Part I—Buildings, By Henry T. Eddy and C. A. P. Turner. 438, size pages, 6 x 9 in.; illustrated. Bound in cloth. Published by the authors. Price, $6.

This is a treatise on the different systems of reinforced concrete construction employed in buildings. As might naturally be expected, the greater portion of the work is devoted to a discussion of the mushroom type of construction invented by Mr. Turner. It would appear from a reading of the book that the authors' purpose was to demonstrate the economic superiority of the mushroom type of construction over other standard types. The book is rather difficult reading, and it is not easy for even the professional man, unless he be a specialist on reinforced concrete, to make use of the information contained. Had the book contained more information as to the methods of working out designs and had it been clearer in its arrangement and in its language, it would have been more valuable.

A large share of the authors' efforts is devoted to showing that the accepted methods of designing floors and estimating stresses with the mushroom type of construction are incorrect, and that stresses are much lower and the strength of the structure much greater than the accepted methods of design would indicate. In demonstrating this proposition the authors give a comparative test of Norcross and mushroom slabs which shows the mushroom slab to be about five times as strong as the Norcross slab containing the same amount of material.

The beam strip theory which the authors reject would lead us to expect that the mushroom slab would be at least three times as strong as the Norcross slab, since the mushroom slab is, in this theory, considered to be a series of interlacing continuous beams, while the Norcross slab is a series of simple beams. The circumferential and radial reinforcement which is added in the mushroom system takes care of the increased bending movement over the tops of the columns. This test would seem to indicate that the mushroom system is approximately 60 per cent. stronger than the beam strip theory would indicate.

A New Style of English House

A correspondent of a London building paper who had just moved into a new house (modern Jacobean) made a survey of the premises, accompanied by the builder. Everything seemed to be all right except that the two bottom stairs creaked painfully. The builder was not perturbed and without the slightest sign of facetious intent he said, "Well, sir, you see, we thought a creak would go with this style of house."

In the northwestern section of Baltimore, Md., building operations are in prospect involving the erection of 300 houses.

In Greater New York there are at present 229 theaters, not including moving picture theaters.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in May, 1915, and May, 1914

A SLOW but steady improvement is to be noted in the building situation as reflected in the reports from leading cities for the month of May as contrasted with the previous month and also with the corresponding period a year ago. While in April a practical equilibrium had been established as compared with 1914, the figures covering 122 cities for May show an increase of a trifle more than one per cent. as compared with May last year. Of the cities reporting, 47 show increases and 75 decreases.

As has been the case for several months past, the eastern section of the country shows increased activity as compared with the corresponding period of 1914, and taking the 47 cities from which reports have been received 20 show increases and 27 decreases, with a resultant gain of 13½ per cent. Naturally, much interest attaches to the showing of the larger cities of the section and especially Greater New York, where the Boroughs of Manhattan and the Bronx indicate a marked gain over the month of May last year. In the case of Manhattan, however, it must be remembered that the $14,387,327—the estimated cost of work for which plans were filed—includes the new $10,000,000 court house. In the Bronx considerable apartment house construction has been planned, so that the total is more than three times that for May a year ago.

CITIES OF THE EASTERN STATES

	May, 1915	May, 1914
Albany	$406,580	$569,565
Allentown	189,600	158,850
Altoona	74,712	122,813
Auburn	59,237	31,923
Bayonne	229,288	74,360
Binghamton	95,455	247,409
Beverly, Mass.	44,675	20,360
Boston	8,158,000	6,399,000
Bridgeport	1,119,354	330,770
Brockton	169,911	167,943
Buffalo	1,222,000	1,124,000
East Orange	82,353	163,722
Elizabeth	99,264	199,045
Erie	179,760	201,117
Haverhill	82,300	127,000
Harrisburg	326,025	129,175
Hartford	691,600	430,159
Hoboken	70,980	144,405
Jersey City	637,998	499,427
Lawrence	69,250	33,250
Manchester	135,747	149,805
Newark, N. J.	981,745	809,288
New Bedford	271,300	278,975
New Britain	111,715	214,182
New Haven	318,740	307,200
New York:		
Manhattan	14,378,327	8,656,959
Bronx	4,730,333	1,519,258
Brooklyn	3,645,429	3,852,523
Queens	2,059,464	2,283,736
Richmond	187,800	324,947
Passaic	85,175	181,090
Paterson	123,882	173,471
Philadelphia	2,868,840	6,264,040
Pittsburgh	937,449	1,592,209
Portland, Me.	202,855	181,405
Quincy	658,872	481,909
Reading	28,775	73,650
Rochester	1,001,455	1,343,781
Scranton	141,933	104,161
Schenectady	114,825	262,117
Springfield	932,818	775,616
Syracuse	257,261	318,005
Trenton	231,344	253,454
Troy	35,002	36,185
Utica	158,705	184,795
Wilkes-Barre	149,644	53,978
Worcester	356,860	645,251

From the middle section of the country we have 34 cities reporting, of which 11 show increases and 23 decreases, and a percentage loss of 5.8. Notwithstanding the strike in Chicago, that city shows an increase in estimated cost of construction work as compared with May last year, while in Cleveland there is a remarkable gain due to the taking out of a permit for a $1,000,000 hotel and for 142 apartment houses to cost over $2,500,000. The great increase in the latter is due to the fact that the new building code went into effect June 1.

CITIES OF THE MIDDLE STATES

	May, 1915	May, 1914
Akron	$348,110	$399,650
Cedar Rapids	181,000	321,000
Canton	216,575	131,650
Chicago	7,902,900	6,919,150
Cincinnati	1,102,425	1,181,715
Cleveland	5,151,909	2,201,820
Columbus	911,785	841,000
Davenport	63,000	142,312
Dayton	313,652	435,671
Des Moines	280,880	202,465
Detroit	2,296,990	3,038,925
Duluth	294,148	340,365
East St. Louis	42,805	32,805
Evansville	143,592	168,186
Fort Wayne	157,875	353,375
Grand Rapids	379,996	304,759
Indianapolis	493,930	1,547,787
Kansas City, Mo.	886,215	1,177,915
Kansas City, Kans.	64,575	109,106
Lincoln	288,185	88,932
Milwaukee	1,188,700	1,743,607
Minneapolis	1,755,200	3,160,685
Omaha	889,385	1,146,853
Peoria	231,280	272,015
Saginaw	52,763	82,020
St. Joseph	155,840	88,467
St. Louis	937,676	1,496,603
St. Paul	1,309,656	1,502,094
Sioux City	312,950	196,583
Springfield	86,323	108,375
Superior, Wis.	144,865	362,691
Toledo	553,155	792,159
Topeka	42,935	33,291
Youngstown	336,055	414,864

In the southern section of the country the 24 cities reporting show a loss of 15.3 per cent., there being 11 cities reporting increases and 13 decreases.

CITIES IN THE SOUTHERN STATES

	May, 1915	May, 1914
Atlanta	$337,934	$732,299
Baltimore	612,557	1,032,200
Beaumont	50,566	73,493
Birmingham	192,735	288,998
Charlotte	87,470	49,245
Chattanooga	45,038	82,400
Dallas	278,335	540,100
Jacksonville	282,749	114,171
Huntington	265,910	123,615
Knoxville	89,393	31,120
Louisville	295,150	459,830
Memphis	228,490	304,695
Miami	64,900	53,000
Montgomery	59,472	36,877
Nashville	129,525	203,402
New Orleans	297,681	204,587
Norfolk, Va.	155,578	164,938
Oklahoma	41,935	28,162
Richmond, Va.	396,300	370,034
Savannah	209,795	134,195
Shreveport	61,677	106,800
Tampa	172,750	101,945
Washington	992,607	1,054,404
Wilmington	151,807	203,870

Coming now to the extreme western section of the country the contrast in the two periods under review is decidedly marked, there having been a falling off last month of 35.89 per cent., with 17 cities reporting, of which 5 indicate increases and 11 decreases.

CITIES IN WESTERN STATES

	May, 1915	May, 1914
Berkeley, Cal.	$331,650	$303,950
Colorado Springs	22,865	118,764
Denver	434,270	218,030
Fresno	150,845	59,115
Los Angeles	1,168,983	1,478,703
Oakland	350,035	366,728
Pasadena	115,372	206,417
Portland, Ore.	432,065	643,880
Sacramento	99,514	508,585
San Diego	80,737	312,626
Salt Lake City	279,791	300,914
San Francisco	947,115	1,781,148
San Jose	53,434	78,072
Seattle	353,820	809,405
Spokane	130,471	103,542
Stockton	149,185	556,537
Tacoma	49,998	187,395

Current News of Builders' Exchanges

Meetings of Various Organizations—Elections of Officers—New President of Birmingham Exchange

"Get-Together" Meetings of Cincinnati Exchange

THE Builders' & Traders' Exchange of Cincinnati, Ohio, held a get-together meeting in their quarters on Sixth street, on the evening of May 20. Edward Kruchemeyer, one of the prominent members, entertained the members with a talk on the architecture in Europe, which was illustrated with stereoscopial news. Mr. Kruchemeyer was in Europe when the war began, and his experiences in different countries visited as related were very interesting.

Joseph McDermott was on the entertaining list and told quite a number of humorous Irish stories.

It is the purpose of the Builders' & Traders' Exchange to hold similar meetings once each month so that the members may get better acquainted with each other. The idea originated with the new president, Wm. Miller, Jr., who was one of the speakers.

New Officers of Atlanta Builders' Exchange

The annual meeting of The Builders' Exchange at Atlanta, Ga., was held May 20 and was followed by a banquet at which over 100 were present. The election of officers for the ensuing year resulted in the following choice:

President.....Charles W. Bernhardt
Vice-President.....B. Mifflin Hood
Treasurer.....R. M. Walker

The new Board of Directors was instructed to consider a proposition inviting the National Association of Builders' Exchanges to hold its 1917 convention in the city of Atlanta.

At the banquet an address was made by J. T. Rose, the retiring president and a member of the Board of Control of the National Association of Builders' Exchanges, who in the course of his remarks praised the fairness of state and municipal legislation affecting the building interests. John McIntyre of Albany, N. Y., who is attorney for the American Manufacturers' Association, made some very interesting remarks and laid great stress upon the benefit of having first class materials in building construction.

Annual Meeting of Norfolk Builders' Exchange

The members of the Builders' Exchange of Norfolk, Va., held their annual meeting at the Fairfax Hotel on the evening of Tuesday, June 8, at which time officers and directors were elected to serve for the ensuing fiscal year. The voting resulted as follows:

President.....A. B. Consolvo
First Vice-President.....J. A. Turpin
Second Vice-President..J. Arthur Addenbrock
Third Vice-President.....C. Moran Barry
Treasurer.....Ira Cahoon
Secretary.....George L. Wadsworth

The directors elected were 12 in number. The reports made by the president, the treasurer and the secretary were of a most interesting nature, the secretary stating that the membership of the Exchange now numbered 117 and 14 new members had recently been elected. There were 104 plans posted and 480 building permits reported. The cost of construction work for local projects reported amounted to $2,035,100, of which $70,500 is expected to be contracted for at once, while $323,500 is temporarily held up. Out-of-town work reported amounted to $1,891,433, making a total for all work reported of $3,926,533.

Following the annual meeting a banquet was held at the hotel, at which Past President M. Augustus Williams acted as toastmaster. Thomas W. Shelton spoke on the Mechanics' Lien Law of Virginia, pointing out difficulties encountered by builders and contractors, and urging the immediate necessity of a simpler, more economical and direct law. The present involved law is nearly a century and a quarter old, having first been adopted in 1791 in the State of Maryland upon the petition of Thomas Jefferson and James Madison, and the speaker suggested as a desirable substitute for it that a bond be given by the general contractor which would effectively protect the owner, the material man and the workman. In other words, a bond such as is required by the United States Government for all public contracts. E. L. Myers dwelt in a comprehensive manner on the subject of the Contractor, his responsibilities and his remuneration, and congratulated the Exchange upon the harmony and understanding it has promoted among the builders of the city. Harvey Abrams spoke upon the disastrous results of unorganized business and urged that a closer union be formed among the men connected with architecture and building. E. B. Johnson dwelt upon the necessity of co-operation and the advantages to be derived from organization of contractors, sub-contractors, material dealers and others associated with the building trades.

Officers of Brandon Builders' Exchange

At the annual meeting of The Builders' Exchange of Brandon, Manitoba, officers for the ensuing year were elected as follows:

President.....Charles W. Hall
Vice-president.....Frank C. Lissaman
Treasurer.....A. R. McDiarmid
Secretary.....F. M. Grant

A Board of Directors was also chosen consisting of nine members.

Meeting of the Nashville Builders' Exchange

At a recent meeting of the members of the Builders' Exchange of Nashville, Tenn., a most interesting address was delivered by Frank Herbrick on "Overhead Expenses" or "The Cost of Doing Business." There was a goodly attendance of members who listened with deep interest to what the speaker had to say on the subject indicated, a part of which was as follows:

"To know what constitutes overhead expenses is of vital importance to every contractor, and he must study it with reference to his own business. Estimates are generally made up of many items, which may be summed up under four principal headings of cost of material, labor, doing business or overhead expense, and profit.

"There is no reason why a contractor who is careful and knows how to take off his quantities should not be able to get the cost of material accurately.

"No one can say accurately just how long it will take to do a certain amount of work. So, the item, cost of labor, must be estimated. There are no rules governing this item. Cost of doing business is less understood than any item in the entire list, and nothing is more important. Every contractor, large or small, has certain items of expense, for which he has to provide, and which he cannot possibly sidestep, namely: Salary, rent, light, heat, telephone, drayage, bookkeeping, office expense, insurance, taxes, license, carfare, tools, collections, bad accounts, labor lost, replacing defective work,

postage, stationery, printing, advertising, charity, water, interest on capital invested and depreciation.

"The contractor may not have all of these items, but he positively has some, and they all go to make up his overhead expense or cost of doing business. Every contractor should know what this really means. It is folly for a man to think that he can continue in business without making a charge for it. Any contractor who imagines that he is making money, when he does not correctly know his overhead expense, needs a guardian."

Mr. Herbrick by way of illustration showed that a contractor with a gross business of $60,000 had an overhead expense of $9,000, or 15 per cent., and explained his profits from different standpoints, including and not including overhead expense. Mr. Herbrick went into another technical illustration of the main phase of cost of business, giving a correct basis on which to figure profits.

"People differ as to what is a proper profit," said Mr. Herbrick. "However, I dare say that all will agree that 10 per cent. on total amount of business is little enough. This, of course, can be shaded if the total volume of business goes into six figures. It is well to remember that we have poor years as well as good years. Don't forget your overhead expense when you figure your next contract."

Annual Election of Baltimore Exchange

At the annual meeting of the Builders' Exchange of Baltimore, Md., held on the afternoon of June 8 in the Assembly Hall at 55 East Lexington street, the balloting for officers for the ensuing year was most spirited. The results of the voting were not announced until evening, when it was found that the following were elected:

President.....Herbert J. West
Vice-Presidents.....A. J. Dietrick
C. Morgan Marshall
John Trainor
Secretary.....I. H. Scates
Treasurer.....S. Frank Bennett

There were also four directors elected. This was the 27th annual meeting and more than 150 members were present. The greater portion of the evening was devoted to a consideration of the revised by-laws and constitution of the Exchange.

New Officers of Washington Builders' Exchange

At the annual meeting of The Builders' & Manufacturers' Exchange of Washington, D. C., retiring president E. R. S. Embrey referred in his report to the fact that despite the great depression in business, the Exchange has grown in membership and activities during the past year. The officers elected for the ensuing year were:

President.....James L. Parsons
First Vice-President.....Andrew Murray
Second Vice-President.....E. S. Kennedy
Third Vice-President.....P. R. Pullman
Treasurer.....James L. Marshall
Secretary.....Charles E. Welsh

At the weekly luncheon of the Exchange held the latter part of May at the Continental Hotel, W. K. King, general counsel for the National Association of Builders' Exchanges addressed those present on the new builders' contract documents which have been the subject of so many conferences and so much discussion and which were recently approved by the National Association and the American Institute of Architects. There were about 50 members of the Washington Exchange present and much interest was manifested in what Mr. King had to say.

Annual Outing of Twin-City Exchanges

The members and friends of The Builders' Exchanges in Minneapolis and St. Paul will hold the annual outing this year at Spring Park, Lake Minnetouka on Saturday, June 26. An interesting programme of field events has been prepared, prominent among them being a game of baseball between nines made up from the St. Paul and Minneapolis Exchanges.

New Officers of Los Angeles Exchange

At the recent annual meeting of The Builders' Exchange of Los Angelses, Cal., held at the headquarters in the Stimson Block, the following officers were chosen for the ensuing year:

President.....John H. Bean
First Vice-president.....P. J. Bolin
Second Vice-president.....S. L. Weaver
Third Vice-President.....M. A. Berne
Treasurer.....John Griffin

There were also 5 directors chosen. The Exchange now has a membership of 250 which includes a large percentage of the general contractors and firms dealing in building materials in the city. It is interesting to note that at the election out of a total of 96 votes cast Mr. Bean received 93.

Broader Field for the Dallas Exchange

The management of The Builders' Exchange at Dallas, Tex. has inaugurated a campaign looking to a much broader field for the exercise of the functions of the organization than has been the case heretofore. The constitution and by-laws have been so amended that now business men and concerns whose interests lie with the promotion and successful accomplishment of construction and building operations in the city as well as the state of Texas at large, are eligible to membership. The object of the organization as stated is not only to be of service to the general contractor but to the sub-contractor, the materialman, and the supplyman, while its headquarters will constitute a general clearing house for all matters of import to the building and allied industries.

The 5th floor of the Scollard Building has recently been secured as headquarters and has been fitted up to meet the requirements of the organization. We understand that it is also the intention of The Exchange in order to put it on a basis of effectiveness with similar organizations in other cities to secure the services of a paid secretary.

The officers recently elected for the ensuing year are:

President.....Frank Hanson
Vice-president.....Harry J. Curtis
Treasurer.....L. R. Wright
Secretary.....Pat Beggs
Sergeant.....F. B. Davis

The plan of holding regular monthly meetings will continue to be an important feature.

New Canadian Builders' Exchanges

As a result of active work by some of the members of the Toronto organization a Builders' Exchange is to be formed at Guelph, Canada, and efforts are also being made looking to the organization of a Builders' Exchange at Sarnia, Ont. In the latter case a committee has been appointed to draw up by-laws and make such other arrangements as may be necessary for properly carrying out the purpose of the movement.

Metal Ceilings in Rio de Janeiro

Before the present business depression, which has temporarily checked the extensive building operations that were under way in Rio de Janeiro, there was apparent a growing demand for metal ceilings, writes United States Vice Consul Richard P. Momsen. Two of the largest moving-picture theaters, the Cine Palais and the Parisiense, have metal ceilings, as well as some of the more modern restaurants. Several local factories making other metal ware now offer to stamp metal for ceilings and interior walls, the sheet metal being obtained from the United States and England.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Carborundum Exhibit at Panama-Pacific Exposition

Among the many attractive and interesting exhibits in the Palace of Machinery at the Panama-Pacific Exposition now being held in the city of San Francisco that of the Carborundum Company, Niagara Falls, N. Y., is worthy of more than passing notice. The plan in brief is to show a wide variety of materials and products in their crude or unfinished state as well as after they have been cut, ground or finished with Carborundum products. The result has been a wonderful collection gathered from manufacturing plants not only in this country but from South America, England, India, New Zealand, Australia and other foreign parts. The collection embraces materials and products ranging from tooth picks to flooring, from flour mill rolls to needles, from steel shafts to watch dials, from beautiful semi-precious stones to shrapnel shells and malleable castings. There are also samples of marble, onyx and granite, pearl, cut and engraved glass, boots, shoes, etc. In the grinding, shaping and finishing of every piece shown Carborundum products have played an important part and in each case the particular Carborundum product that did the work is exhibited. Some idea of the appearance of the exhibit of the company may be gathered from an inspection of Fig. 1 which is a direct reproduction from a photograph taken for our purpose. In this is also a view of the Carborundum fountain 12 ft. high and made of irregular masses of iridescent diamond-like Carborundum crystals over which real water plays in a way to produce an effect that is strikingly beautiful. The coping of the marble basin into which the water falls was molded with Carborundum wheels. To attractively display the hundreds of products a space of about 1400 sq. ft. was necessary. The exhibit is railed off with heavy silk cords of green strung from newel posts. The back of the exhibit is a classic colonnade supported by fluted columns finished in old ivory enamel.

Fig. 1—General View of the Exhibit of the Carborundum Co. at the Panama-Pacific Exposition in San Francisco

Catalogue of "Creo-Dipt" Stained Shingles

There has just been issued from the press an exceedingly attractive catalogue relating to "Creo-Dipt" stained shingles manufactured by the Standard Stained Shingle Company, 1030 Oliver street, North Tonawanda, N. Y., and with Western warehouse at Chicago, Ill. There are 17 grades of cedar shingles, 16 in., 18 in., and 24 in., and 30 different color shades, thus adapting the product of the company to meet practically every conceivable requirement. The company points out that "Creo-Dipt" stained shingles are made from the very

best selected red cedar sawed from live timber and not from stumpage or refuse left in the forest. The shingles are all parallel widths and are claimed to be free from sap. The colors used in the creosoting and staining of the shingles are said to be the strongest and most expensive pigments which are ground in pure linseed oil in the company's own mills and then suspended in a vehicle of pure creosote oil, which is especially refined so that it will properly carry the colors without injuring them, and at the same time will thoroughly preserve the wood. The process of creosoting and coloring causes each shingle to be treated separately so that the colors are uniform and permanent. The catalogue in question is profusely illustrated with halftone engravings of attractive dwellings, the roofs of which are covered with "Creo-Dipt" stained shingles. The houses shown are selected from practically every section of the country, thus showing the wide popularity of the company's product. In applying the shingles the company recommends the use of good zinc coated nails, as ordinary wire nails will quickly rust. The company claims that its shingles with non-rust nails will last a lifetime.

Richards Shingling Bracket

One of the more recent candidates for popular favor in the way of a shingling bracket and one which will be found of special interest to the practical carpenter is the device illustrated in general view in Fig. 2 of the engravings and which has been placed upon the market by the Richards Shingling Bracket Company, Toledo, Iowa. The device is intended for holding an entire bunch of shingles upon a pitch roof while the work of shingling is in progress. It is referred to as a great time-saver as the device can be moved from point to point upon a roof of any pitch with but little effort, thus avoiding the loss of time and annoyance incident to the moving of loose shingles. In this device the entire bunch of shingles is placed in the bracket before the band is cut and they remain there until all have been used. At no time is the shingler annoyed by loose and slipping shingles, neither is he in danger of being knocked from the roof as a result of an entire bunch slipping. When the shingler reaches the ridge the bracket may be turned so as to be supported on the other side of the roof in a position accessible to the shingler. The bracket is constructed of steel, yet is light and the finish is of black Japan. A special feature of the Richards shingling bracket is the weight bar which is designed to rest upon the shingles after the band has been cut and prevent them from being blown away by strong winds. Every carpenter knows

Fig. 2—The Richards Shingling Bracket

the difficulty of making any great progress in shingling under the old method when a high wind prevails, but by the use of this shingling bracket the claim is made that the shingles are always exactly where they are wanted and may be easily removed as required. The weight bar being readily removable can be easily detached from the bracket when not required.

Novo Portable Saw Rig

One of the latest candidates for popular favor in the way of a portable saw rig is the "Novo" illustrated in general view in Fig. 3 of the engravings and manufactured by the Novo Engine Company, Lansing, Mich. The picture shows what is known as the No. 4 rig which is provided with a 4-h.p. engine and which is built to stand hard, continuous service. The frame is made of 3½ x 3½ in. seasoned hardwood strongly bolted together, thus insuring great strength, rigidity and durability. The top, which is 54 x 30 in. area, is made of accurately planed iron. It is strongly hinged to the

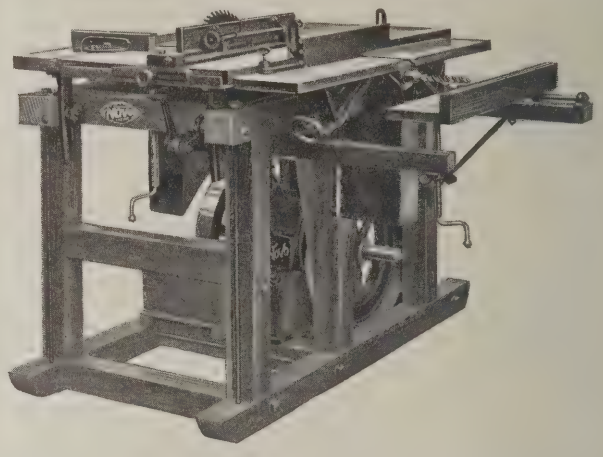


Fig. 3—General View of "Novo" Portable Saw Rig

rear of the frame and is easily raised and lowered by means of a hand screw, being held firmly in any position by clamps on each side. The jointer or planer is entirely separate from the top of the machine, has a steel cutter head fitted with two 6-in. knives and is slotted on two sides to receive matcher bits or molding cutters for working a large variety of shapes. The arbor is of steel 1-5/16-in. in diameter and has self-oiling and Babbitted boxes strongly yoked together. The boring table is adjustable, the bits having ½-in. shanks and are carried in the end of the saw arbor, being securely held by a hollow safety set screw. The cut-off gauge can be set to cut squares, miters or any angle desired. The ripping gauge is adjustable and has a tilting fence for bevel sawing. The saw rig is of such a nature that three men can do three different kinds of work on it at the same time without interfering one with the other. The special governing system with which the Novo engine is equipped, is said to bring about a great saving in fuel. The Novo is a well-balanced engine of little vibration, is simple in construction and is referred to as absolutely reliable and dependable in every detail. The outfit occupies a floor space 54-in. square and with the 4-h.p. engine weighs about 1200 lb.

The Hagar Portland Cement Company

A charter was issued on June 9 under the laws of Maine incorporating the cement company, projected by Edward M. Hagar, who lately resigned the presidency of the Universal Portland Cement Company for the purpose of organizing a concern to acquire and operate a chain of cement plants to cover the territory between the Atlantic seaboard and the Rocky Mountains. It is called Hagar Portland Cement Company and its capital stock is $20,000,000, all common.

Mr. Hagar announces the election and appointment of the following list of officers and assistants:

President.....Edward M. Hagar
Vice-president.....Morris Metcalf
Vice-president and Sales Manager..B. H. Rader
Secretary and in Charge of Cost Accounting, Gordon Wilson
Assistant to President in Operation and Construction.....Leonard Wesson
Assistant to President in Extension Work, J. P. Beck
Engineer of Economies.....C. W. Lyon
Superintendent of Construction, J. H. Barbazette

Pending the election of a permanent treasurer, the office will be filled by Gordon Wilson.

(*Continued on page* 78)

A Complete House Or Any Part Of A House At WHOLESALE Prices

YOU are paying higher prices for your materials than you have to, Mr. Builder! Get our **"mill-direct-to-consumer" prices** on your needs. Save money! You can buy a whole house—or any part of a house—at **wholesale**—from us Everything for building! We ship to you **anywhere**—no matter where you live! Over **100,000 customers**—some in every State. Over **10,000 contractors, carpenters** and **builders** deal **regularly** with us. All bought by mail. **Three strong banks also vouch for us.** Everything sold under legal-binding guarantee of **safe, prompt delivery, highest quality and satisfaction or money back.** Study these sample prices. Order what you want from this advertisement. Be sure you send for our **5000 Bargain Catalog.**

MASTERPIECE COLONNADE

Ideal for the living room—dining room or living room hallway arch. Creates one spacious room. The inside of each pedestal is fitted with adjustable shelves. Can be faced into living room and used for books, or into dining room and used for cut glass or chinaware. Craftsman hardware in either dull brass or antique copper. Glazed with leaded crystal glass.

In Yellow Pine - **$25**
In Plain Red Oak - **27**

FRONT DOOR LOCK SET

Consists of 1 mortise lock 5¼ x 3½ inches. Japanned cast iron case, steel front and strike. Outside escutcheons, 10 x 2¾ inches; 1 small steel inside escutcheon, 7 x 2¼ in. Two wrought steel knobs, 2¼ inch. 2 German silver keys. No EH188. Dull brass finish, steel

Price per set, with screws - **$2.50**

BUILT-IN CHINA BUFFET

Note beautiful effect of wooden bars in China Buffet doors. Also the fine, bevel plate selected mirror and Colonial butts on the lower doors. Lots of drawer room. Built in two sections for easy installation. Drawers and doors all fitted. Hardware included in price, but not outside casing or trim around openings as this is to match regular trim in room in which China Buffet is installed. Price in Red Oak, including glazing, hardware and selected bevel mirror **$41.00**

BUILT-UP PORCH COLUMNS

Manufactured from good select Cypress, the everlasting wood. Put together with our patent lock joint. An example of the thoroughness of G.-V. T. construction. No. E-320. Square Column 8x8 in. sq., 8 ft. high - **$2.07**

FINE INTERIOR VARNISH

A very high-grade Fine Interior Varnish, recommended for all kinds of Interior Finishing (except floors) and finest grades of work. Is pale in color, easy working and free flowing and good body.

Gallons **$1.75** 5 Gallons **$8.00**

FLOOR VARNISH "Quality" Brand

A perfect, durable Floor Varnish in every way, and made to walk on. Is tough and elastic, will not mar, white, dries hard over night; can be rubbed.

Gallons **$1.75** 5 Gallons **$8.00**

"Quality" House Paints

"Quality" Brand House Paint contains just the right proportion of each ingredient necessary to make the right kind of house paint. No paint offered you can excel the paint you buy of Gordon-Van Tine Company. "Quality" is our watchword every minute in the day.

The low price quoted on our Paints is due to the difference in selling plans. Other Paints come to you through the local dealer and, besides his profits, is added the profits of the middleman, jobber and manufacturer.

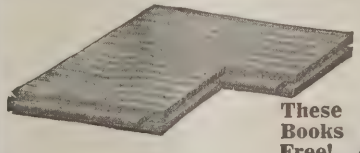
25 Gallon ½ Barrels, per Gallon **$1.10**
5 Gallon Kits, per Gallon **$1.17**
1 Gallon Cans, per Can **$1.22**
1-2 Gallon Cans, per Can **65c**
1 Quart Cans, per Can **35c**

FRONT DOORS

Hundreds of special designs. See Catalog. Illustration shows our "Craftsman D"—Oak—a beauty—3 feet by 7 feet **$10.25**
2 feet 8 inches by 6 feet 8 inches..... **$9.95**

THIN OAK FLOORING

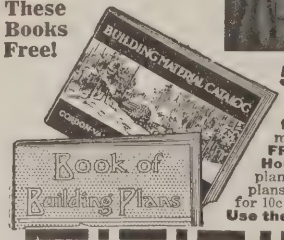
An innovation! A special thin Oak Flooring, ⅝ x 1½ in., to be laid over old floors or cheap pine boards. Warm, noise-proof. Trifling cost. Fine for old or new houses. Price per 100 lineal feet, random lengths - **80c**



Fancy Windows

We carry a large stock of fancy windows in newest designs. For complete list with illustrations, see pages 37 to 46, inclusive, in our Big Catalog.

These Books Free!



5000 BARGAINS

in our big **156 page, illustrated Catalog. Everything for building!** A price-maker—money-saver! **Send Coupon! FREE!** Also send for **"Quality" House Plan Book** of over 150 plans. Photos, color-schemes, floor-plans. Guaranteed Right Costs! Free for 10c to cover packing and postage. **Use the Coupon.**

GORDON-VAN TINE COMPANY,
770 Federal St., Davenport, Iowa.

Gentlemen:—Please send the books checked below:
In sending for Plan Book, enclose 10 cents for postage and mailing. You will receive the books by return mail.

☐ Building Material {Lumber, Millwork, Hardware, Paints, etc.} ☐ Plan Book

Write in margin if necessary..

Name.....

Address.....

Occupation.....

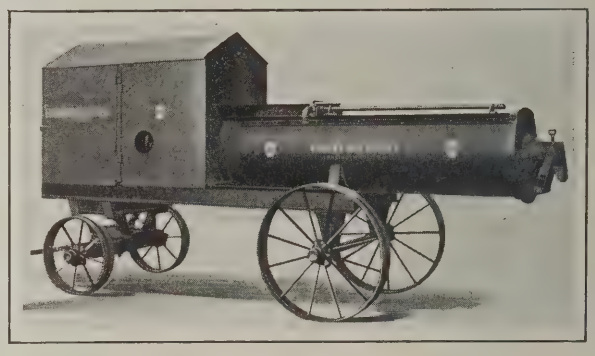
GORDON-VAN TINE CO.

770 Federal Street **Davenport, Iowa**

The general offices of the company are located at 208 South LaSalle Street, Chicago.

Eureka Mortar and Plaster Mixer

The "man with the hoe" long a familiar figure in connection with building work, especially in its early stages, is giving place to the mixing of mortar by machinery, and in Fig. 4 of the accompanying illustrations we show a mortar and plaster mixer which has been placed upon the market by the Eureka Machine Company, 113 Handy street, Lansing, Mich. The machine is mounted upon a truck and the frame is constructed of channel steel. The wheels are also of steel with grooved tires, and the claim is made that the mixer can readily be hauled over rough roads or cobblestone pavements with perfect safety. The cylindrical drum is 6 ft. long, 18 in. in diameter and is rolled out of 10-gauge steel plate. It is open at the top, and at the front end of the drum is a cast hopper into which the material is shoveled, the shoveling hight being about 45 in. The arrangement of the removable mixing blades which make 40 revolutions a minute as indicated in Fig. 5 of the engravings, which show the internal mechanism of the mixer. The discharge door is of exclusive Eureka design and locks itself securely in either an open or shut position as desired by simply raising or lowering the handle. The power is transmitted by a 5-in. leather waterproof belt, while an automatic idler engaging the belt allows the mixer to be stopped or started instantly from either side. The engine and gearing are protected by a substantial steel housing having one door in front and two doors at either side. The power is furnished by a "New-Way" standard 4½-h.p. gasoline engine. The manufacturers state that one man operating the mixer can produce as much motor as three or more working by hand, and in addition to the saving in labor the machine actually produces a stronger mixture with considerably less lime. The point is made that the mixture comes from the machine free from lumps or pockets of sand and lime and in proper condition for the masons without the trouble of retempering, so that in actual practise the bricklayer can lay many more brick per day where the machine is used than without it.



Eureka Mortar and Plaster Mixer—Fig. 4—General View of the Machine

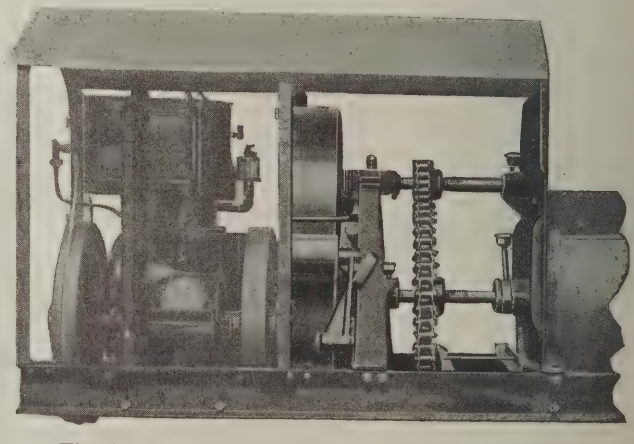


Fig. 5—Interior View Showing Operating Mechanism

(*Continued on page* 80)

Sheet and Tin Plate Exhibit at Panama Exposition

American Sheet & Tin Plate Company, Frick Building, Pittsburgh, Pa., has been distributing invitations to visit its exhibit in the Palace of Mines and Metallurgy at the Panama-Pacific International Exposition now being held in San Francisco, Cal. Accompanying the invitation is a floor plan showing just where to find the exhibits, which it may be stated occupy the entire south end of the building in question. In addition to the manufactured articles the entire range of operations of the steel industry from the ore to the finished products is shown by means of models, specimens, photographs and charts arranged in consecutive order. They are further illustrated by a complete series of motion picture films. Representatives of the company are in attendance to personally conduct visitors through the exhibits and explain all that there is to be seen. A comprehensive view of the exhibit can also be obtained from the "Roof Garden" which has been provided for convenience of visitors. Not the least interesting is the "Apollo Farm" model, which illustrates the application of galvanized sheet steel to all classes of farm buildings, etc. One section of the exhibit is devoted to "Keystone," a copper alloy steel possessing great corrosion resisting qualities.

Newell Automatic Band Saw Guide

An attractive booklet relating to the Newell automatic bandsaw guide, and of a size convenient to carry in the pocket has just been sent out by the Automatic Saw-Guide & Machine Company, 406 Empire Building, Pittsburgh, Pa., and with general office and works at Irwin, Pa. This band saw guide is constructed on unique principles and is of such a nature, it is claimed, as to greatly reduce the breakage of band saws, while improving the accuracy of the work. The guide is the result of a most careful development based on numerous and severe tests extending over a period of several years. The company points out that the Newell guide automatically counteracts the tendency of the saw to deviate from its true course and instead of being rigid as in the case of other guides, has a lateral swinging movement which allows the saw to swing freely at the back, but which holds the teeth practically stationary. The claim is made that the guide renders the small band saw practical for ripping or re-saw purposes, which is one of its distinctive features.

The Saw in History

There has just been issued from the press by Henry Disston & Sons, Inc., Philadelphia, Pa., a little work of 64 pages, entitled "The Saw in History." It handles in a comprehensive way the development of the saw from its prehistoric origin to its present highly perfected form. Within the covers of the little work practically every type of saw is covered, the descriptions of the more modern developments being especially complete. The illustrations are numerous and the matter represents the results of a vast amount of research work among libraries, private records, original manuscripts, etc., so that "The Saw in History" may be claimed to be the first complete chronological record of the development of this tool. The facts are presented in an interesting, readable manner, and will prove of special value to those in intimate touch with the present-day application of this universal tool. We understand that a copy may be had free of cost by writing to the address above given.

Catalogue of Mortising and Wood-Boring Tools

A very neat and attractive catalogue of 64 pages, which cancels all previous editions, has just been issued from the press by the Forest City Bit & Tool Company, 1206 Kishwaukee street, Rockford, Ill. It is known as "Catalogue M" and illustrates and describes extensive lines of high-grade hollow mortising and wood-boring tools turned out by this concern. In con-

(*Continued on page 82*)

nection with the illustration is to be found interesting and valuable descriptive data; also price lists, sizes, etc. Those readers of *The Building Age* who are interested in mortising and boring tools can obtain a copy of the catalogue in question by writing to the company as above.

New Connection for A. S. Hill, the Saw Mill Machinery Expert

The trade will be interested in learning that the American Saw Mill Machinery Company, Hackettstown, N. J., has secured the services of Anthony S. Hill, well known as a saw mill machinery expert and for many years at the head of William E. Hill & Co., Kalamazoo, Mich., widely known as makers of heavy saw mill machinery, steam niggars and other specialties. In the new connection Mr. Hill will be manager of the heavy saw mill department. We understand it is the intention of the American Saw Mill Machinery Company to greatly amplify its line of heavy duty machinery under the supervision, designs and patents of Mr. Hill. It is also planned to bring out an improved line of steam specialties in connection with which the "Hill" name has been so intimately associated. In order to handle its increased lines with maximum efficiency the company is building extensive additions to its plant.

Crimp Edge Eaves Trough

In order to meet a constantly growing demand for its product the Milwaukee Corrugating Company, Milwaukee, Wis., has perfected machinery whereby it can furnish its crimp edge eaves trough in 6-in. size and in 10 and 12-ft. lengths, this being in addition to its well known 3½-in., 4-in. and 5-in. trough in the lengths named. This trough illustrated in Fig 6 is made from galvanized sheets, either slip or lap joint, and has the advantage of being rigid, perfectly formed and exceptionally strong. The construction is such as to prevent the hangers from slipping. The company claims that the 12-ft. lengths made without a cross seam are as easy to handle as the shorter pieces and at the same time more profitable, as they effect an appreciable saving in placing in position. The company is getting out a new general catalogue which we understand will be the handsomest and most complete that it has ever issued. It will contain in addition to illustrated descriptions of its line of "Milcor" products some valuable information on figuring roofing and siding as well as the method of applying it together with other general information gained by years of practical experience in the sheet metal line.

Fig. 6—Crimp Edge Eaves Trough

Interior Trim of Arkansas Soft Pine

We have before us a copy of an exceedingly attractive pamphlet of 20 pages within the covers of which are set forth some of the many advantages of Arkansas soft pine for interior trim. The matter is carefully illustrated with half-tone views showing the use of the material in question for interior trim, and there is a central double page picture of an interior finished in colors to represent as nearly as possible the actual appearance of the finished wood. Another feature of this attractive little work is a series of panels or samples of the wood showing the effects which may be produced through different treatment of it. The panels are finished in silver gray, flemish, moss green, weathered, natural, mission, cherry and golden, the printing being in colors to represent these different finishes. Accompanying the pamphlet is another entitled "Uses of Arkansas Soft Pine for Building," and among the information given is a list of producers of the material. The pamphlets are sent out by the Arkansas Soft Pine Bureau, 608 South Dearborn street, Chicago, Ill.

(*Continued on page* 84)

Use of Silica-Graphite Paint

A practice that is fast gaining adoption in progres sive power plants is the use of paint for the inner surface of steam boiler drums. The paint is said to afford protection against pitting. Silica-graphite paint is used for this purpose and for a number of years the manufacturers of this paint have coated the steam drums of five B. & W. boilers developing 1800 H. P. and as a result the drums are in almost perfect condition. Another instance in a plant equipped with B. & W. boilers developing 8400 H. P. the interiors of the drums were scalded, painted both above and below the water line and allowed 48 hours to thoroughly dry. This treatment was repeated every ten months and not only did it stop pitting but where it had previously taken six men seven days to clean the drums of one boiler, two men now clean them in a day. This latter experience is quoted from a letter of the chief engineer of the New York Life Insurance Company, in the April issue of *Graphite*, the house organ of the Joseph Dixon Crucible Company.

Cabot's Deafening Quilt in Schoolhouse Construction

There has just been issued from the press an attractive pamphlet of 24 pages setting forth the merits of Cabot's deafening "Quilt" and its special advantages for sound-proofing purposes. The little publication before us is devoted more particularly to the use of the "Quilt" in connection with schoolhouse construction, the opening pages containing some interesting information on schoolhouse acoustics. Reference is made to a number of sound-deadening tests in connection with music rooms and studios and sectional drawings are given showing the manner in which the deafening "Quilt" is utilized in the walls and floors of a building. Not the least interesting feature is found in the testimonials which furnish very conclusive and striking proof of the fire-resisting qualities of Quilt. These testimonials refer only to the Standard Quilt, paper covered, and not to the Asbestos Quilt. The little work is profusely illustrated with halftone engravings of schoolhouses in various parts of the country which have been sound-proofed by the use of the deafening "Quilt" in question which is made by Samuel Cabot, Inc., Boston, Mass., and with New York office at 1133 Broadway.

New Factory For Kaustine Company

In order to meet the rapidly increasing demands of its business the Kaustine Company, Inc., has just constructed at Perry, N. Y., a one-story brick factory building with yellow pine columns, girders and beams, and covering an area 60 x 175 ft. The length of the building is divided into 11 bays and the width into 4 bays, each bay having a window 10 ft. 6 in. wide by 8 ft. high; also a ventilating section. The sash are of steel.

The floor is constructed of cinder-concrete with cement finish. The floor space is divided into five rooms which will be used as paint shop, tank shop, tin shop, toilet and wash rooms and storage. The partitions are constructed of tile and the roof is 5-ply laid in accordance with Barrett Mfg. Co.'s specifications.

The special machinery consists of a 22-h.p. arc-welding machine and rolls and shears which will be used in the construction of the tanks. The tin shop and paint shop have the regular machinery in these departments. The company has also purchased a special machine for use in finishing covers and seats of its closets systems.

This addition to the company's plant will not only increase its capacity 100 per cent. but will also enable it to manufacture a large number of parts which heretofore had to be purchased from other makers. The railroad facilities have been greatly improved through the construction of a private switch by the Buffalo, Rochester & Pittsburgh Railway Company. This switch is about ⅛ of a mile long and required a large amount of cutting and filling in its construction.

Coulson's Ventilating System for Store Fronts

A four-page folder illustrated in colors and showing various details of the Coulson ventilating system for store fronts is being distributed by J. W. Coulson & Co.,

(*Continued on page* 86)

107 West Spring Street, Columbus, O. Special attention is directed to the construction of the sill of the show window and to the ventilating openings which also serve as drainage pipes. The metal covering can be had in polished copper, polished brass, nickel plated, oxidized, copper plated and gun metal, but the manufacturer recommends the polished finishes in preference to the plated ones. An important feature in connection with this form of store front construction is found in the 1915 full size details which are sent out in blue print form and clearly show the patent store front construction. The company calls attention to the great reduction in price which has recently been made in connection with this work.

The Buffalo Efficiency Woodworker

What may be regarded as a veritable portable planing mill, possessing as it does nine woodworking attachments, has just been placed upon the market by the Buffalo Woodworker & Machine Company, Inc., 918 Mutual Life Building, Buffalo, N. Y. It is in fact a portable cut-off saw for use in connection with getting out the "forms" and the framing for concrete work.

Fig. 7—The Buffalo Efficiency Woodworker

It will be found of special interest and value to the carpenter and the builder who gives the slightest attention to concrete work, and at the present day every up-to-date contractor is constantly called upon to handle jobs involving work of this kind. The portable machine is of substantial construction, having a frame of iron and is therefore rigid and durable. It is furnished with either 5-h.p. air-cooled engine, electric motor or countershaft. A general view of the machine is presented in Fig. 7 of the illustrations.

Fireproof Enclosure for Stairways

A feature of construction in many of the new buildings erected at the present day is the enclosing of the stairways and elevator shafts in fire-resisting construction. One form of this stair construction consists of cement plaster applied on metal lath secured to steel studding. Each stud is built up by using two small channel irons and spacing them about 4 in. apart so as to provide a hollow wall. The channels are tied together by means of U-shape pieces. There is one horizontal brace midway between the floors. This brace consists of a small channel securely wired to each of the vertical studs. Kno-burn metal lath is then wired to the uprights and the partition is ready for applying the cement plaster.

New Catalogue of Lansing Company

A very attractive catalogue of 194 pages and of a size convenient for reference as well as to carry in the pocket, has just been issued by the Lansing Company, Lansing, Mich. It is known as "No. 11" and illustrates and describes the varied lines of concrete mixers placed upon the market by this enterprising concern as well as the extensive assortment of contractors' equipment consisting of tampers, hand carts, wheelbarrows, trucks in great variety, scrapers, coal chutes, builders' hoists, etc., etc. The statement is made that the Lansing plant covers 15 acres and in order to take care of its southern trade the company has erected a factory at Parkin, Ark., and has purchased there more than 16,000 acres of timbered land. Attention is called to the fact that the list prices given in the catalogue supersede those in former

(*Continued on page* 88)

editions. The matter is arranged with careful attention to details and reference is greatly facilitated by a comprehensive index which occupies the last page of the little work. Another convenience is a telegraphic code.

Economy Drawing Tables

In a profusely illustrated catalog of 48 pages, sent out by the Economy Drawing Table Company, Toledo, Ohio, there is shown an extensive variety of sectional file cases, drawing tables, and specialties in this line, particularly adapted to meet the requirements of architects, building contractors, technical schools, engineers, artists, etc. The illustrations are for the most part half-tone engravings and show the goods as they actually appear in their completed state. Special attention is directed to the hold-down wires for keeping drawings and papers in drawers from catching when pulling out the latter. They are claimed to increase the capacity of a drawer 30 to 40 per cent., are easily attached and are applicable to any size of drawer 10 in. wide or over. Two wires are required for each drawer 20 in. wide or over and the point is made that its shape is such that it will not catch on the drawer when it is being pulled out or pushed in. Another feature to which special attention is directed is a spring cover which extends the full length of the drawer and 6 in. back from the front, thus protecting the entire front edge of all drawings and leaving no space where they can work up, cut or tear as the drawer is manipulated. It is especially efficient when the drawers are overcrowded and when drawings become crumpled and when frequent reference to them is necessary. The hinge is of special design, which allows the cover to be turned back horizontal and flush with the top of the drawer.

An Electric Screw Driver

We present in Fig. 8 of the cuts a general view of a late type of electric screw driver that is being marketed by the Neil-Smith Electrical Tool Company, Cincinnati, Ohio. This tool is designed for driving wood screws, and the manufacturer claims that where quite a large number of screws are used the time and labor

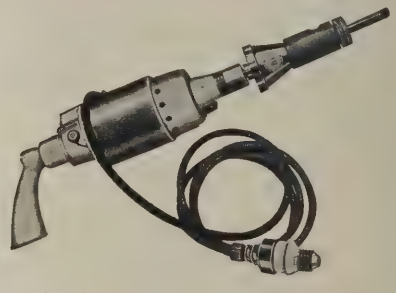


Fig. 8—An Electric Screw Driver

costs are more than cut in half. It can also be used for driving lag screws or tightening up nuts on bolts, as a socket wrench attachment is furnished. As will be noted, a friction clutch with a spring release is provided so that when the pressure is released the driving bit does not revolve, but the motor continues running.

Prevention of Sound Transmission in Buildings

There has just been issued from the press by the Hydrex Felt & Engineering Company, 120 Liberty Street, New York City, an exceedingly interesting booklet on "Sound Transmission in Buildings—Its Prevention and the Use Therefor of Hygienic Materials." It deals with the reinforcement and conduction of sound, forced and sympathetic vibration, absorption of sound waves, reference to the fitness of various materials for the purpose, and then describes at length the merits of Hydrex-Saniflor as a non-conductor of sound, heat and cold. It states that the material is a blanket-like thick felt coated on its two surfaces like enameled leather, this flexible coating making the felt waterproof, non-absorbent to moisture, odors, dirt and

(*Continued on page* 90)

dust, and absolutely clean, vermin-proof and sanitary. It is especially adapted for walls, floors and roofs of residences, schoolhouses, churches, hospitals, hotels, and for such work as music rooms, floors over bowling alleys, cold storage insulation, telephone booths, insulation under tin and concrete roofs, etc.

Shingling and Roofing

The Asphalt Ready Roofing Company, 9 Church street, New York City, has just issued from the press an exceedingly neat and attractive pamphlet profusely illustrated with halftone engravings and relating to the subject of artistic and durable shingling and roofing. The matter, which is copyrighted, sets forth the "functions of the roof" and points out the salient features of the Hudson asphalt shingles which are referred to as both durable and economical, as no painting or staining are required. They are also fire-retarding, which is a quality tending to reduce the fire risk as well as cost of insurance of the buildings upon which they may be used. The claim is made that Hudson shingles can be laid by carpenters in less than two-thirds the time required to lay wood shingles; that they are uniform in size and can be cut with a knife and straight edge when necessary. Explicit directions for applying the shingles are given, and reference is made in the pamphlet to the "Arrow" brand of roofing and to Hudson brand of asphalt felts for sheathing, for built-up asphalt roofs, and for laying under tile and slate roofs. Attention is called to the fact that the Boston Hip method, can be successfully employed; that is, laying the shingles lengthwise on the ridge or hip and bending them over to extend 4 in. on either side. The company has also found that the Hudson shingles make very good siding by laying them 2 in. to the weather.

TRADE NOTES

The office of Commissioner Julian Armstrong of the Publicity Bureau of the Associated Metal Lath Manufacturers has been transferred to 332 South Michigan Avenue, Chicago, Ill., and the former office at Youngstown has been discontinued.

The June issue of "DooR-Ways," the house organ of the Richards-Wilcox Mfg. Company, Aurora, Ill., contains the usual amount of interesting matter relating to specialties of this enterprising concern and among the illustrations is an interior and exterior view of a model dairy barn, all the sliding doors of which are R-W hung. There is something about the garage door problem and also about the R-W rapid acting vise for the woodworker, in the school, the shop or the home.

Sanitary Composition Floor Company, 315 West Fayette street, Syracuse, N. Y., is sending out an 8-page circular giving full instructions for laying "Santilite" composition flooring. These instructions are probably the first that have ever been issued by any composition floor concern which illustrate the various operations in the laying of composition floors. Santilite is referred to as the "perfect sanitary flooring for the home, hospital, store, school and public building." The claim is made that when laid according to directions it will produce a floor that will not crack, chip, crumple, buckle or wear dusty.

The West Coast Lumber Manufacturers Association announces the removal of its general offices from the Tacoma building, Tacoma, to 411 White building, Seattle, Wash.

TABLE OF CONTENTS FOR AUGUST, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

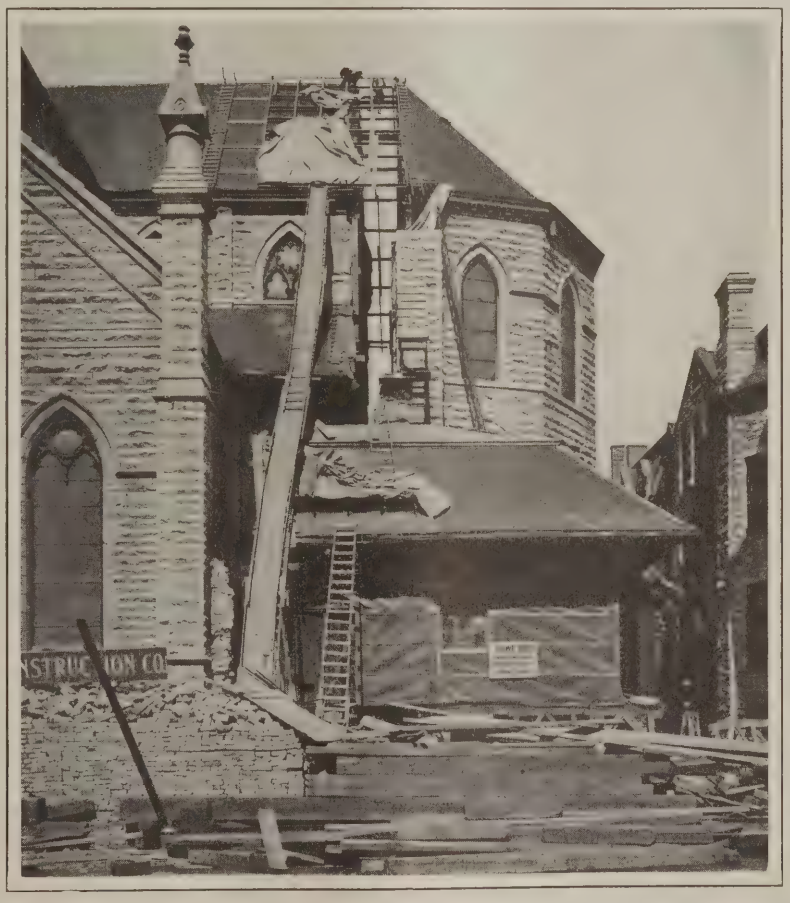
THE BUILDING AGE

NEW YORK, AUGUST, 1915

Notable Church Remodeling Operation

A Piece of Work Which Involved Setting Back 14 Feet a 500-Ton Section of a Church

WE have from time to time presented in these columns interesting examples of structural moving operations ranging all the way from an ordinary five-story brick apartment house up to railroad stations, mammoth school buildings and masonry churches involving a weight in some instances of many thousands of tons, but none perhaps have involved the peculiar features incident to the notable removing and remodeling operation here illustrated and described. Its unusual features have to do with the cutting apart of a stone church building and moving a section of it back for a distance of 14 ft. in order to enlarge the sanctuary as the clergy felt that on ceremonial occasions it was far too small to comfortably meet the requirements of the case. Furthermore the provision for a baptistry had been a long cherished desire, and these two features, together with additional improvements in the heating, ventilating, lighting, new Mosaic flooring, windows and marble work were all included in the scope of the remodeling operation. What was actually done was to lengthen the church by cutting off the rear section and setting it back the distance stated. The section weighed something like 500 tons and the preparatory work covered a period of approximately two months, although the actual moving operation was accomplished in two days.



Appearance of the Work After the Rear Section of the Church Building Had Been Moved a Distance of Four Feet

The pictures here presented afford a very good idea of the manner in which the work was done. The first picture gives the appearance of the church building after the rear section had been cut in two and moved a distance of 4 ft. The second picture shows the appearance of the main floor after the section had been removed the required 14 ft., while the third picture represents the cribbing, the jack screws and other equipment utilized during the progress of the actual

work of moving the section. The last picture is an inside view of the sections of the building after the setting-back operation had been completed.

The project of enlarging the sanctuary was one that required very careful consideration, and it was finally decided that the best method of successfully performing the work would be to cut the building from roof to foundation at a point in the sanctuary about 15 ft. east of the transept walls. It was then proposed to move the section thus severed a distance of 14 ft. toward the east, and by so doing introduce a new bay in the sanctuary. Stone cutters were employed for the first part of the work and the cutting apart of the two sections was done in the usual manner. Great care, however, was necessary in connection with the cutting owing to the expensive marble and woodwork in the floors and ceilings.

In preparing the foundations to receive the east section it was necessary to sink 9 caissons, each 4 ft. in diameter, to bed rock 93 ft. below grade so as to insure a solid foundation. In the meantime the shoring engineers were occupied in the basement cutting away the old foundation walls and jacking up the section to be moved on runways and rollers.

Adjusting the loads and keeping the work level required untiring effort, for the least deviation would be likely to result in trouble if not disaster. The outer walls of the sacristy were torn down and temporary weathertight partitions erected which

A Notable Church Remodeling Operation—Appearance of the Main Floor of the Building After the Rear Section Had Been Moved Back the Required Distance

also acted as supports for the old ceilings and roofs. Scaffolding was erected along the sanctuary in two sections the full width of the church from floor to ceiling, one section being on either side of the cut. This framework was strong enough to act as a supporting structure for the roof pending such time as the new roof was put into place. In addition to this provision, it was also built to withstand the possibility of exposure to high winds during the period of reconstruction. Care was taken in erecting this framework so that the view of the High Altar from the floor of the church would not be obstructed. When all these preparations had been completed the cut was made.

The section was supported by 300 steel beams and eight steel trusses resting upon 1500 jack screws. The latter were of two types—the ordinary cast iron house jack screw and a cut thread steel screw. Each was 24 x 4 in. and stood a test of 24 tons under hydraulic pressure but could no doubt have stood much more under a severe strain. The screws of the cast iron and steel types were arranged alternately, that is, first a steel screw, then a cast iron screw, and so on. The workmen operated the screws by giving each a quarter turn upon a whistle signal by the foreman.

The rollers used in connection with the work were of hard maple, each being of 8 in. diameter and 4 ft. 8 in. long.

Twenty men operated the jack screws in forcing the rear section of the building back to its new position. In pushing the two segments apart long anchor chains were fastened to the cribbing so that the weight of the building acted as its own anchor. The chains were carried back to the jack screws and set against them so that when the screws were turned the building moved. This work was done at the rate of 1 ft. per hour and as already stated was successfully completed in two days' time. During this operation the engineers kept their levels constantly on the work in order that any settling, even to the minutest fraction of an inch, would be immediately perceptible.

The removing of this section provides the sanctuary with more than double its former area, and two new recesses similar to those already built were added. The construction of the new bays allowed the installation of two magnificent stained glass windows, each 10 x 20 ft. in size on the interior for lighting the main altar. Four smaller windows were provided in the outer walls of the sanctuary.

The interior walls and roof of the section filling the cut were made identical with the older portion of the building. The woodwork is red oak, white wood and walnut with a natural finish. The floor is of marble to match the rest of the sanctuary. Six new marble pillars were erected in the new bay to support the clerestory walls and side arches. The moldings, capitals, brackets, corbels, etc., were duplicated in the construction of the new bay and all mill work, frames, door, trim, etc., were made to correspond with the older portion.

A Notable Church Remodeling Operation—View Showing the Cribbing, Jack Screws, Etc., During the Progress of the Actual Moving of the Building

The building in connection with which these remodeling and removing operations were made was the Holy Name Cathedral in the city of Chicago, and the plans were prepared by Architect Henry J. Schlacks, Otis Building, Chicago, Ill. The contract was carried to a successful conclusion by Crowe Brothers, shoring engineers, Chamber of Commerce Building, Chicago, Ill.

Model of Nave of the Cathedral of St. John the Divine

In order to determine just what the new $1,000,000 nave will look like when constructed of stone the Trustees of the Cathedral of St. John the Divine have had a paper model prepared and placed it on exhibition a few weeks ago in the Æolian building in West Forty-second Street. It is probably the most elaborate model ever constructed and required the labors of four men for a period of six months. Concerning the model of the nave and the $10,000,000 cathedral itself, the architects make the following statement:

"We have made no attempt to develop a final scheme for the crossing, transepts, towers and west front. The time has not come for decision on these points. The question of a central dome, tower or spire as against transeptal or other towers should await the construction of the nave. As at present designed we are persuaded this nave will harmonize equally well with a central tower or with transeptal towers.

"Regarding the west front we are of the opinion that the towers should be moved further north and south so that the front on Amsterdam Avenue should in general mass approximate more nearly that of Bourges than that of Notre Dame, Paris.

"It is understood, of course, that the details of ornament, the carving, etc., are tentative only, as they appear in the model. This refers to tracery, panelling, balustrades, parapets, capitals, niches and pinnacles.

"For materials we believe the interior should continue the color effect already in use in the choir, with the introduction of yellow Mohegan granite for the columns. The main walls of the exterior should be of Mohegan granite, while the cut work could well be of the Kingwood stone used with good results for the exterior of the Potter chapel."

The model of the nave is built of Bristol board in solid masses fixed together under pressure, while the carved work is of *papier mache*. The windows are faithful reproductions of old glass and are made of celluloid. The sketches of the nave were prepared by Architects Cram & Ferguson, 33 West Forty-second Street, New York City, and about $200,000 will be expended each year during the period of five years required to complete the nave.

Peculiar Features of English House Construction

On the editorial page of a recent issue of the London *Building News* we find the following comments touching some of the peculiar features which are to be found in a lately erected house in a suburb of the city mentioned:

In his question, to which we replied last week, "A Builder" proposed to encase a timber lintel with a keyed and rebated stone facing over an opening, to give an external appearance of masonry, thus perpetrating an architectural sham, besides making an incurably bad piece of construction. It reminded us of some other similar abortions actually perpetrated by so-called "practical" builders in the carrying out of their own designs, without the check of professional supervision. One of these was a case analogous to the one above, in which a timber was completely buried, thus risking dry-rot. A window opening in a wall happened to be built several inches too wide for the casement frame which had been made for it; so to save the cost of altering the frame, which, when being offered up in position was found to be too small, the ingenious builder got over his difficulty by fixing up a length of an ordinary rough putlog taken from his scaffold, and in this way he reduced the opening to accommodate the window-frame; but the York stone sill was left unchanged. The consequence is it projects on that side of the window about 7 in. more than on the other. The facing of the walls were rough-casted, so the builder drove some nails into the putlog to get a key and plastered over the wood, finishing the reveal in this fashion as if nothing had happened, and hiding the discrepancy.

In the same house, which has been erected in a London garden suburb, a soilpipe is run up in front of the principal elevation on the face of the brickwork, below the projecting sham half-timbered gable which comes above; but the oversailing of this gable is so slight that the 4-in. iron tube partly protrudes in front of the stucco paneling, with the most incongruous effect, particularly so as the pipe is not vertical, varying also in its relation to the face of the wall, in order to clear a rafter where the roof projects, and thus it passes, oddly enough, through the tiling on one side of this apex, this sewer-gas vent not even assuming the character of a gable finial. This the ridge-tiles in any case would preclude.

The drawing-room fireplace is set so close to the door that it is always in a direct draft, with the result that whenever a fire is lighted the smoke is more than often driven out into the parlor. A gas-fire, therefore, is employed; but the fumes still cause much discomfort, owing to the unpreventable side draft. That the artist in question deserves little commiseration is obvious, because, instead of consulting one of his architect friends before he had his house built, he made a bargain with the "practical" builder, who has achieved the result. The "half-timber" is made up of inch boards planted on to the face of the plaster, and the work is curling up gracefully under the action of the sun. The owner evidently effected no economy when he saved the dreaded architect's fees.

Danger in Certain Woods

The fact is well established that sawdust of some kinds is annoying and injurious to those who work about sawmills and other plants where the objectionable woods as used, says a writer in *Hardwood Record*. California laurel—which is not laurel but sassafras—is not widely known, and little of it goes to sawmills; but its reputation for annoyance is well established. The odor from the freshly cut wood produces headache, with sharp pain over the eyes. The sawdust may not be directly concerned, but the

irritation is caused by oil from the wood, floating in the air, like that from a freshly-cut onion.

Another California and Oregon wood clearly injurious to persons about sawmills where it is cut is the Port Orford cedar, also known as Lawson cypress. It grows in dense forests in the vicinity of Coos bay, in southwestern Oregon. The crews of mills which saw the logs cannot work continuously, but must have frequent relief or they become incapacitated. The wood is so rank with oil that it resists the attacks of ants in the Philippine Islands where cargoes are sold for building purposes.

Some Oriental woods have had reputations because of injurious effects upon sawmill workers. Satinwood's odor is pleasant enough when inhaled in small doses; but too much of it works great harm.

Walnuts of different species, but chiefly the black walnut of the United States, and eastern walnut, commonly known as Circassian, are accused of serious injury to workmen who cut much of the lumber; but the reputation may not be wholly deserved. Some workers in walnut experience no annoyance.

Rosewood produces sneezing and headache among the workers. In this instance it is believed to be the finely pulverized sawdust floating in the air, rather than oil emanating from the wood, which produces the undesirable consequences.

No complaint seems to have been made against American larch or tamarack, which is very similar in botanical characters to the European larch.

A Notable Church Remodeling Operation—An Inside View Showing the Sections After the Removal Had Been Completed

Elementary Perspective Drawing—V

The Perspective of Circles—The Circles in the Elevation of an Arch—A Simple Lesson

By George W. Kittredge*

THE perspective of circles has been merely hinted at in the earlier part of this work. Since this is a department of the subject which seems to be less perfectly understood by many draftsmen in which naturally more errors are to be noticed than in any other part of the work, a few words thereon will serve to put the beginner on the right track. Any one with the least geometrical knowledge knows that a square can be circumscribed about a circle: that is, drawn so as to touch the circle at four points. With what has been already said, there should be no difficulty in putting a square into perspective as seen from any point of view, either in a vertical or a horizontal place, after which the line representing the circle can be easily drawn within the lines representing the square. The method of accurately drawing the circle within the square will be made clear by an inspection of Fig. 8, which shows a cube in perspective upon the three visible faces of which circles are drawn; the point of view being such that the three sides are seen at different angles. The method of putting the cube into perspective is so clearly shown as to require no explanation, *A c* and *A d* being, of course, equal to the height *A. B.*

To draw the circle within one of the sides, as, for instance, the right side, first cross the diagonals obtaining the center *m*, through which draw a vertical and a horizontal line (the horizontal line being, of course, drawn toward *VR*). The four intersections, with the sides thus obtained, will be the points where the curve representing the circle will be tangent to sides of the square. If for greater accuracy it is desirable to locate other points on the curve, this can be done in the following manner: First construct a square in elevation upon one of the vertical sides of the plane in perspective as *A B* or *D E*, or in line with the same, as shown at the right, in which inscribe the circle and draw the two diagonals. Then from the points *H* and *K* draw lines horizontally to *D E* and carry them thence in perspective to cut the diagonals previously drawn across the sides of the cube, cutting them, as shown at *h h* and *k k*. This gives four points upon the curve in addition to the four points of tangency with the sides of the square. Through these eight points the curve can be drawn by eye, or with the assistance of the "French" curve if necessary.

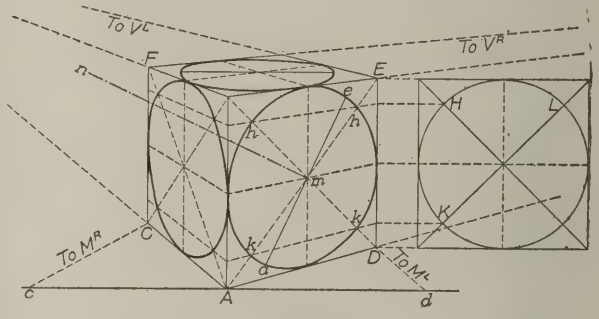


Fig. 8—Perspective of Circles Inscribed Upon the Sides of a Cube

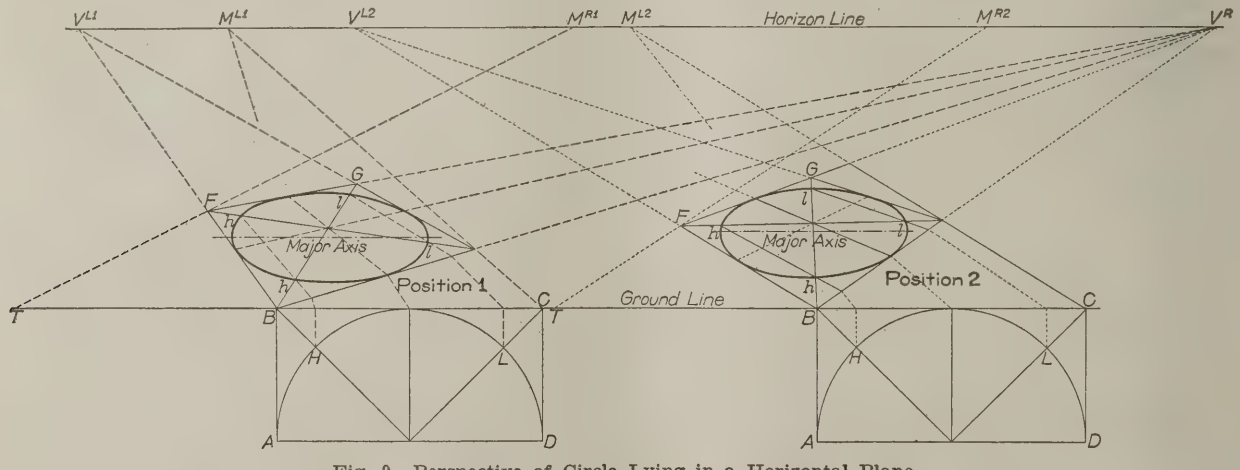


Fig. 9—Perspective of Circle Lying in a Horizontal Plane

Elementary Perspective Drawing—V

In the case of a circle in a horizontal plane, as that upon the top of the cube in Fig. 8, the method

[*The present series of articles which appeared in these columns some years ago and attracted a wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers. —Editor The Building Age.]

of procedure is practically the same as that just described for circles in a vertical place. Diagonals are crossed locating the center, through which point lines are drawn to both vanishing points, giving the four points of tangency of the curve with the sides of the square. Since, however, neither side of this square is in the plane of the view nor parallel thereto, as is the case of those forming the sides of the cube, the square in elevation must be constructed below the ground line—that is, with one part of the ground line, say, *A d*, as one of its sides, instead of at the right as before. This is more fully shown in Fig. 9, in which the circumscribing square is represented as being seen from different points of view for a purpose which will be explained later. The reference letters for corresponding points are the same in both positions, so that either one or both can be referred to, and both correspond in that respect, so far as possible with Fig. 8. Having constructed the square in elevation with its diagonals (or one-half of it, which is quite sufficient) below the ground line, as shown by *A B C D*, cut *A B*, when its distance from *B* can be set off on the ground line from *B* toward *T*, and thence carried toward *M R* to cut *B F*, and finally toward *V R*, to cut the first line drawn. The intersection thus obtained will occur on the curve in perspective.

An inspection of the curves as obtained in the side planes of the cube in Fig. 8 will now show that a circle in perspective will appear upon the paper as an ellipse more or less flattened, according as the plane in which it is drawn is more or less oblique to the line of sight. Being an ellipse, it will be observed further that its major axis or longest diameter is not vertical, as it is sometimes

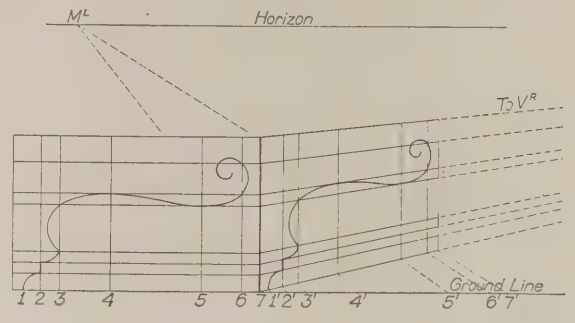


Fig. 11—Perspective of Figure, the Outline of Which is an Irregular Curve

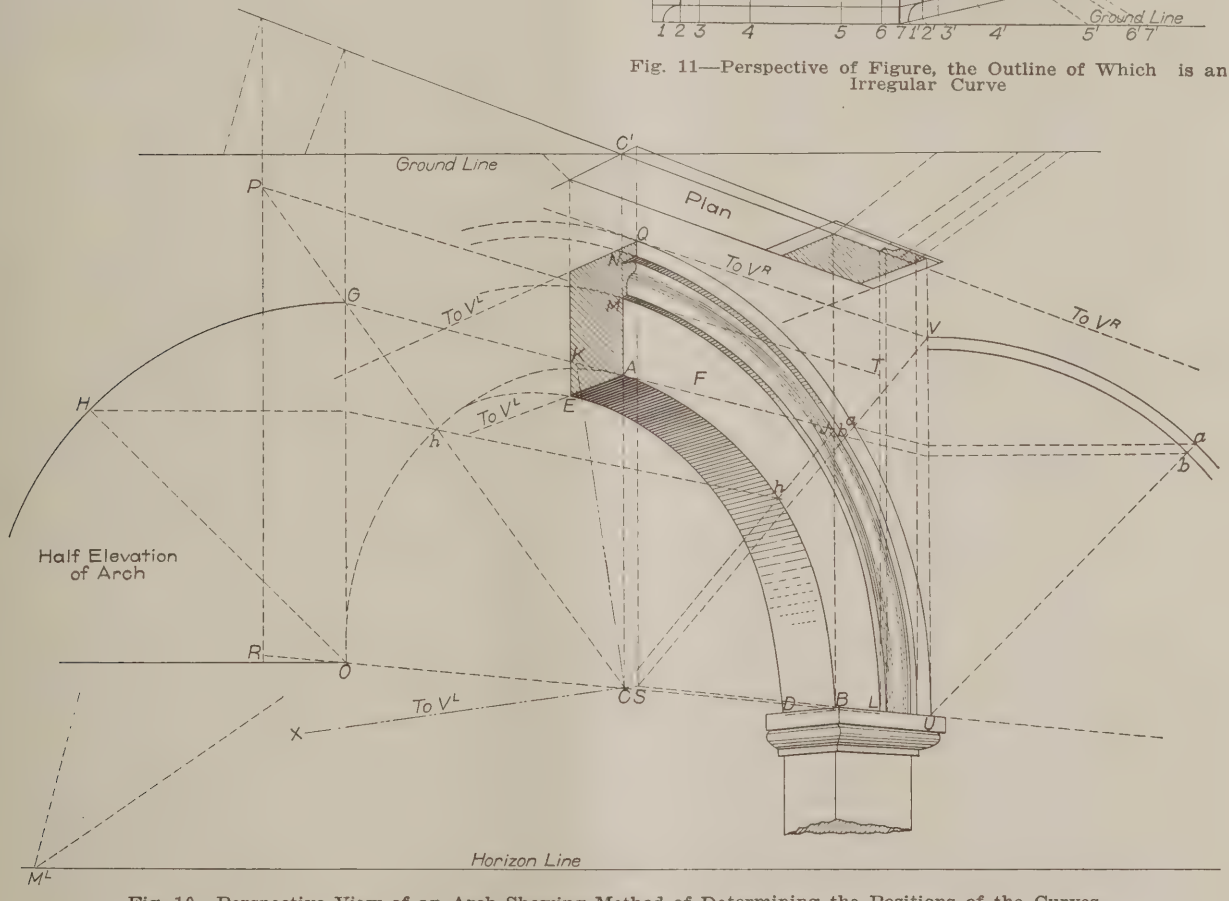


Fig. 10—Perspective View of an Arch Showing Method of Determining the Positions of the Curves

Elementary Perspective Drawing—V

lines are now carried up from points *H* and *L* to cut *B C* first, then toward *M L* to cut *B E* and finally toward *VL* to cut the diagonals, as shown at *h h* and *l l*. This gives the four additional points in the line of the curve as before, through which, and the four points of tangency previously obtained, the curve can easily be drawn.

Additional points upon the curve can be obtained in a similar manner. A point, for instance, between *A* and *H* can be carried first, upward to cut *B C*, thence into perspective as before, another line can then be carried from the point to the left to drawn, but it is at right angles to the axis of an imaginary or real cylinder, of which the circle in question is one end. Thus the line *a e* of Fig. 8, being the longest line that can be drawn through the center *m* of the ellipse *h h k k*, is at right angles to *m n*, which may be considered as the center line or axis of a cylinder, of which the circle represented is one end. Almost every circle used in the delineation of mechanical subjects or solids does represent the end of a real cylinder, because in architectural drawing lines are used to represent the angles between surfaces.

The circles in the elevation of an arch represent not only the outlines of the vertical or plane surfaces, but also the profiles of the receding surfaces. The under surface or soffit of a fillet of half an inch projection, as *M* or *N* of Fig. 10, is just as much a cylinder (or a portion of one, in case the full circle is not used), as is that of an arch a foot thick or as the sides of a circular opening whose depth is greater than its diameter. It is necessary to bear in mind that the axis of a right cylinder in reality, not as it appears in the picture, is at right angles to the plane of its end at its middle point; that is, normal to the plant of the circumscribing square at the crossing of the diagonals.

Locating the Long Diameter on an Ellipse

In order, therefore, to locate upon the paper the long diameter of an ellipse, which does not actually represent the end of a cylinder, as in the case of a mosaic or a pointed design, it becomes necessary to first draw the normal in perspective; that is, to draw a line from the crossing of the diagonals toward *V L* or *V R*, as the case may be, and then to draw the major axis, or long diameter, of the ellipse, at right angles thereto.

The relation to each other of the several parts just described will be made clear by an inspection of Fig. 10, which shows the perspective view of one-half an arch. In this figure line *A B* represents at once the outline of the arch, of which *C* is the center and *A C* the radius, and also the profile of the soffit, of which *E A B D* is one-half, *E A B D* being also one-quarter of a cylinder whose axis *C X* is perpendicular or normal to the plane of the arch at the point *C*, just as *m n* of Fig. 8 is perpendicular to the plane *A B E D* at the point *m*. The method of drawing the several curves of the arch is fully shown by the dotted construction lines, and thus furnishes another illustration of the principles already explained in conection with Fig. 8, and shows that *C K*, which is one-half the long diameter or axis of the ellipse, is at right angles to *C X*, the axis of the cylinder.

The illustration will possess additional interest as a simple lesson in perspective, in all its parts, including the plan, are all above the horizon line. The perspective of the half-square in which the semicircle of the arch is inscribed is shown by *O G J B*. Upon the left side of this, with *O G* as a radius, a sufficient portion of an elevation of the inner curve of the arch is drawn to meet the line *O H*. This line being drawn from *O* at an angle of 45 deg., thus constitutes part of the diagonal of a square whose outside dimensions are equal to two times *O G*. A line from the intersection, *H*, is then carried horizontally to cut *O G*, thence toward *V R* to cut the diagonals *C G* and *C J*, thus locating the points *h* and *h* upon the curve of the arch intermediate between the points of tangency *O A* and *B* of the circle with the circumscribing square.

Construction of an Ellipse

The construction of an ellipse upon its major axis, as the representation of a circle in perspective, will be found of great advantage, both in preliminary sketch work and also as a means of verifying the curve as drawn first within the square. To avoid possible error, however, it should be noted that the lines *a e* of Fig. 8 and *C K* of Fig 10, while they represent the center lines of the ellipses in perspective, do not divide them as they appear upon the paper into exact halves, and are not, therefore, in strict accuracy, their longest diameters for the following reason: Objects of equal size diminish in apparent size as they recede from the eye, consequently that half of the ellipse which appears beyond the line *a e*, or the line *C K*, must be smaller or narrower than the near half. The position of the real major axis can easily be found, if desired for constructive purposes, by bisecting the minor axis, as shown in Fig. 9. This operation, however, has no particular value in perspective drawing.

From what has now been said regarding the relation of the major axis of an ellipse to the axis of the cylinder the conclusion will be easily reached, that the long diameter of an ellipse representing a circle in a horizontal plane must itself be horizontal, because the cylinder is vertical. This would seem to be self-evident, yet, nevertheless, the error of drawing it otherwise is of frequent occurrence. It is not uncommon to find the major axes of the ellipses representing the bases of a row of columns which stand near the edge of a porch floor, or other continuous base, drawn parallel or nearly so to the said edge of the floor. In Fig. 9 the method of drawing the circle in a horizontal plane is fully illustrated. In the first position in that figure one side of the inclosing square is seen much more obliquely than the other, while in position two both sides of the square have nearly the same angle of obliquity to the picture plane, and yet in both cases the long diameters or axes of the ellipses maintain their horizontal positions. This fact becomes important when it is noted that if known to them at all it is disregarded by some of the best artists, in whose paintings portions of buildings form important accessories. To be exact, there are certain conditions, viz: when the subject is placed near the edge of a picture which includes a very wide angle in the view, under which the major axis of the ellipse deviates somewhat from the horizontal, but as this is not a matter of sufficient importance to justify the extended explanation it would require we omit further reference to it. If the squares within which the circles are to be represented are drawn to the same vanishing points as the other lines of the work, of which they form a part, the resulting curves will appear correct, whatever be their position, when the picture is properly viewed.

Curves Other Than Circles

In reference to curves other than circles which it becomes necessary to show in perspective, as, for instance, ogee arches, or sides of brackets having fanciful outlines, the work can most easily be accomplished by first inclosing the design in a rectangle, which can be subdivided into smaller rectangular spaces. These spaces may be equal in size or the lines can be drawn so as to touch the important points of the design. The rectangle can then be put into perspective and the design, drawn, so that its lines cross or touch the lines of the perspective correspondingly with those of the elevation, all as shown in Fig. 11.

(*To be continued*)

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

A PLAIN strap hanger, Fig. 45, follows: First obtain the area required for bearing, then the thickness to prevent straightening at the edge of the support, then check to see that the area of the vertical legs is sufficient in tensile strength to carry the load. This last item is generally taken care of when the other conditions are satisfied.

5.—Design a strap hanger, or stirrup, for the 8-in. × 14-in. beam in the last example.

Answer.—The total load = 10,700 lb. which gives a reaction = 5350 lb. The allowable compression across the grain = 250 lb. per square inch, so the bearing area in the stirrup $= \frac{5350}{250} = 21.4$ sq. in. The width of the beam is 8 in., therefore the width of the strap under the end of the beam $= \frac{21.4}{8} =$ 2.66 in. Make the strap 2.75 in. wide, a stock width. Allowing a value of 10,000-lb. per square inch tension for wrought iron the required area of the two legs $= \frac{5350}{10{,}000} = 0.535$ sq. in. or 0.2675 sq. in. for each leg. The thickness of metal required $= \frac{0.2675}{2.75}$ = 0.097 in. (practically No. 10 gauge.) Allowing a fiber stress of 14,000 lb. per square inch for steel the required area in the two legs $= \frac{5350}{14{,}000} = 0.382$ sq. in., or 0.191 sq. in. for each leg. The thickness of metal required $= \frac{0.191}{2.75} = 0.0695$ in. (practically No. 13 gauge). Each leg must rest on top of the girder with a length of not less than 4 in.

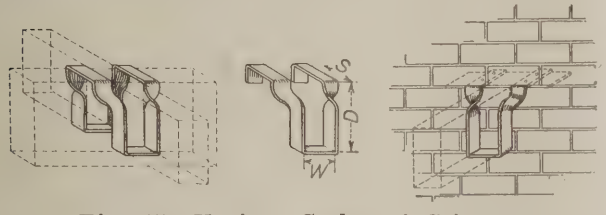


Fig. 45—Various Styles of Stirrups

This is thin metal and will surely straighten under the load, besides which it does not offer enough body to resist corrosion. Use a minimum thickness of ⅜ in. The stirrup shown in Fig. 45 is double and the weight of the beam on either side tends to balance the weight of the beam on the opposite side of the girder. A stirrup 2¾ in. wide of ¼-in. metal will therefore be all right and may be wrought iron or steel. A couple of holes drilled through the top for lag screws or spikes will take care of unequal loading on beams.

When a half stirrup is used it must be investigated for bending at the point *A*. Assume a bearing length of 4 in.

$$M = \frac{4 \times 5350}{2} = 10{,}700 \text{ in.-lb., half on each leg.}$$

This computation considers the legs as cantilever beams uniformly loaded.

The thickness of the metal is ⅜ in. (0.375 in.) and the width is to be found. For wrought iron with a fiber stress of 10,000 lb. per square inch, $R = \frac{10{,}000}{6}$ = 1667. For steel with a fiber stress of 14,000 lb. per square inch, $R = \frac{14{,}000}{6} = 2333.$

$$b = \frac{M}{Rh^2} = \frac{5350}{1667 \times 0.375^2} = 22.8 \text{ in., of which}$$

each leg will be one-half, or 11.4 in. for wrought iron.

$$\text{For steel, } b = \frac{5350}{2333 \times 0.375^2} = 16.3 \text{ in., of which}$$

each leg will be one-half, or 8.15 in.

The reason for the low stresses used is due to the blacksmith work required to bend the metal to the required shape, the heating annealing the metal and restoring disturbed molecules to a normal condition. Cold working has a contrary effect—within limits—but may crack the metal, thus nullifying the effect of the strain which sets up internal stresses that apparently cause an increase in strength.

The effect of increasing the thickness of the metal is to make a considerable reduction in width on the supporting girder. Try a ½-in. steel strap.

$$b = \frac{5350}{2333 \times 0.5^2} = 9.2 \text{ in., of which each leg will}$$

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 45 of the July issue.

be one-half, or 4.6 in. By increasing the thickness ⅛ in. the width of the strap has been reduced nearly one-half. The wide strap will weigh 10.4 lb. per lineal foot. The narrow strap of thicker metal will weigh 7.8 lb. per lineal foot, so will be the cheaper strap to use.

If a stirrup is not designed to be safe according to calculations such as those illustrated it should not be used. A lack of strength in bending is sometimes claimed to be taken care of by using a longer support and holding it down with lag screws or spikes. The longer support increases the bending moment and the holding down strength of the fastenings must be investigated. The leg is sometimes run across the top of the girder and bent down on the other side and there fastened, which is sometimes good, but the increase in material added to the cost of fastenings and the cost of labor to drive them amounts to more than the cost of the additional thickness necessary to prevent straightening. A stirrup strong enough to carry a load without bending is more satisfactory than one confessedly weak with which fastenings must be used.

Tops of beams and girders should not be cut to make a seat for stirrups. This weakens the timber, so the underside of the floor planking should be cut to make pockets for the stirrups. A cheaper method is to lay a strip of wood to carry the flooring on top of the beam between stirrups. When the floor is double the under layer may be cut away at the stirrups, the upper layer being amply strong to carry over the small hole. Fig. 45 is reproduced from Ryerson's Ready Reference. The stirrups illustrated are made of wrought iron and the recommendation is made in the book that the following sizes mentioned in the table should in general be used for the size of joist supported, the stirrups, unless otherwise specified, being furnished ¼ in. smaller than nominal size of timber or joist. Wall hangers rest on plates as shown.

Size of Joist or Timber to be Supported	Section of Stirrup	Capacity of Stirrup
2x 8 to 3x10	¼x2½	7,500 lb.
4x10 to 4x12	⅜x2½	11,250 lb.
6x12 to 3x14	⅜x3	13,500 lb.
8x12 to 4x14	½x3½	21,000 lb.
6x14	½x4	24,000 lb.
8x14 to 10x14	⅝x4	30,000 lb.

TABLE OF STIRRUP SIZES AND CAPACITIES

(To be continued)

Houses of the Trinity-Corporation

Some very interesting information concerning a type of dwelling house familiar to old New Yorkers is found in the Year Book and Register of the parish recently issued by the Trinity Corporation. At present the latter owns 359 houses, of which 241 are private dwellings for one or two families in each, and 118 are occupied by three or more families each.

The largest number of families in any one house is twenty-one, in a building erected as a model tenement. The next largest number is thirteen in a house. Next come five houses built as model tenements with ten families in each. The houses owned by the corporation contain accommodations altogether for 889 families, or an average of 2.5 families per house.

The low, old-fashioned buildings with a large yard in the rear, commonly used as a flower garden or flower and vegetable garden are still the prevailing type. Out of 359 houses, three are two stories high, 290 are two stories and attic, or three full stories; sixty are four stories and six (of which five were built as model tenements) are five stories high. There are none higher than five stories. The ordinary six-story, double-decker, dumbbell tenement of downtown New York is unknown among the Trinity houses, though such buildings are seen in large numbers in the section east of the corporation's dwelling houses.

The rents average about $1 a week, or between $4 and $5 a month per room. The rents for private dwellings range from $12 a month for a very small, one-family house to $100 a month for a two-family house with an office. The lowest apartment rents are $7 a month for three rooms; the highest are $26 for five rooms.

Advantages of the One-Story School House

The bungalow of the Pacific Coast and the cottage of the Middle West are two very significant expressions of the advantage of one-story buildings for dwelling purposes. Convenience, safety and economy in first cost and operation are characteristics which make these types of buildings particularly attractive, especially in suburban communities and smaller cities.

The advantages of the cottage home are slight in comparison with the special utility of the one-story schoolhouse. In the small town the one-story school costs far less to erect and maintain than a two-story or three-story building of equal capacity, says a recent issue of the *School Board Journal.* It is easier and cheaper to heat and ventilate. It can be better lighted—from the top if desired. Fire escapes and elaborate fire protection systems are unnecessary. Stair climbing and its dangers to small children, growing girls and women teachers are eliminated. The dangers of panic are altogether nil, particularly if each room has an emergency exit directly leading outdoors. The feeling of safety resulting from such an arrangement alone is worth more than any extra expense which the one-story school might involve.

From the administrative standpoint the flexibility of one-story schools is notable. They can be enlarged, almost indefinitely, without alterations or serious disturbance of the old parts.

Finally, in mild climates, the one-story school can be built in the form of a hollow square, with an open court and cloisters. Such a building may be a fresh-air school the year round and may be a source of untold blessings to anemic children.

The only objection to the one-story school is the amount of ground which it covers. In large cities it is not practical, and it cannot be applied to high school uses. For the smaller cities its many advantages clearly outweigh the cost of the land which it may occupy.

A Four-Family House of Stucco Finish

A Style of Dwelling Which While Providing Multiple Accommodations Has the Appearance of a Private House

THERE are many residential sections in the smaller as well as larger cities of the country where it is often desirable to provide buildings having accommodations for several families and which in their external architectural treatment shall carry the idea of a private dwelling. An example of this kind affords the basis of the present article, and the halftone picture shows the reader the extent to which the designer of the structure has accomplished the purpose stated. The building is arranged for four families, there being accommodations for two upon a floor, each family having four rooms and bath.

A Four-Family House of Stucco Finish—Architect, Rex D. Weston, Los Angeles, Cal.

At the left as one enters the building is the living room with its open fireplace, and beyond is the dining room, separated from the living room by sliding doors. A feature of the dining room is the buffet extending entirely across one end and well lighted by the triple window. Another feature, unusual in many sections of the country, but common on the Pacific coast, is the disappearing bed which enables the dining room to be also utilized as a sleeping room. When not in use the bed is pushed back into the closet, thus leaving the dining room its full area as originally planned.

Beyond the dining room is the cabinet kitchen with all modern built-in features, including the well-known "California cooler." The kitchen is admirably placed under the triple window and has drain board at right and left. Access to the kitchen from the outside is through a screened porch, and there is also direct communication between the hall and the kitchen as well as between the dining room and kitchen. Across the hall from the kitchen is the bath room, and at the rear of the house is a commodious bed room with clothes closet.

The building is of frame construction, the exterior studs being covered with sheathing boards laid diagonally to give strength to the framing, and over the sheathing is building paper, on top of which metal lath is applied to receive the plaster finish. The latter is composed of white cement and pure white sand, which gives the house a natural white finish without being painted.

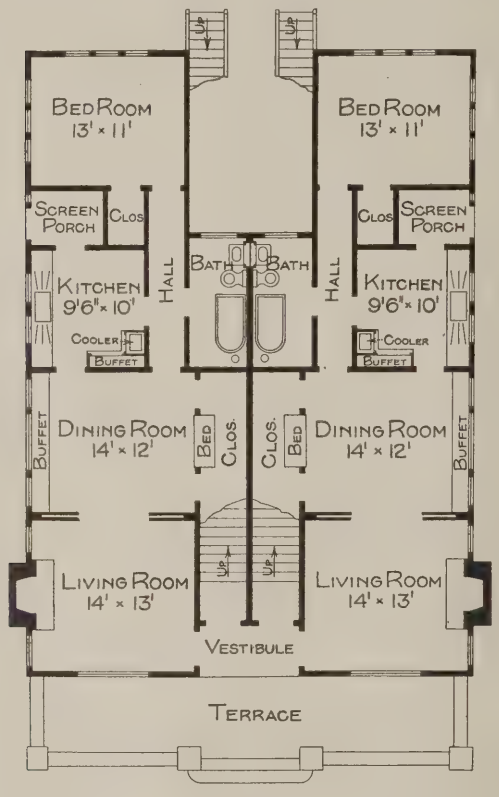
At the second story casement windows in front are two ornate balconies, which tend to break up

the plain surface and at the same time give each family a private outdoor retreat.

Hardwood floors are provided throughout the house, and the equipment for each family is thoroughly modern and up to date.

The house was designed by Architect Rex D. Weston with offices at 507 Chamber of Commerce Building, Los Angeles, Cal.

He states that the total cost was $5,800, distributed about as follows: Excavating and foundation, $125; rough lumber, $1,250; finish lumber, $390; sash and doors, $300; carpenters' labor, $1,000; inside and outside plastering, $400; roofing,



A Four-Family House of Stucco Finish—Floor Plans—Scale 1/16 Inch to the Foot

$100; brick work and fireplaces, $300; rough hardware, $100; finish hardware, $275; plumbing, $640; hardwood floors, $250; wiring, $75; electric fixtures, $80; woodstone sink boards, $38; deadening papers, etc., $20; galvanized iron and down spouts, $50; screens, $50; shades, $40; painting, $442; cement walks, $75.

Building Data League

The readers of this journal will doubtless be interested in the formation just announced of what is known as the Building Data League, Inc.—an outgrowth of the Architects' Bureau of Technical Service—which is a corporate association of consumers organized for the purpose of securing through co-operation exact and reliable information as to the quality and relative economic value of the vast number of materials, methods and devices offered for use in the construction and equipment of buildings. The purpose of the League is to establish market standards in the building industry in order that demand may find definite expression. The League accepts such standards of quality as are established by a recognized authority, but where such standards are lacking, the League will establish them for its use from co-operative research, investigations and examinations with producers, and products will be given a market rating with regard to their value measured by such standards.

It is intended that through the work of the League the consumer may readily secure accurate information and a working knowledge of available materials, methods and devices—a knowledge which under existing conditions is beyond his reach. On the other hand, the League will focus upon the producer the demand of the consuming class for the attainment and maintenance of high standards and honorable methods in the manufacture and marketing of his products.

The present membership includes many prominent architects and engineers from Boston to San Francisco and the officers are:

Chairman.....Lansing C. Holden
First Vice Chairman..Chas. L. Borie, Jr.
Second Vice Chairman..Jas. S. Macgregor
Treasurer.....Frank Sutton
Secretary.....Sullivan W. Jones

The secretary will be recognized as a member of the well-known architectural firm of Palmer, Hornbostel & Jones.

Cleaning Glazed Terra Cotta Ornaments

A painter in Pennsylvania desirous of ascertaining how to clean white glazed terra cotta ornaments on the exterior of a building which had been badly stained by smoke wrote to the *Painters' Magazine* for the desired information and the following suggestions were offered in reply:

"To remove the smoke make a stout lather of soap and water and add some ammonia, and apply this to the ornaments with a soft brush. Let it remain for a little while, but before it becomes dry brush it over the whole surface with a good scrubbing brush, taking care to get into the figures at every angle, then sponge off with clean water. If the smoke stains are obstinate, the addition of finely powdered pumice to the lather and good brushing will remove them. Other stains may be removed by the use of coal-tar benzol or pure spirits of turpentine on a rough cloth.

"When using pumice it is necessary to have the finest grade, known as flour of pumice, to keep the glazed surface from being scratched or dull the luster of the glaze."

In recognition of their services in laying out the ground plan by which the buildings at the Panama-Pacific International Exposition became a superb architectural unit, silver medals were given by the directorate of the great enterprise to architects Willis Polk of San Francisco, Cal., and Edward H. Bennett of Chicago, Ill.

An interesting exhibition of the work of the pupils of the Baron de Hirsch Trade School, 222 East Sixty-fourth Street, New York City, occurred on the evening of Thursday, July 8.

New York's Revised Building Code

Some of the Important Sections Approved After Prolonged Effort—Many Changes Made in the Regulations

THE efforts which have been made during the past ten years to revise the building code of New York City are about to be crowned with success. Important sections which have been the subject of keen controversy for a long time past were adopted by the Board of Aldermen the first week in July, and the code is now well toward completion. Practically every section of the old code has been materially changed, and among the more important ordinances that have thus far been adopted in revised form, with the principal changes, are those given below. These are of broad interest to builders not only in New York City and vicinity, but also in the other larger cities of the country.

Materials of Construction

Article 2 on materials of construction governs the strength, weight and quality of materials. The specifications for each material are brief and expressed in plain language. Wrought iron is not provided for, as it is no longer manufactured for structural purposes, but second-hand shapes of this material are permitted when in good condition. The article provides for tests under the direction of the Superintendent of Buildings for new materials or materials not provided for specifically in the chapter. For several of the materials of construction, unless the rules of the superintendents prescribe specifications, the standard specifications of the American Society for Testing Materials are designated to apply. Among the materials of construction provided for in this new code and not heretofore recognized are hollow building blocks, both of terra cotta and concrete.

Working Stresses

Article 3 prescribes the working stresses for the different materials of construction and the minimum loads that must be assumed for floors used for different purposes. Generally speaking, the working stresses heretofore prescribed are continued. In the case of timber, however, the working stresses on the timbers ordinarily used are raised above those of the old code. The stresses prescribed by the old code were so low that in several of the boroughs of the city they were, as a matter of practice, disregarded and the stresses used which had been prescribed by the old law of 1892, but which were inordinately high. If it were not for the fact that floors in residence buildings are not loaded to the extent assumed by the old building code there might have been serious results from this practice. The increase in the working stresses is offset in the matter of residence buildings by a reduction in the live loads assumed on the floors of dwellings. This load has been reduced from sixty to forty pounds a square foot. The result of this is that in residence buildings the sizes of wood beams used hereafter will remain practically the same as heretofore. The allowable loads on steel, cast iron and wood columns have been changed to conform more nearly with the present generally accepted practice.

Classification of Buildings

Article 4 on classification of buildings is a new article, dividing buildings according to occupancy into public buildings, residence buildings and business buildings; and according to construction into fireproof, non-fireproof and frame. It was found sometimes difficult to draw the line between buildings of different classes so far as occupancy is concerned. In general it may be said that residence buildings are buildings in which people sleep; public buildings are buildings in which the public, either voluntarily or involuntarily, congregate for different purposes, including court houses, theatres, churches and schools and institutions for the care, treatment or legal detention of persons. Business buildings include, under the article, all other buildings, among them office buildings, factories and stables. The provisions as to what constitute fireproof, non-fireproof and frame buildings are practically those applying to those types of construction heretofore.

Restricted Areas

Article 5, entitled restricted areas, covers the fire limits and also a new restricted zone designated as suburban limits. The fire limits in Manhattan, the Bronx and Brooklyn and Queens have been extended and the new limits defined.

Partition Fences and Walls

Article 11, partition fences and walls, contains little that is new, but codifies and clarifies the situation created by the three sets of ordinances heretofore existing on the subject and applying to different parts of the city. The President of the borough, and not the Alderman of the district, is made the arbiter in the event of a dispute as to the necessity for a retaining wall or the division of the cost.

Excavations and Foundations

In Article 12, on excavations and foundations, the old code has been closely followed. The provisions, however, for taking care of neighboring buildings when an excavation is made have been strengthened so that the parties responsible for the care of the neighboring buildings must take care not only of such walls as may be immediately adjoining the excavation, but also of such the safety of which may be affected by such excavation. The footings of buildings under this new law are to be designed more in accordance with the practice of the present day in that their sizes are determined more by the amount of the dead load than the live loads that come on them.

The article also provides for the conditions under which concrete piles of different types may be used in building construction, continuing also the present provisions for wood piles. The provisions regarding concrete piles are substantially those now contained in the rules of the Superintendents of Buildings.

Masonry Construction

Article 13, on masonry construction, is one of those that were passed at the last meeting of the board. The most striking change perhaps, and one over which there was more or less controversy, is the provision allowing the use of hollow building blocks for the exterior walls

of buildings of less than forty feet in hight and in buildings of skeleton construction, provided they are faced with at least four inches of brick work. The present practice as to the thicknesses of walls is continued with some few minor changes, except that in buildings of skeleton construction twelve inch walls may be used throughout the entire hight of the building, as against the old provision requiring an increase of thickness in such walls in the lower sections of buildings more than seventy-five feet in hight.

Iron and Steel Construction

Article 15 deals with the requirements and details of iron and steel construction. It specifies the main requirements for the workmanship in the manufacture of cast iron columns, steel columns and beams and other shapes that enter into general building construction, and it provides for the safe assembling of these parts in setting up the steel frames. In the matter of steel construction it practically continues the old practice, but in cast iron construction it places certain limitations which have been found desirable, the more important of which is that cast iron columns shall not be used when loads are so eccentric as to cause tension in the column or when wind stresses must be taken into account.

Article 16 is a new article providing for reinforced concrete construction. The provisions of this article are in substance those of the existing rules of the Superintendents of Buildings, and with the exception of larger loads allowed on spirally reinforced columns, no change is made in the present practice.

Fireproof Construction

Article 17 on fireproof construction contains provisions which in previous attempts at revision have generally given the most trouble. Most of the provisions of the article represent existing practice, though not all embodied in the old law. The greatest interest in this article naturally centers around the forms of construction permitted for fireproof floors. Brick arches, constructed as heretofore required, are provided for. In the case of terra cotta arches the required depth of the arch blocks for flat construction has been somewhat reduced from the present practice, but an increased depth in the blocks and an increase in the thickness of shells and webs is required according as the load to be carried is increased. Arches of terra cotta reinforced with steel, not heretofore recognized in the law, are now provided for. For concrete floor arches both stone and cinder concrete are accepted, a difference, however, being made in the carrying capacity of the arches when these two materials are used.

More Latitude for Cinder Concrete

Under this article it is no longer necessary to determine by test the carrying capacity of cinder concrete arches when they vary in span and in thickness or the amount of reinforcement, as a method of calculating strength of these arches is provided. This allows both owners and contractors a greater freedom in the use of cinder concrete. Other forms of construction which are not provided for may still be used under this article, provided that they meet fire and load tests prescribed in the article. No material change has been made in the existing practice as to the use of fireproofed wood in buildings over 150 feet in hight, the only difference between this and the old law being that hereafter the sleepers, door buck and grounds when not exposed on any side need not be treated to make them fireproof.

Plumbing

Article 29, on plumbing and other systems of piping, was among the first of the articles to be revised and adopted. The rules heretofore governing the installation of plumbing are continued, as is also the method heretofore in vogue of amending and repealing them, but it is declared to be unlawful hereafter to use any plumbing or gas piping installed contrary to the rules governing this class of work.

Rudolph P. Miller, former superintendent of Buildings of Manhattan and now engineer in charge of the revision of the code expressed his gratification at the passage of the articles which had been the subject of such bitter controversy; namely, on masonry construction, fireproof construction and reinforced concrete construction, and made it clear that politics had not entered in any way into the work of this revision.

Ancient Skyscrapers

In the days of Solomon there were buildings ten stories high; one rabbi tells of climbing 100 ft. to his room; Herodotus says there were houses in Babylon four stories high, and Greek historians report many houses in ancient Tyre ten stories high. Athens had a building law limiting the height of buildings for residences to ten stories.

About the year 325 A.D., when Constantine, the Roman emperor, determined to establish his capital on the Golden Horn, he built a wall across the peninsula as the limits of his city and the dividing line between city and country taxes. Speculators rushed in and bought up land, raising real estate prices over 300 per cent within a year.

High buildings were the logical outcome of this condition, and the capitalists sent to Rome for architects who could design higher buildings, with the result that in ten years the new capital rivalled Rome in this regard.

Constantine, finding the view of the city and bay obstructed by these higher structures before he completed his palace, says an exchange, issued an edict forbidding buildings more than 100 ft. high.

A wail went up from the speculators, but the tops of the buildings had to come off, and it is recorded that one block lost the four upper stories, which would indicate that there were buildings from 125 ft. to 135 ft.

It is related that one Apothagos built a row of houses between the royal palace and the sea. They were of stone and brick as required by law and within the required limits of 100 ft., but on top of this he built frame structures of three stories. The royal "inspector of buildings" ordered these frame superstructures to be removed, but Apothagos, claiming it was only a temporary structure for housing his workmen while they completed the building, went into court with it. After ten years of litigation, the superstructures were torn down, but all this time royalty was much offended by the buildings standing between it and the sea.

Moving Pictures in Building Construction

The educational value of moving pictures is being demonstrated by building interests which have adopted this means of teaching the lay public how big operations are handled. An experiment in this direction is being made with the Third National Bank Building of Springfield, Mass., a ten-story bank and office structure, in course of erection by Hoggson Brothers of New York, which will have its complete history shown on the screen.

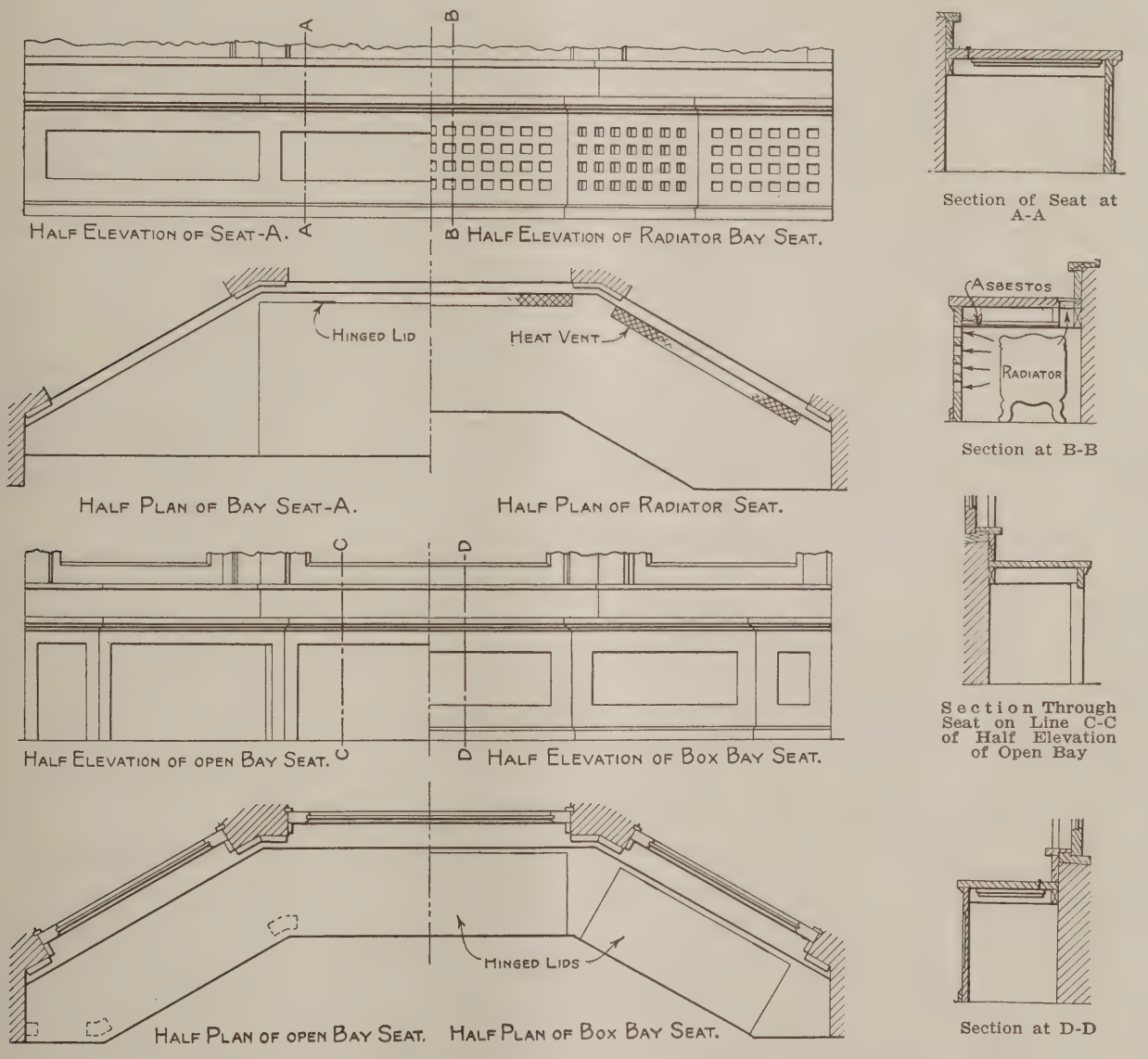
Details of Seat for a Bay Window

An Inexpensive Way to Utilize the Space in a Home That Is Quite Frequently Wasted

By John Wavrek, Jr.

IN the better class of houses being built at the present day there is usually one bay window, and sometimes two or three are indicated on the plans. The style of these windows varies to a considerable extent, some being square, some hexagon and others octagon in plan. Whatever the design may be, the fact remains that this space is often wasted when it might be utilized to good advantage by placing therein a convenient window seat. People realize in a short time after they have occupied a house provided with bay windows that it would be a good plan to have some sort of a seat built in the projection and of course the planing mill is asked to put one in. Here is where the genius of the mill man has a chance to assert itself.

As a general thing the occupants of the house want a seat which is not very expensive, and the cheapest method of construction in this case would be to simply run a seat of desirable width around the walls of the bay supported by a strip at the back which is nailed against the wall under the seat and then making use of some style of inexpensive legs, preferably square, in the front and an apron connecting the legs, all of which will aid in the stability of the seat. This method of construction is clearly indicated in the accompanying sketches. This type



Details of Seat for a Bay Window—Two Styles of Treatment Suggested by the Author

although being the least expensive is really not of very much service as is the case with most cheap affairs, and I usually persuade people to spend a little more money by pointing out to them the advantages derived from having the seat boxed, that is, enclosing the front with a simple panel and providing a lid with hinges so that it may be raised, thus opening the space within.

Here we have at once a neat finish to the bay window and a desirable place wherein to store many things. It will be found especially convenient in a house where there are children, for in it books, shoes and toys, which often lie around in great disorder, can quickly be put out of sight into one of these handy receptacles. The sketches show two different styles of box seats—one follows the shape of the bay parallel and the other one passes straight across at the front. This latter is very roomy and access to its interior is by means of a hinged lid.

Another Style of Treatment

Another style of treatment of the bay window seat is required where there are radiators placed in the bay window projection as is often the case. Here we must take into consideration the fact that the heat must be allowed to escape or it will work serious damage to the top of the seat. It is quite probable that unless considerable openings are provided for the escape of the heat it will tear open the joints and spoil the whole job no matter how neatly the work may have been done. The correct method of construction in such a case is to make the seat top double allowing an air space between of 2 or 3 in. Along the back of the seat top there is an open space of about 1½ in. for the passage upward of the heat. This opening should be covered by a strong screen so as to prevent articles falling through. In addition to the double top and the heat-vent it is also desirable to cover the part nearest the radiator with sheet asbestos. The sketches will, I hope, make the different forms of construction readily understood by the reader.

These bay window seats are almost always made up in the planing mill according to measurements supplied by the mill measurer and sent to the job in "knock-down" shape, where they may be easily assembled by any good carpenter supplied by the contractor, or they may be set up by the millman who got out the work. In either case it is essentially a planing mill proposition and the man who measures up in the mill can be instrumental in having the people install either style of the bay window seats here described.

Hamlet's Castle Reproduced at Panama Exposition

Among the many interesting pieces of building construction at the Panama-Pacific International Exposition at San Francisco, is the Pavilion of Denmark. It stands but a stone's throw from the Lagoon of the Palace of Fine Arts, and it is unique in many particulars. The construction is typically Danish and is nearly a replica of Elsinore Castle, the scene of "Hamlet."

The exterior of the building is ornamented with busts of Denmark's great men. Three towers surmount the structure and to the right as one enters is a moat filled with water.

Upon entering the pavilion the visitor finds himself in the Danish Hall in the center of which is huge columns decorated with frescoes showing figures of ancient vikings. To the right is a reception hall in which the Danes of the world who visit the Exposition may assemble, and to the left is a living room in which the Danish commissioners hold their meetings.

Chicago Carpenters' Strike Settled

The strike of several thousand union carpenters, which for many weeks practically paralyzed the building industry in Chicago, was settled July 10 by committees representing the Union Carpenters, the Building Construction Employers' Association, and the building material interests. The agreement reached provided that the men shall receive 70 cents an hour and that they accept what is called a "uniform agreement" which is designed to prevent strikes and lockouts. The agreement is for three years dating from May 31; provides for a closed shop and stipulates that there shall be no restriction regarding the sources of building material—whether it be manufactured in Chicago or elsewhere.

The settlement is regarded by both sides as a compromise as the carpenters had demanded a wage scale of 70 cents for the first year, 72½ cents for the second and 75 cents for the third year. The men previous to the strike had been paid 65 cents an hour.

Damp Walls

The architect has at times to meet and overcome defects caused by dampness in walls. The first matter is to determine the cause. If this be removed the remaining trouble may be or may not be left to time, and the decorator. If the whole cause of the trouble, says *The Salon,* be simply moisture, it will dry out after its supply is cut off.

Among the most fertile sources of this simple kind of dampness in walls above ground are faulty roof gutters, leaky water or sewer pipes, and ineffective surface drainage. In rooms below ground surface the trouble may arise from any of the above causes or from subterranean springs or water-bearing earth strata. If practicable the outer face of the wall should be uncovered and a surface damp course laid against the wall, consisting either of some waterproof material, or a belt of broken stone or pebbles, with a properly formed drain at its foot. If this be not practicable it may be necessary to line the wall inside with lath and plaster fixed on battens plugged to the wall. Where it is possible to induce a current of air to pass up between the vertical battens, that is, between the laths and the damp wall, the moisture is to a large extent removed and a fairly satisfactory remedy achieved. Sometimes a layer of rich cement is floated on the inner surface of the wall after the face has been properly prepared.

The Value of Friendship in Business*

An Important, Yet Oft Ignored, Influence Leading to Success in a Man's Chosen Calling

By Edward A. Roberts†

"WHAT is the greatest factor in business-getting to-day?

Some men, especially in the building business, would quickly reply prices; others would say service, and still others would regard reputation as the essential requisite. Few men would attach much importance to sociability or friendship as a primary influence leading to success in the business world, and yet if you will stop to consider the matter, you will observe that the men in Cleveland who occupy the highest positions in the business world are also the men who are, for the most part, cordial fellows to meet and who spend more or less time in association with others.

You will also probably conclude that the man who neglects to cultivate the quality of friendliness nowadays is proceeding under a definite handicap. In the olden days when business was transacted largely through personal contact of the individual with the individual—that is before the telephone and other agencies for quick communication were available—there was not so much need of mediums for encouraging that personal acquaintance which every one will admit constitutes a distinct business asset.

Such mediums are now a necessary part of business life. That is why we have in Cleveland, as in most other large cities, a great variety of specialized organizations and social clubs calculated to bring men together in personal relationships which lead, in many instances, to business affiliations.

Promotion of Good Feeling

A leading feature of all the existing organizations is the promotion of sociability and good feeling not only for the benefit derived by the individual himself but also for the general good of the industry in which he is engaged. Unless a man is connected with such an association or other means of meeting men out of business hours, he may have dealings for years with them without even having a speaking acquaintance.

To realize how strong the personal element is in business getting, just recall how readily you will go for a suit of clothes to a tailor with whom you are well acquainted or for a pair of shoes to a store where you know the clerk or for a piece of haberdashery to a dealer who knows your likes and dislikes rather than to a strange place.

It is the custom with many large corporations to assign certain of their men to membership in specific organizations with a view to establishing a direct connection and affording opportunities for cultivating personal contact. In many cases the cost of membership is made a legitimate charge by the company and is figured as an item of regular expense.

A well-known business man said to me the other day: "Until recently it was my belief that the man who stuck constantly to his desk and gave individual attention to every item of his business would get ahead faster than the man who gave a portion of his time to outside matters and sought companionship and social activities in connection with business. After some observation, however, I am convinced that I have been on the wrong track and that not only does attendance at meetings, dinners, etc., have a direct business value, but that these affairs afford a mental recreation and often an inspiration which not only helps the business man in his own individual efficiency but these relations profit him more than he realizes."

Opportunities in the Building Line

In building lines opportunities for cultivating friendly personal relationships are of great importance on account of the large variety of trades and their interdependence upon each other. In respect to the advantages afforded in this regard, the Builders' Exchange is unique among similar organizations of the country.

The Exchange, in addition to maintaining quarters which men in the building business visit in large numbers every day, conducts a series of events throughout the year for the direct purpose of fostering social intermingling as a business factor.

Among these events are the annual Christmas party, attended by upward of 500 men each year; the fall clam bake; the annual watermelon feast in August, the membership luncheons with prominent men as speakers and guests, and more important than all, the annual summer outing.

No other Exchange in the country conducts regular summer outings of the kind which have become so successful with the Cleveland organization. For seventeen years the Exchange has arranged an excursion every summer for members and their families, who go for a week or nearly a week's vacation.

Some business men have expressed the opinion that noon-day luncheons and other social meetings are being overdone in Cleveland and that there is liable to be a reaction. In reply to this it may be remarked that these affairs were never more popular than they are at present and that their patronage is increasing rather than decreasing.

Our people seem to have "got the habit" to a larger extent than in any other city and so long as the quality of addresses and speakers keeps up to the present standard I believe these noon-day assemblies will fulfill a distinct need in the city.

*Extracts from an article in the *Plain Dealer*.
†Secretary The Cleveland Builders' Exchange.

Features of the "Home of Redwood"

Some Examples of the Many and Diversified Qualities of Redwood as a Building Material

By J. H. Browne

THE purpose of the "Home of Redwood" at the Panama-Pacific International Exposition is to show just how beautiful Redwood is when properly treated and to bring together under one roof authoritative examples of the many and diversified qualities of this remarkable building material.

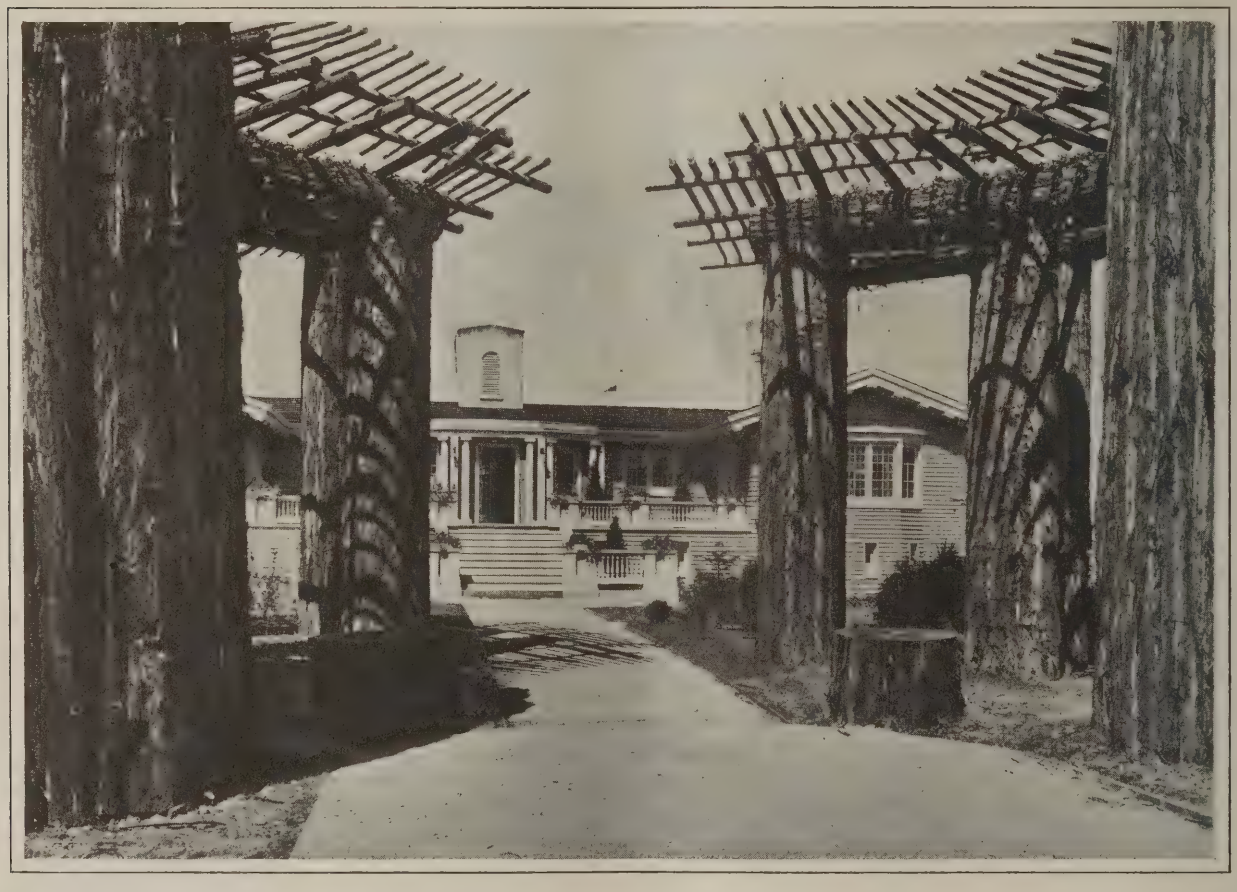
All the lumber used in the construction of the "Home of Redwood," except the floors is Redwood. The Redwood, technically called *Sequoia Sempervirens,* is one member of a distinct and unique family of trees, the *Sequoia Gigantea,* or Bigtree, being the other species. The *Sequoia Sempervirens* is found only along the fog belt of the California coast, extending in a strip from ten to thirty-five miles wide from the Oregon line on the north down into Marin County, with a few scattered groves of small commercial importance as far south as Monterey.

The Redwood tree grows to a height of 150 to 300 ft. with a diameter from 3 to 15 and even 20 ft. at the base. The trees grow very close together and will average from 75,000 to 100,000 board feet to the acre. The record yield per acre is 1,000,000 board feet.

Largely on account of lack of transportation facilities, Redwood has been little known outside the Pacific Coast territory, but with the recent completion of direct rail connection this lumber will soon become one of, if not the, most important of building woods.

The imperviousness of Redwood to decay has long been known, and therefore its use by the home builder for foundations is not only natural but advantageous. Homes in Humboldt and Mendocino Counties were built on Redwood foundations as long as fifty years ago, and the original sills are at the present day as sound as when first laid down.

The weather-resisting qualities of Redwood, even when unpainted, are proverbial and make it preeminent for exterior use. Barns erected in Humboldt and Mendocino Counties as early as 1855 were



Front View of the "Home of Redwood," as Seen Through the Redwood Pergola on the Side of the Lumberman's Building and House of Hoo Hoo at the Panama-Pacific Exposition

sided with unpainted Redwood boards and covered with Redwood shingles and shakes, none of which to-day show the slightest deterioration from exposure. The Russian Church erected at Fort Ross., Cal., in 1811 was built entirely of hewn Redwood, and although the building itself was completely wrecked by the earthquake in 1906 the Redwood itself is as sound to-day as when the trees from which it was hewn were felled.

The fire-resisting qualities of Redwood are well known, and no forest fire, no matter how severe has ever destroyed a Redwood forest or killed a sound mature Redwood tree. In the great San Francisco fire of 1906 this characteristic was put to a most severe test, and while it is not claimed that Redwood will not burn, it burns more slowly rot. Its entire frame is of Redwood, because it is in every way suitable for this purpose and is fire resisting. The roof is covered with Sawn Redwood Shakes and the sides with a novel combination of Sawn Redwood Shakes and Redwood Beveled Siding, because this material is everlasting and gives a greater protection than any other wood in case of fire.

The interior finish, with the exception of the floors, is of Redwood, because the width of panels and extreme beauty and varieties of grain are characteristic of this wood alone. The surface finishes are beautiful and vary from the simple white of hygienic utility to tones of exquisite depth and richness.

In fact this residence shows in finished form

Entrance Hall of the "Home of Redwood," Showing Redwood Panels Finished in the Natural

than any other wood, and when saturated with water, hardly at all.

Redwood for interior finish gives the home builder a wider range of possibilities than any other wood. It has in the first place all of the merits of any other, except the hard woods, in addition to which the entire absence of pitch renders it especially adaptable to paint or enamel. Again the great beauty and varieties of the grain permit effects obtainable with no other wood, especially in the natural finish or when combined with the use of paint or stain.

The "Home of Redwood" embodies all these uses of Redwood. Its foundations, underpinning, and floor joists are of Redwood because they will not

the uses of Redwood in house construction wherever it is suitable. Attention is called to the fact that the only places in the entire structure where Redwood is not used are the floors and steps. Here oak is used for the interior and Douglas fir for the exterior.

In the limited space available it is not possible to give full specifications governing the material and workmanship represented in this exhibit, but to those who are desirous of duplicating the "Home of Redwood," either in whole or in part, what here follows is likely to prove of special interest.

The foundation, underpining, floor joists and frame are all built of Merchantable Redwood.

The entire building is sheathed, inside and out,

with surfaced 1-in. No. 2 Common Redwood, building paper being put next to the sheathing and immediately underneath the exterior and interior finish.

The roof is covered with Sawn Redwood Shakes dipped in Cabot's Shingle Stain before laying.

The sides are covered with a combination of Sawn Redwood Shakes and a special pattern of Clear Dry Redwood Siding.

The bathrooms, kitchen, pantry and servant's room are finished in Select Dry Tongue and Groove Redwood.

The other rooms are finished in Clear Dry Redwood Panels, as shown in the photographs presented upon this and other pages.

View in the Living Room of the "Home of Redwood," Showing the Fireplace and the French Doors which Lead into the Dining Room

In general, the proper treatment of Redwood surfaces is as follows:

After the wood is thoroughly sanded and cleaned smooth, apply a coat of white shellac; then mix pigment of whatever color desired with white lead or zinc and boiled oil, thinning the mixture with turpentine if necessary, applying with a brush. Immediately thereafter, while wet, wipe with a soft rag, cheesecloth, or dry brush, leaving a thin film of color and allowing the Redwood grain to show through uniformly.

This process may be repeated until the desired tone is obtained uniformly, allowing previous coats to dry thoroughly first. After a satisfactory uniform finish color has been established then wax with two coats applied hot and rubbed to surface finish desired.

Any color tone may be produced, depending upon the pigment, mixture and quality of workmanship.

The specific finishes shown in the various rooms were obtained through these formulas:

Reception Hall.—Two coats white shellac, thinned with grain alcohol, applied with a brush and then rubbed with beeswax.

Living Room.—Two coats white shellac, thinned with grain alcohol, applied with a brush and partially rubbed off with a sog rag (cheesecloth), and then rubbed with beeswax.

Dining Room.—Two coats white shellac, thinned with grain alcohol, applied with a brush; one coat of walnut brown pigment, applied with a brush, partially rubbed off with cheesecloth, and then rubbed with beeswax.

Butler's Pantry.—One coat white shellac, thinned with grain alcohol, applied with a brush; two coats white lead paint and one coat of white enamel.

Kitchen.—Same as butler's pantry.

Servants' Quarters.—Same as butler's pantry and kitchen, except that the third coat is paint instead of enamel.

Shower Bath.—Same as butler's pantry and kitchen.

Family Bath.—Same as butler's pantry and kitchen.

Bedchamber "A."—Two coats white shellac, thinned with grain alcohol, applied with a brush; two coats of pinkish brown pigment applied with a brush, and partially rubbed off with cheese cloth and then rubbed with beeswax.

Bedchamber "B."—Two coats white shellac, thinned with grain alcohol, applied with a brush; two coats mauve colored pigment, partially rubbed off with cheesecloth, and then rubbed with beeswax.

Sitting Room.—Two coats white shellac, thinned with grain alcohol, applied with a brush; two coats golden brown pigment, applied with a brush, and partially rubbed off with cheese cloth and then rubbed with beeswax.

other soft wood, and it costs considerably less than some soft woods, such as White Pine. Redwood compares favorably in price with Red Cedar and Cypress, is a little higher than Douglas Fir and Yellow Pine and is less expensive than either Eastern or Western White Pine. A building of the type of the "Home of Redwood" may be made inexpensive or not, in accordance with the amount of work which the owner wants to put into it. It is about the same thing as discussing the relative price of two suits of clothes. The cloth in either suit is not worth to exceed $12 or $15, yet one tailor might charge $30 for the article and another $65, in accordance with the skill and workmanship shown.

Another View of the Living Room in the "Home of Redwood," Showing Redwood Panels Finished in Fawn Color

Many questions have been asked relative to the cost of the "Home of Redwood" and as to what the building could be duplicated for in various parts of the United States.

This is a question that is very difficult to answer, not only because the cost of the raw material differs greatly in different sections, but also the cost of the labor is much higher in some localities than in others. For example, in San Francisco labor is probably higher than in any other place in the United States while the cost of the Redwood lumber would be less, yet it is the labor that really counts.

In a general way it can be said that it costs no more to build a home out of Redwood than any

We give below an approximate idea of the cost of the "Home of Redwood" as erected:

Lumber and material (excepting millwork)	$2,700.00
Millwork, including all interior finish, gutters, porch rail, windows and doors	2,500.00
Labor	1,400.00
Plumbing	850.00
Painting and finishing	1,375.00
Electrical work and fixtures	450.00
Tiling	285.00
Incidentals	500.00
Total	$10,060.00

In order that the reader may form an idea of the great variety of uses of redwood as shown at the Exposition, it may be stated that it is found in connection with different buildings in the Forestry Court, and in the California Building; is used for towers, tanks, stave pipe, sashes, doors, frames,

etc., in Machinery Hall and the Mines Building; for silos in Stock Barns; water tanks, wood curios and novelties, etc., in various departments, and is used largely in the construction of the State and Government Buildings, especially for siding and shingles in the reproduction of Mount Vernon in the Virginia Building; for siding and blinds in the New Jersey Building, and as fancy redwood shingles in the Swedish Building.

The booths of a majority of exhibitors throughout the Exposition are also of redwood, as are the permanent sewers on that portion of the grounds owned by the United States Government.

Quakeproof Houses in San Salvador

Owing to the presence of many volcanoes, Salvador is regarded by its inhabitants as more susceptible to earthquakes than any other country in the world, and for years efforts have been made to find building material which will resist the action of the quakes, according to Special United States Agent Garrard Harris, writing from San Salvador.

"The rigidity of thick and heavy adobe walls," he says, "was abandoned by those who could afford to build of other material. The heavy Spanish tiles for roofs were likewise dispensed with, for many of the casualties of the past had been caused by the collapse of these roofs during a shock.

"The poorer people began to build their houses of upright poles or beams, on which dried reeds were tacked or wrapped with string or rope, and between these reeds and over them was plastered clay or mud. It dried, and was then finished off, smoothing inside and out with another coat, after which it looked fairly well. Tin and corrugated iron were used for roofing when the owner was able to buy them; other material, such as a palm thatch or similar expedient, was used, while many continued the use of the tiles.

"The well-to-do followed the same general plan. To the 2 x 4 uprights, which were very firmly nailed at bottom and top and braced to prevent collapse, corrugated iron was nailed on the outside. Over this a layer of almost pure cement was placed and smoothed off, giving an appearance of real solidity, and one by no means unpleasing. Light plastering inside and light but strong partitions were used, with corners braced. Corrugated iron was used for the roofing in most instances. Since 1880 the wisdom of this type of construction has been many times demonstrated, when earthquakes of considerable violence have failed to injure the houses or to hurt any one living in them."

The Dining Room in "Home of Redwood," Looking Toward the Living Room—The Redwood Panels Are Finished in California Brown

One of the recent building operations in Ridgewood, Borough of Queens, N. Y., involves the erection of 47 two-story brick dwellings involving an estimated outlay of $140,000.

Rear View of the "Home of Redwood," Showing the Side Porch of the Building and the Entrance which leads to the Service Quarters

View in the Sitting Room of the "Home of Redwood," Showing the Redwood Panels Finished in Velvet Brown—It also Affords an Excellent View of the Open Fireplace at the Left

A Suburban House of Stucco Finish

A Frame Dwelling with Exterior Walls Covered with Cement-Mortar Applied to Metal Lath

WE have taken for the subject of our colored supplemental plate this month a suburban residence of frame construction, but with exterior walls finished with stucco applied to metal lath. The roof is to be covered with shingles which are to be stained before applying. The house is intended for erection on a plot having a frontage of 50 ft. which will afford considerable open space on either side, as the width of the house itself is only 28 ft.

Footings and Foundations

According to the specifications of the architect the footings of the building are to be of concrete mixed in the proportion of one part cement to three parts sand and five parts broken stone. They are to be laid 10 in. thick and to project 6 in. on either side of the foundation walls, the latter being 10 in. thick and composed of concrete mixed in the same proportions as just described.

The outside walls are to be built up of 2 x 4-in. spruce studs doubled at all openings; the framework to be covered with 1 x 9-in. hemlock sheathing laid diagonally, and this is to be covered with three-ply building paper. Over the latter 1 x 2-in. furring strips are to be nailed to which to attach the metal lath to carry the stucco finish. The latter is to consist of two coats, the scratch coat to be at least ½ in. thick outside of the lath surface and to be made up of one part Portland cement, three parts sand and not more than 10 per cent lime putty. The first coat is to be applied under pressure and is to be well scratched before it sets. The finish coat is to be ¼ in. thick and composed of one part cement, two parts sharp sand and three parts of pebbles for rough finish, or what is often termed "pebble dash." The surface finish is to have a light cream tint.

The Roof Construction

The roof is to consist of 2 x 8-in. spruce rafters laid 20 in. on centers and covered with shingle lath to carry red cedar shingles exposed 5½ in. to the weather and laid with heavy joint every third course.

The exterior cornice, rails, brackets, trim, etc., are to be of white pine.

The chimney is to be of brick and finished where exposed above the roof with stucco. All flues are to have vitrified flue lining.

The first floor timbers are to be of 2 x 10-in. spruce, the second floor and attic floor timbers to be 2 x 8 in., all laid 16 in. on centers and strengthened with rows of cross-bridging spaced 6 ft. apart. The interior partitions are to be built up of 2 x 4-in. spruce studs, also placed 16 in. on centers, doubled at all openings and strengthened with rows of cross-bridging.

The first-story rooms are to have double floors, the rough flooring to be 1 x 9 in. and the finish floor to be ⅞ x 2½-in. tongued and grooved comb grain North Carolina pine. The rooms in the second story are to have finish floors of ⅞ x 4-in. flat grain North Carolina pine, while the attic rooms are to be floored with North Carolina pine.

The Interior Trim

All interior trim is to be of cypress except the kitchen and bath room, which are to be finished in white wood and the living room which is to be finished in fir.

All rooms are to have three coats of plaster and to have a sand finish except the kitchen and bath room, which will have a hard, smooth finish.

The bath room floors are to be of white tile, and the side walls to a height of 3 ft. are to be wainscoted with 3 x 6-in. white glazed tile. The wainscoting is to start from a sanitary base and finish with a tile mold. The bath room fixtures are to be porcelain enameled, and all exposed pipes are to be nickel plated.

In the kitchen are two-part soapstone wash trays and an iron enameled sink with brass fittings. All pipes are to be exposed and connections are to be with the hot-water boiler over the range.

All exterior trim is to have three coats of white lead and linseed oil paint. The interior trim is to be brought to a smooth finish, filled with a good wood filler, stained and varnished. The trim of the kitchen and bath rooms is to have three coats of enameled paint.

The hardware throughout the house is to be antique brass finish.

The Heating System

The building is to be heated by steam with radiators located in all rooms and halls except the kitchen and bath rooms. The exposed parts of all registers are to be finished to match the hardware.

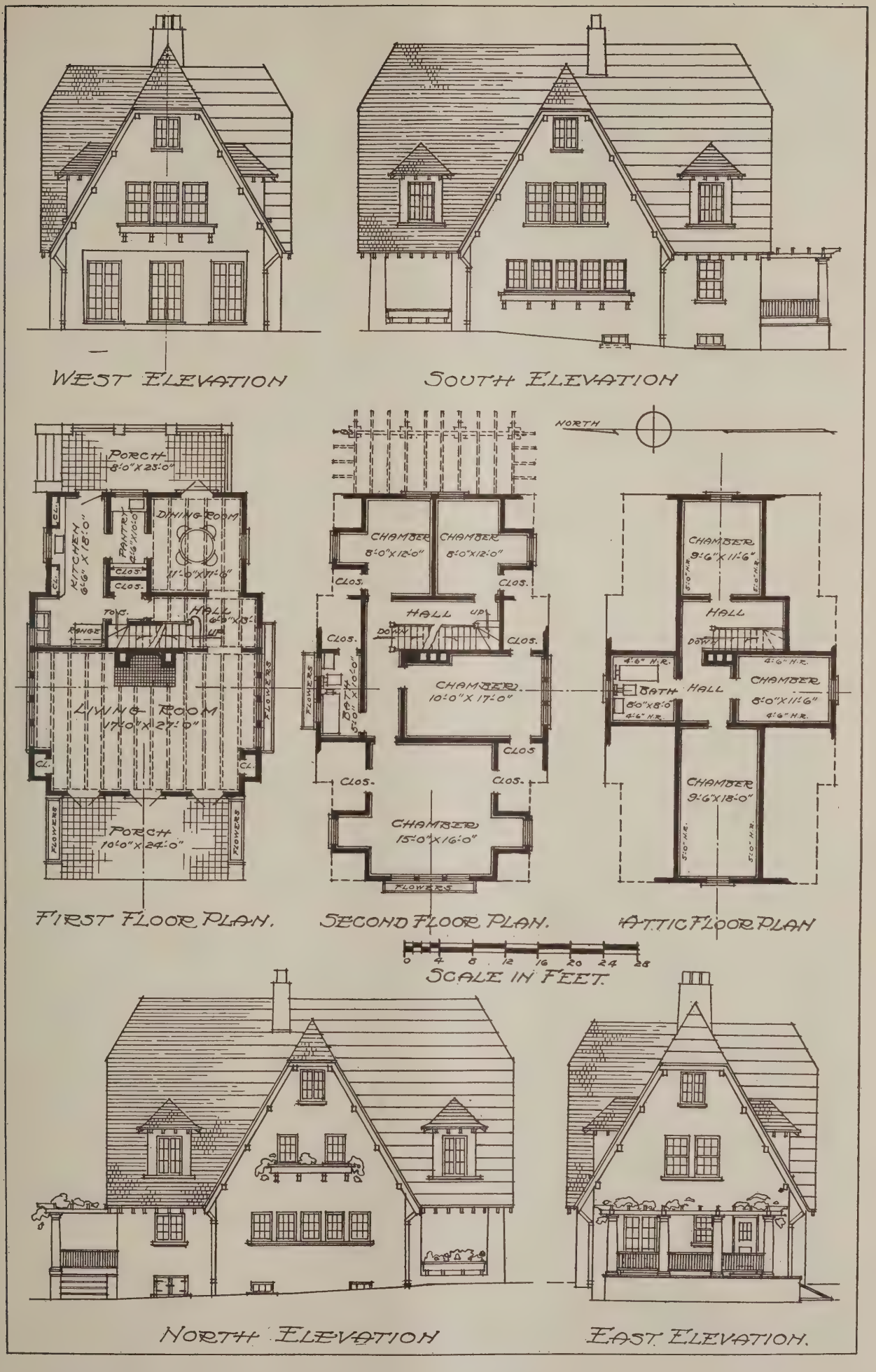
The entire house is piped for gas and wired for electricity with outlets provided in all rooms for combination lighting fixtures of antique finish.

An examination of the floor plans shows the entrance to the house to be through three French casements which open directly into a large living room—the focal point of which is a large mantel. The side walls of the living room are panelled and the ceiling beamed.

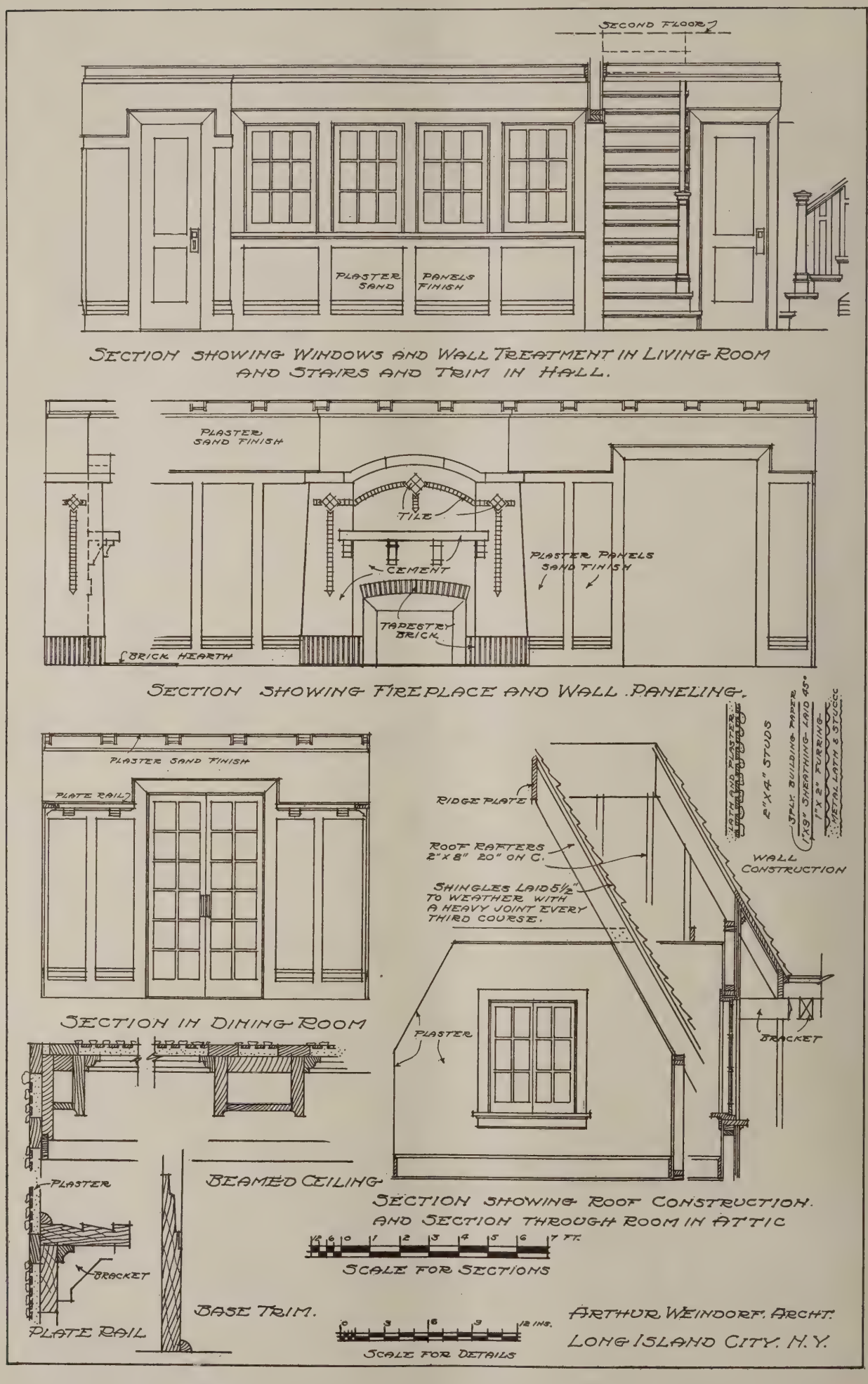
The stairway to the second story is shut off from the living room but has easy access from the kitchen and dining room. The cellar stairs are located under the main flight and in the cellar are furnace and storage rooms.

At the rear of the house is a large private porch connecting with kitchen and dining room.


ARTHUR WEINDORF.
1914



Plans and Elevations of the Suburban House Shown on Colored Supplemental Plate this Month



Miscellaneous Constructive Details of the House Shown on the Colored Supplemental Plate

On the second floor are four commodious bed rooms, each provided with good closet space, excellent light and ventilation and having easy access to a large bath room. In the attic are three small rooms and bath room.

The architect figures the cubic content of the house at 35,000 cu. ft. and gives a unit price of 20c. per cubic foot. He states, however, that the cost can be considerably reduced by substituting wood floors for the tile porch floors, wood lath instead of metal lath on the exterior, eliminating beamed ceilings and omitting the bath fixtures on the attic floor.

The house here shown on the two previous pages was designed by architect Arthur Weindorf, with offices in Long Island City, N. Y., or he can be reached in care of THE BUILDING AGE, 239 West Thirty-ninth Street, New York City.

An Eight-Room Brick Schoolhouse

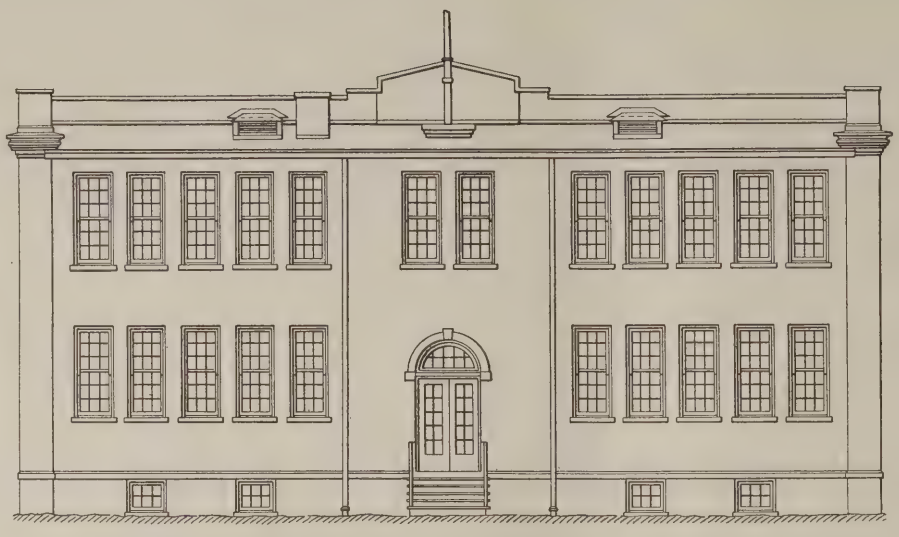
A Compact Arrangement Combined with Economy of Construction, the Cost, Including Furnace Heat, Being $12,500

THE school building here considered is of a design well adapted for erection in any of the smaller cities and towns of the country, providing as it does eight classrooms divided between two floors. Adequate wardrobes are provided with commodious halls which give ready means of entrance and exit. In the basement is the heater room centrally located, also a coal and store room as well as two toilet rooms, the latter being placed at diagonally opposite corners of the building as shown on the basement plan.

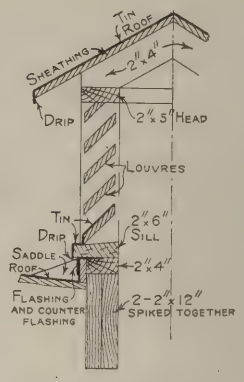
An Eight-Room Brick Schoolhouse at Berea, Ky.—Architect F. J. Manley, Lexington, Ky.

According to the specifications of the architect, the footings consist of a 1:3:6 mixture of concrete, while the foundation walls are of a 1:2½:5 mixture of concrete. At all corners ½-in. twisted bars are used for reinforcing the concrete, the bars being 4 ft. long and placed with 12-in. vertical spacing. Where cement finished floors are indicated they are placed on a 3½-in. concrete base mixed in the proportions of 1 of cement to 2½ of sand and 5 of gravel. The top coat consists of 1 part cement to 2 parts sand and is lined off into approximately 5-ft. squares.

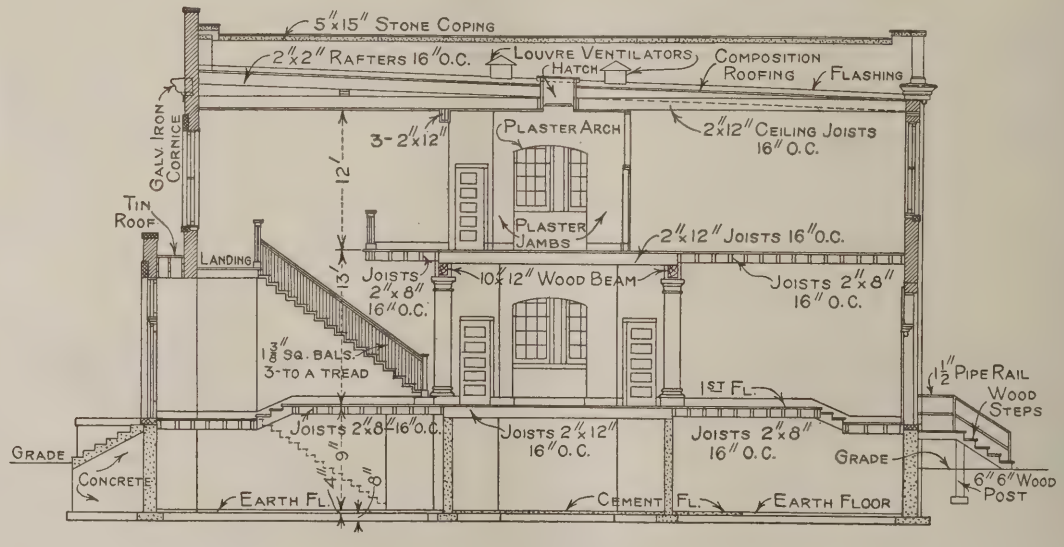
The exterior walls are built of common brick



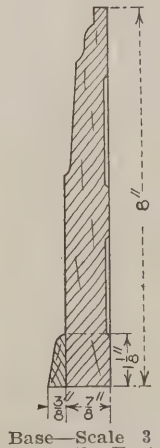
Rear Elevation of the Building—Scale 1/16 In. to the Foot



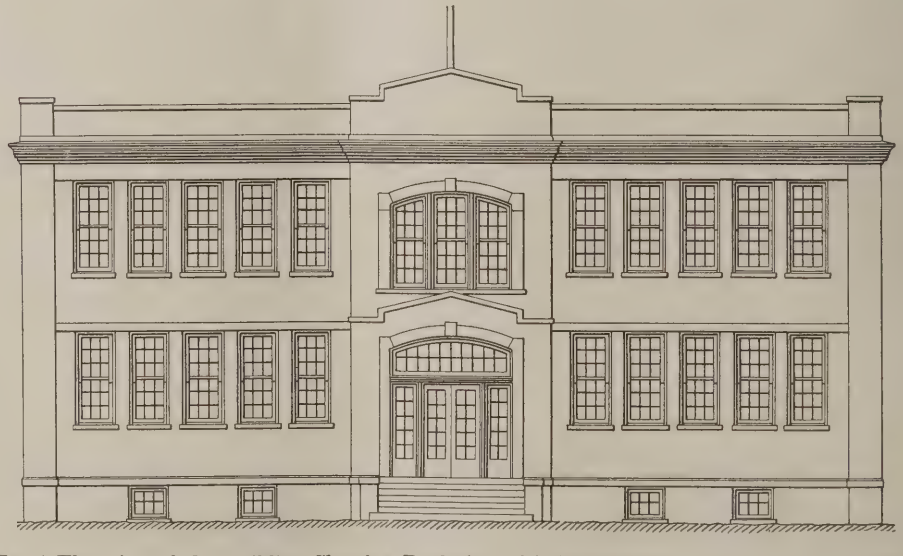
Sectional Detail of the Louvre Ventilators—Scale ¼ In. to the Foot



Vertical Longitudinal Section of the Building Taken on the Line B-B of the Plans —Scale 1/16 In. to the Foot

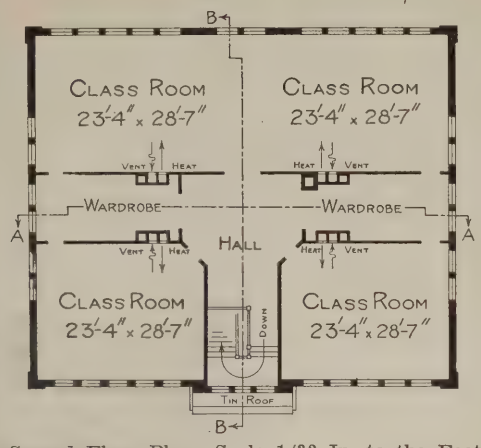


Base—Scale 3 In. to the Foot

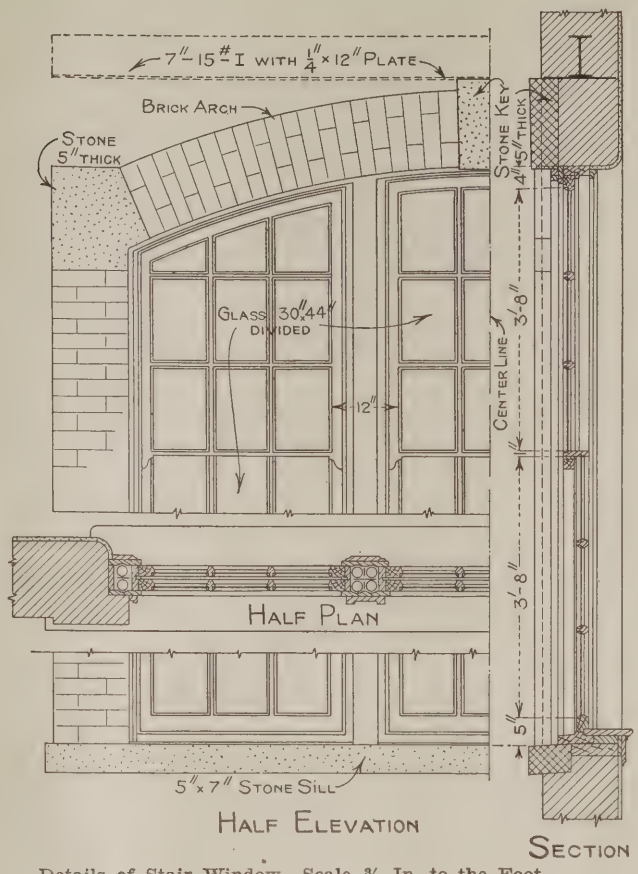


Front Elevation of the Building Showing Profusion of Windows—Scale 1/16 In. to the Foot

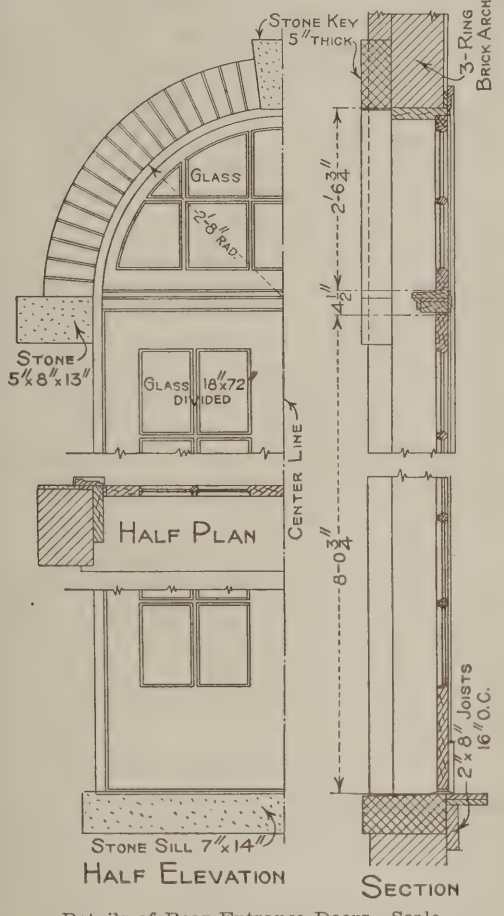
An Eight-Room Brick Schoolhouse—Elevations and Miscellaneous Constructive Details



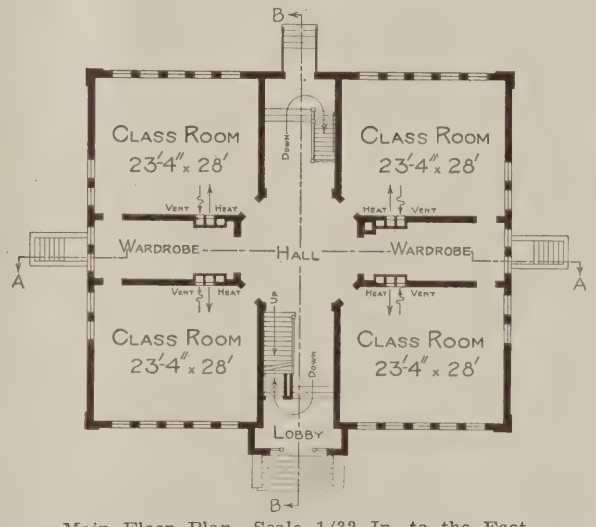
Second Floor Plan—Scale 1/32 In. to the Foot



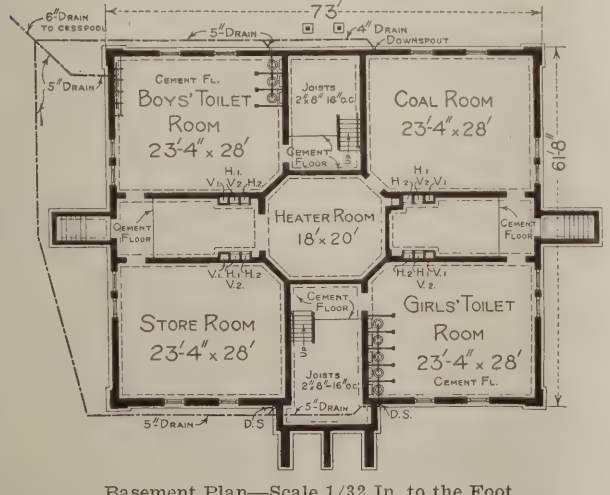
Details of Stair Window—Scale 3/8 In. to the Foot



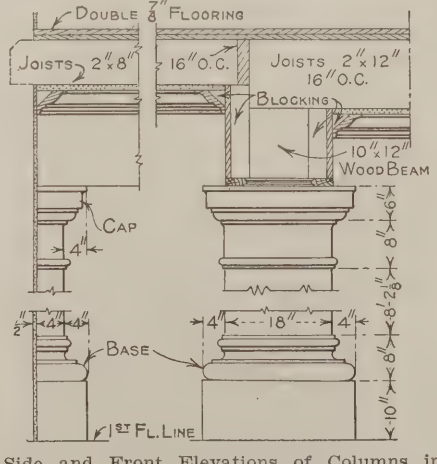
Details of Rear Entrance Doors—Scale 3/8 In. to the Foot



Main Floor Plan—Scale 1/32 In. to the Foot



Basement Plan—Scale 1/32 In. to the Foot



Side and Front Elevations of Columns in First Story Hall—Scale 3/8 In. to the Foot

An Eight-Room Brick Schoolhouse—Plans and Miscellaneous Constructive Details

and are 13 in. thick. The trimmings are of cut stone, and the roof is of composition.

All framing timbers are of long leaf yellow pine. The first floor joists are 2 x 14 in. except in the space occupied by the halls, where they are 2 x 12 in., and all placed 16 in. on centers. The ceiling joists of the second story are also 2 x 12 in., and the rafters are 2 x 12 in. placed 16 in. on centers. The joists and rafters are framed around flues, and the joists are stiffened by rows of 1 x 3-in. cross bridging. Standard joist anchors are set in brick walls not otherwise anchored, these being placed every fifth joist.

The studs are 2 x 4 in., placed 16 in. on centers, and doubled on both sides of openings and at all corners. At the brick walls the studding is doubled and securely spiked. The partition sills and plates are 2 x 4 in., and the studding in the second story is bridged with 2 x 4-in. stuff.

Throughout the first and second stories the floors are double. The sub-floor is laid diagonally and consists of ⅞ x 5½ in. yellow pine sheathing thoroughly nailed. On the sub-floor is laid a finish floor of ⅞ x 3¼-in. yellow pine, driven up close and blind nailed. Between these floors in the second story are two layers of deadening felt weighing not less than 1½ lb. per square yard.

The stairs throughout are of yellow pine, the risers being ⅞ in. and the treads 1⅛ in., properly tongued and grooved, and housed into the wall stringers. The carriages are of 2 x 14-in. material for the long runs and 2 x 12-in. for all other runs, spaced 12 in. on centers.

The glass in all doors and windows is of double strength, and that in the main entrance door is of American plate. The sash in the boys' and girls' toilet rooms is glazed with ¼-in. rough wired glass.

The box window frames are provided with Corbin's 2½-in. ball bearing pulleys. The frames have 1¾-in. heads and sills of cypress.

Finish of Trim

All exterior woodwork was given a priming coat and two coats of white lead and linseed oil. The entrance doors received an extra coat. The treads and landings of the stairs were given two coats of linseed oil, well rubbed off.

The interior woodwork was given two coats of paint, and the window and door frames were primed before being set. All galvanized iron work was given two coats of enameled paint and all tin work two coats of red lead and oil paint.

In each of the boys' and girls' toilet rooms is a 20 x 30 in. white enameled flat rim sink, fitted with compression faucets and supported on iron brackets. Fixtures are also provided as indicated upon the basement plan.

The heating of the building is accomplished by means of a triple furnace made by the Williamson Heating Company of Cincinnati, Ohio.

The architect points out that the building being practically a cube tends to economy of construction and the cost completed was about 7c. per cubic foot. The building is located at Berea, Ky., and was designed by Architect F. J. Manley, 600 to 602 Lexington City National Bank Building, Lexington, Ky. The contract was executed by John Muncey of Berea, Ky.

Cement Tile Roofs

Scattered along the route of the Catskill Aqueduct are to be a number of buildings having to do with the great conduit in some way or other. This necessitates a very considerable total amount of roofing. Certain buildings will be situated at pionts more or less remote from inhabited sections, thus imposing a requirement that the type of roofing selected should be one in connection with which little or no repairs will arise. It was desirable, too, to have a roofing that would have a high degree of durability, as the buildings themselves are to be very substantial. The ability to withstand the vicissitudes of fluctuating weather conditions was also an advisable element. If I mention many more highly desirable qualities, says a writer in an exchange, some of my readere will guess the answer and say: Those people wanted concrete roofing. Well, they did settle down upon cement tiling as the thing for the job.

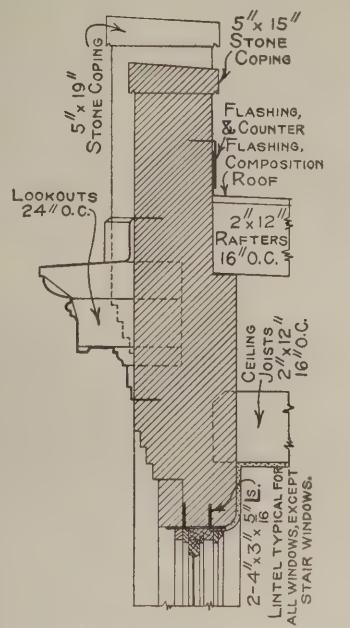
Granite slabs would have filled the bill of requirements, if it had not been for their weight and cost. Well, those are pretty important matters. As everybody is coming to learn, when low cost and high quality are both leading requirements, cement in some form is usually indicated. Slate roofing would have satisfied aesthetic considerations, and the same may be said of terra cotta; but both are fragile materials. The former would have required a bed of reinforced concrete or of terra cotta tiles to receive it, and thus the expense would have gone up. The latter could only be had, it seems, in small sizes.

With cement, the problem has been completely solved. The color effects desired may be controlled in manufacture. The strength was simply a matter of more or less reinforcement. Endurance, non-fragility, economy of manufacture, these are the everyday qualities of Portland cement that are winning victories without number.

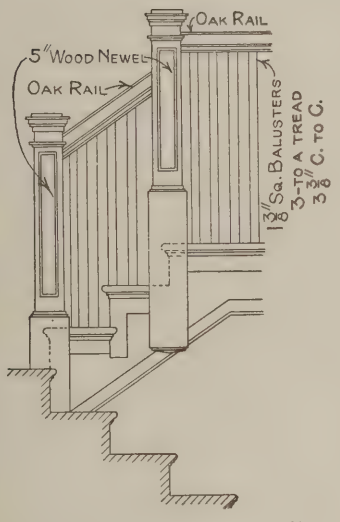
The style of tile to be used follows an old Greek pattern. Such tiles are sometimes made of granite. When you visit New York you may see an example of granite Greek tiles on the roof of the Sub-Treasury building at Wall and Nassau streets—an old and classic structure well worth seeing for other reasons.

Two sizes of tiles are to be employed—one 26 x 60 in., the other 22 x 30 in. Both sizes have a thickness of 1⅛ in. The length of the tiles runs up and down the roof. They are laid directly on the steel purlins, which have been previously covered with mortar. The joints in a horizontal row of tiles match the joints of the row below and of the row above, and so on up or down the roof. That is the joints are not staggered. These remarks apply to the general locations of the joints. When a closer examination is made it will be found that there is an equivalent to a staggered arrangement, as will become clear as we proceed.

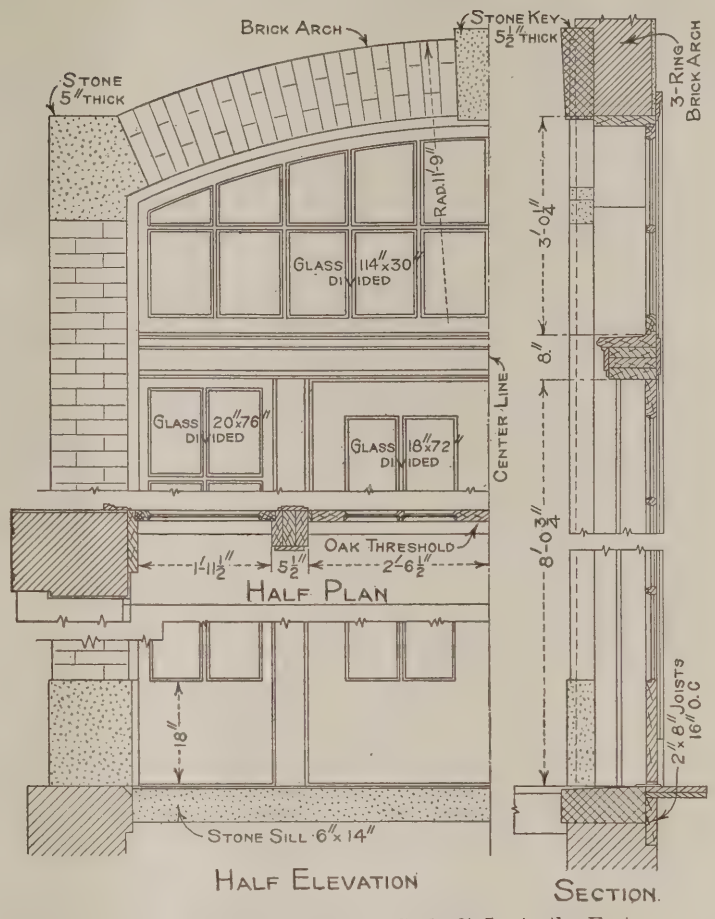
A typical tile is simply a cement board, except along one shorter and both longer sides. On one long side a kind of ridge or rabbet is provided on the weather face. On the other a broad and heavy rib is provided. On the weather face this rises above the general surface. Underneath, however, the tile is cut away. The precise forms of



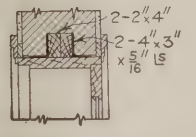
Details of Main Cornice—Scale ⅜ In. to the Foot



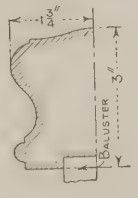
Detail of Stairs—Scale ⅜ In. to the Foot



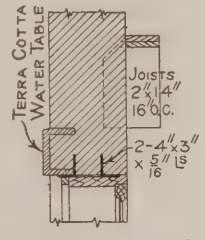
Details of Front Entrance Doors—Scale ⅜ In. to the Foot



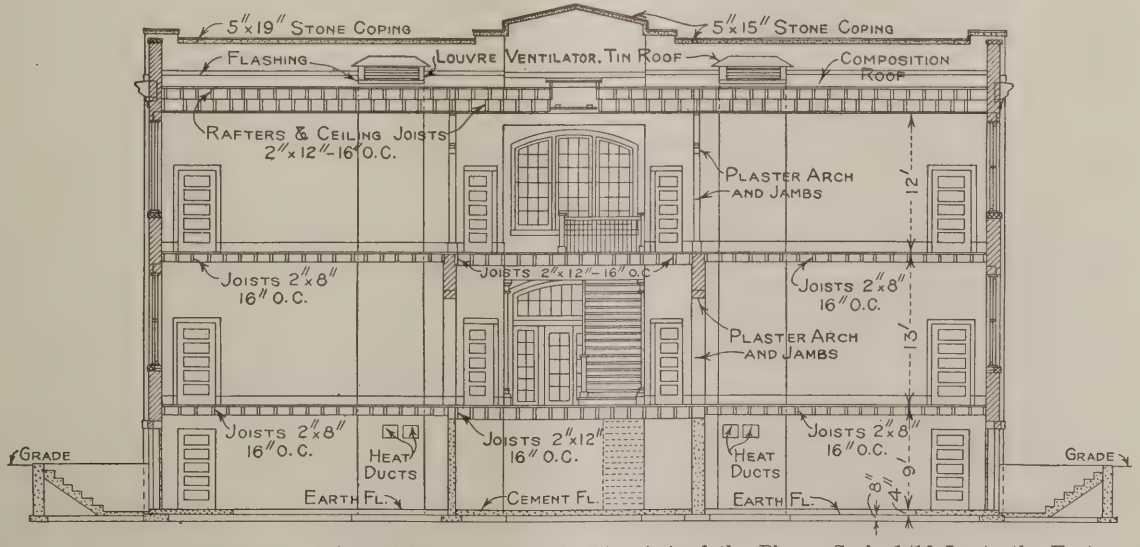
Lintel Over Interior Openings in Brick Walls—Scale ⅜ In. to the Foot



Half Section of Hand Rail—Scale 3 In. to the Foot



Detail of Lintel Over Basement Doors and Windows—Scale ⅜ In. to the Foot



Vertical Cross Section of the Building Taken on the Line A-A of the Plans—Scale 1/16 In. to the Foot

An Eight-Room Brick Schoolhouse—Cross-section and Miscellaneous Constructive Details

long edges will be better understood by attending to a cross-sectional view, showing the rabbet of one tile and the rib of the adjoining tile. The rib, it will be noticed, projects over and hooks, as it were, the rabbet. This is the manner of making the joint. It will also be seen that there is considerable latitude for horizontal adjustment between adjacent tiles. On one shorter edge the rib is not to be exposed to the weather. This provides a means of hooking the tile to the steel purlin.

The ribs which cover the actual joint are 7 in. wide and 2¼ in. high. Seen in cross-section, they present the appearance of a very flat gable. When the various rows of tiles are in place, the roof will have heavy ribs running up and down its slanting surface at intervals of about 2 ft. These parallel and heavy lines give an air of substantiality and simplicity.

At the hip of the roof a special form of tile is employed to cover the joint at this location. This form of tile may be seen in one of the illustrations. These ridge tiles add a horizontal heavy rib to those running up and down. The aesthetic result of the arrangement of heavy ribs is in keeping with the character of the buildings.

At every joint where rabbet and ridge come together, jute or yarn and elastic cement are used to prevent moisture from finding its way in beneath the tiles. In this manner provision is also made for taking care of expansion and contraction due to weather changes.

San Francisco's Oldest Mission

There stands within the confines of the present city of San Francisco a building which is interesting as a memorial of the first white men on the

San Francisco's Oldest Mission—Detail of the Main Entrance

peninsula and also because of some of the graves in the little vine-tangled cemetery under its south wall, which is that immediately at the left of the pictures presented herewith, one of which is a detail of the main entrance and the other shows the structure complete. The building is the Mission Dolores, situated on the west side of Dolores Street, between Sixteenth and Seventeenth. The Mission was established in 1776, the year of the Declaration of Independence, yet it may be supposed that no echo of this reached it for years and then merely as an affair of a foreign people.

The building itself dates from 1782 and is the northernmost of the California missions. Others, however, were established several years afterward

General View of Mission Dolores in San Francisco

at San Rafael and Sonoma. The walls are 4 ft. thick built of adobe, the sun-dried brick of the Spanish pioneers as the deep embrasures of the windows show. The ceiling and ceiling beams retain the decorations of red and white paint the Indians put on them more than 100 years ago. Two circumstances indicate that it must have been considered the most important of the missions, for its main altar is the finest among them all; and it bears the name of the founder of the Franciscan order, San Francisco d' Assisi to which order had been entrusted the civilizing of California. Against the northern wall is a large painted screen built in sections symbolizing the doctrine of the Holy Eucharist. This screen was placed in front of the altar at the celebration of the Eucharist once a year. Near the entrance set in the red-baked tiles of the floor is the marble slab that marks the tomb of the Noe family—Spanish grantees and grandees of the days "before the Gringo came."

Within a short time after its founding the Mission is said to have had 814 Indian communicants, and the Rev. Walter Colton in his "Three Years in California," says that in 1825 its wealth had grown to 76,000 head of cattle, 950 tame horses, 2,000 brood mares, 84 fine stud, 820 mules, 79,000 sheep, 2,000 hogs, 456 yoke of oxen, 18,000 bushels of wheat and barley, $35,000 in merchandise and $25,000 in cash. To-day about all that the residents of the neighborhood know of Indians is what they have seen of them in Wild West Shows or read behind the lid of the desk in school.

Among the myrtle vines and tottering willows of the cemetery are three graves of special interest for their association with San Francisco Bay. One is the tomb of Don Luis Antonio Arguello, first governor of Alta California under the Mexican regime, born in San Francisco in 1784 and brother to that Concepcion de Arguello whose sad romance with the Russian Resanov Bret Harte and Gertrude Atherton have embalmed in verse and story.

In marked contrast to the old mission is the new one of steel skeleton frame construction which is rising beside it at the corner of Sixteenth and Dolores Streets from plans by Architects Shea & Lofquist of San Francisco.

Law Points in Building Contracts

Compensation for Extra Service—Limitation Upon Architects' Powers—Other Practical Phases Discussed

By Arthur L. H. Street

A WIDE range in legal principles of importance to architects and builders is covered by three interesting appellate court decisions which have just been handed down—one by the Wisconsin Supreme Court, one by the Virginia Supreme Court of Appeals, and one by the West Virginia Supreme Court of Appeals.

The first point decided in the Wisconsin case is that where plans and specifications provide for the construction of stairways, but do not show of what material some of them are to be constructed, and, after the building contract is entered into, the owner orders concrete construction, the builder is entitled to an allowance as for extras. Says the court: "The contractor was not called upon to furnish more concrete construction under his contract than the plans and specifications could be reasonably construed to call for. Concrete stairs are not so customary and usual that, where some are marked concrete on a plan, it will be inferred that all are to be of such material; especially where, as here, the evidence shows that the owner was undecided whether to construct them of iron or of concrete at the time the contract was let. Of course, a situation might well arise where the marking of one or more stairways of concrete might be held to include other unmarked ones. But such is not the case here. The trial court properly allowed for the concrete stairs mentioned as extras."

"Blind-Nailing" Defined

The contract involved in this case provided that "all nailing in interior finish shall be done with finishing nails, and, as far as possible, concealed from sight." Another clause required "all nailing to be blind-nailed in the best workmanlike manner." The owner claimed, and offered evidence tending to prove, that by "blind-nailing" is meant raising a chip of the wood, driving the nail under the raised chip, and gluing the chip over the nail. On the other hand, the contractor offered testimony to show that "blind-nailing," in a contract relating to the interior finish of a house, means driving the nail in with a nail set, and concealing it with putty and paint; and that the method described by the owner is used almost exclusively in cabinet work, and is known as "chip-nailing." Referring to the decision of the trial court on this point, the Supreme Court said: "The court held with the contractor, and found the nailing was according to the contract. We cannot say that the finding is contrary either to the evidence or the established use of the term 'blind-nailing' as applied to the interior finish of a house."

The third point in the Wisconsin case relates to an architect's right to extra compensation. The architect in this case entered into a contract to prepare plans and specifications and superintend the construction of a three-story building for one per cent of the cost thereof. For this he was allowed $439.16. After he had prepared plans and specifications for a three-story building the owner changed his mind and wanted a four-story building. He requested the architect to prepare plans and specifications for such a building, which was done, and the architect superintended the construction of a part of the fourth story also, but not all of it. Nothing was said as to his compensation for the work on the fourth story. The owner claimed the architect should receive but 1 per cent for it—the same as the compensation mentioned in the written contract for the three-story building; while the architect claimed that he was entitled to recover the reasonable value of the extra services shown by the evidence—2 per cent for preparing plans and specifications for the fourth story and 3 per cent for superintending the construction thereof, so far as it was completed when he severed his connection with the work. On this phase of the case the Supreme Court said: "The trial court allowed him the reasonable value of the extra services, which amounted to $176.66 and $131.49, respectively. A majority of the court are of the opinion that the contract compensation for the three-story building does not measure the compensation he should receive for the extra work, and that the court properly allowed him the reasonable value thereof as shown by the evidence."

On other phases of the case the court declared: "An oral request made by one party to a written building contract and complied with by the other, if contrary to the contract, modifies it to that extent. So also knowledge of, and acquiescence in, the fact by the owner that extras are being put in by the contractor imply a promise that the owner will pay their reasonable value. While the architect cannot, without express authority, waive important conditions in a building contract, the parties themselves may do so."

Authority of Supervising Architect

The authority of a supervising architect to dispense with work called for by plans forming part of a building contract was the subject of the decision of the West Virginia Supreme Court of Appeals. That court holds that such an architect is merely a special agent of the owner; that his authority depends upon the terms of his employment, or upon the terms of the contract between the owner and the contractor; that the architect in

this case had no authority to change the plans by dispensing with vitrolite wainscoting in the corridors of the building, without the consent of the owner, and that an owner is not responsible for any mistaken reliance of the contractor upon the supposed authority of the architect.

In this case the contract between the owner and the builder for the erection of a house expressly referred to the drawings and specifications, prepared by the architect and adopted by the owner, and identified by the signature thereon of the contracting parties, and made them parts thereof. The drawings showed, by printed words in the spaces representing the corridors, that vitrolite wainscoting was to be used therein, but the specifications made no mention of it, and, before bidding for the work, the contractor examined both the drawings and specifications, but was informed by the architect that vitrolite was not to be used, and that he would erase from the drawings the words relating to it, but he failed to do so, and did not advise the owner as to what he had told the contractor, who bid for the work as a whole and did not, in terms either include or exclude vitrolite. He refused to put it in, and completed the work without it. The owner then caused it to be put in, and deducted the amount of the cost thereof from the amount of the contractor's bid. The Supreme Court of Appeals holds that the owner acted within his legal rights in making the deduction, on the ground that the drawings and specifications were both parts of the contract, and were not inconsistent with each other merely because they both did not show that vitrolite was to be used in the corridors, and on the ground that the architect had no authority to dispense with the vitrolite construction.

Effect of Trades Custom on Building Contracts

The Virginia decision covers the effect of trade customs on building contracts, approval of work by architects and damages for defective work and delays in performance of contracts.

Under a contract for the erection of a building it was provided that any dispute as to the interpretation of the specifications should be finally settled by the architect. In the prosecution of the work a dispute arose as to whose duty it was to underpin the wall of an adjoining building, and it was determined by the architect that the duty rested on the contractor. In this situation the Supreme Court of Appeals held that the determination would not be disturbed, although the contractor relied upon a custom to the contrary. The court declares: "There was no effort made by the contractor to bring home knowledge of this alleged custom to the owner or the architects, although they testified that they had never heard of such a custom; nor was there any evidence to prove that the custom was so general, uniform and notorious as to raise a prima facie presumption of knowledge thereof on the part of the parties to be affected thereby. There was also no proof offered as to fraud, or its equivalent, on the part of the architects in deciding the question submitted to them."

Holding that where a building contract stipulates for approval of the work by an architect by a writing or certificate, any writing which fairly carries out the purposes intended is sufficient, the court decided that an architect's act in marking a contractor's bill for a balance due for work, with the letters "O. K." and signing it with his initials, constitutes a sufficient certification of approval.

Another point decided in the same case is that the measure of damages for defective work done by a contractor is the excess of the value of a building constructed in accordance with the contract—the contract price—above the value of the building as actually completed.

The contract in this case provided that the contractor should observe all city ordinances and regulations of building inspection. City ordinances provided for building permits. The contractor applied for a building permit, basing his application on the original specifications which called for an excavation for foundations of a depth of 12 ft., but before the application was made the plans were modified by agreement calling for an excavation 14 ft. deep. Afterward the building inspector, on discovering the change in plans, ordered the work stopped, resulting in operations being suspended for about two months. Under these circumstances the court holds that the contractor was responsible for the delay occasioned by the action of the building inspector.

On the question of measure of damages recoverable against a contractor for inexcusable delay in completing the work, the court decided that if the owner, to the knowledge of the contractor, has tenants ready and eager to occupy the building immediately upon its completion, the contractor is liable for consequent loss of rents to the owner.

Readers of THE BUILDING AGE who may desire to refer to the full text of any of the decisions referred to above will find the cases reported as follows: Wisconsin case, Sterling Engineering & Construction Company vs. Berg, 152 Northwestern Reporter, 851. West Virginia case, Smith vs. Board of Education of Parkersburg District, 85 Southeastern Reporter, 513. Virginia case, Chesterman vs. Scott's Executor, 85 Southeastern Reporter, 502.

American Building Materials in San Salvador

There is noticeable in the newer buildings that are being erected by those who can afford to be particular about appearances the desire to get away from the monopoly of style which has largely prevailed as a result of the enforced limitation of available building material, says special U. S. Agent Harris, writing from San Salvador. It is believed that now is a favorable time for makers in the United States of goods suitable for the conditions in Salvador to get into the market and create a demand for the materials which will give the same results in security and yet afford a larger degree of satisfaction to those artistically inclined.

The Minnesota State Art Commission will hold its twelfth annual state art exhibition of painting, sculpture, handicraft, and industrial art at the Minnesota State Fair, Hamline, Minn., Sept. 6 to 12 of the current year. It is planned that the exhibit shall be as high in standard and as substantial in quality as last year, and a series of cash prizes as well as special awards are offered.

CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

The Screen Door Which Sags

From J. F. H., Indianapolis, Ind.—Probably every jobbing carpenter has at one time or another been called upon to fix that most exasperating of all household contraptions—a screen door which sags. Additional trouble is given the carpenter by the fact that the worst doors to sag—the 89c. doors from department stores—are of such flimsy construction that to fix them right would cost more than the price of the door, and the owner has spasms when the probable cost of repairs is mentioned.

When I have to hang these cheap doors, I raise them as high as I dare to at *B*, Fig. 1, in order to take care of a certain amount of sag, but in a few weeks the door will strike the floor or threshold at *A* and can never be shut unless lifted and set in place—something which is not done once in a hundred times, therefore the door normally hangs open a half inch or so, affording free passage for swarms of flies.

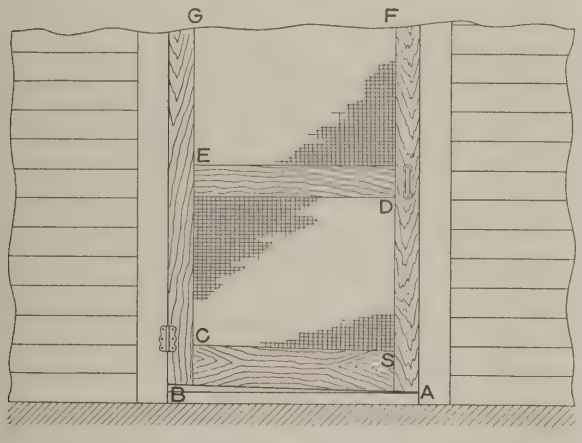


Fig. 1—The Sag of Door Shown from A to B

The usual way to fix the door is to cut in a diagonal strut or brace from *C* to *D*, and another from *E* to the top of the screen door above *F*. This method fails for the reason that the door is not fastened together strongly and the joints pull apart under the stress of the diagonal pieces, and the door soon sags as badly as ever.

Frequently attempts are made to cure the sag by screwing on a diagonal tension brace from *S* to the top of the door above *G*. This usually fails from the drawing of the screws under the severe pounding which the door is continually receiving as it slams under pull of the stiff springs which close the door. Unless the brace is very wide and can carry quite a number of screws, it will fetch away as the screws are pulled sidewise, and soon the door is sagging again.

I have worked out a way of fixing these cheap doors which holds well and which does not disfigure their appearance to any great extent. Certainly the remedy is not nearly as unsightly as the wooden struts or braces described above.

As shown in Fig. 2, the "Sag Restrainer" consists of a wire which is attached by means of screws, but which imparts its stress direct to the frame of the door and does not depend upon the strength of the screws to carry the load. Almost any available wire may be made use of for the purpose. In one instance, I removed the insulation from some No. 10 insulated electric wire and used that on a door, but the best and most convenient is a piece of stranded wire clothes line, which one may find in most 5 and 10-cent stores, and one of the 10c. packages will be enough for three 2-ft. 6-in. by 6-ft. 6-in. doors.

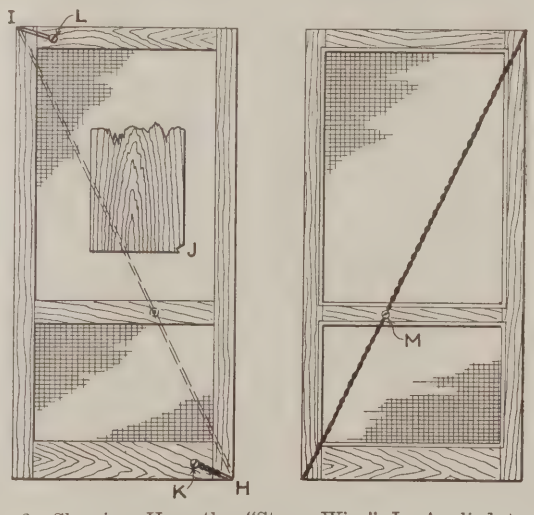


Fig. 2—Showing How the "Stress-Wire" Is Applied to the Door to Prevent the Sagging

The Sagging Screen Door and How to Remedy It—Sketches Submitted by "J. F. H."

To apply the wire, saw a little notch on opposite diagonal corners, of the door as shown by *H* and *I*, Fig. 2, and in detail at *J*, then drive two screws at *K* and *L*, letting the heads project on the side opposite that upon which the wire is fastened to the door. It will require about 16 ft. of the wire for each door. Fold this length in the middle and hook the bight over screw *L*, which we will say is on the outside of the door, the wire being on the inside. Place screws *K* and *L* on the side of the door opposite the wire cloth, hook the stress wire over the screw *L*, pass the wire over the top of the door and pull the wire tight in notch *L*. Then carry the wire through notch *H* and pull

the wire tight with the pliers. Don't give the wire any slack, but carry both ends around screw *K*, in opposite directions, then twist the ends of the wire together a couple of turns, tuck both ends down between the wires reaching from corner of door to *H*, bring one of the wires up over each of the stress wires, cut off the free ends, and press them down between the stress wires.

This makes a connection which will not slip under any strain likely to be put upon the stress wires. By taking a little care, the wires can be pulled so tightly with the pliers, that the door will be raised and will not drag, but the wires will settle into place a bit, where they pass over the edges of the door, therefore it is best to "tune up" the wires a little more by putting a screw between them as shown at *M*, locating this screw so it comes fair upon the middle stile of the door. With the pliers, twist the wires, using the screw upon the screw for that purpose, and after the door has been raised far enough by twisting the wires, hold the screw firmly with the pliers and drive it into the door until the screwhead is snug against the wires.

The screws *K* and *L*, on the opposite side of the door may then be set down snugly against the wires, and the door is ready for use. Should the wires bed themselves into the wood of the door and the lower stile again touch the floor or threshold, simply back out screw *M*, give it a turn or two with the pliers to tighten the stress wire, and replace the screw, when the door will be up again, free from the floor.

It will be noted that the screws *K* and *L* are placed in a peculiar manner in relation to the direction of the stress wire. The screws should be placed as shown, the short wire *K H*, making the same angle with the lower end of the door that the stress wire *H I* makes with the side of the door. This is for the purpose of holding the door rails and stiles firmly together so that no matter how severe the strain upon the stress wire there is no danger of a door thus reinforced being pulled to pieces by the diagonal strain same as when diagonal braces are screwed on or cut in between rails and stiles.

Screen doors are largely hung nowadays by means of spring hinges, but very few of the cheaper kinds give satisfaction, and it soon becomes necessary to add one of the coiled helical springs which sell two for a nickel, sometimes, and are attached to door and to jamb by means of two little hooks screwed into the door and jamb. In putting up these excellent springs locate the end which is attached to the jamb, six inches or more above the end which is attached to the door. This is for the purpose of holding up the door against its tendency to sag, and where the case is a slight one the springs can be made to cure the trouble completely.

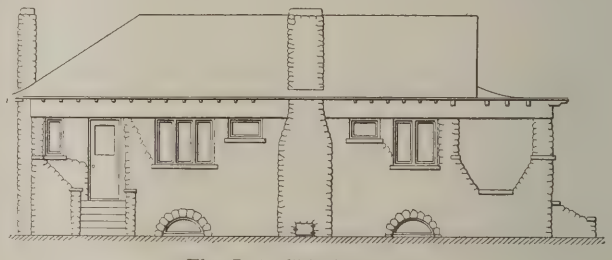
Some doors are warped so badly that a single spring, located about the middle of the door, or usually at the middle stile, cannot always be made to keep both top and bottom of the door fair against its stops. In cases of this kind, I put on two of the little springs, one at the top of the door and the other one at the middle stile, but if this will not bring the screen door fairly to a bearing, place the second spring at the bottom of the door and it will come to time—and to the jambs—without further trouble.

Designs for a Flour Bin

From D. P. B., Redford, N. Y.—In my opinion "W. W.," Providence, R. I., will have to use a little computation in arriving at the dimensions of his flour bin concerning which he made inquiry in a recent issue of the paper. A flour barrel holds approximately 4 cu. ft. and a bin 2 ft. high, 18 in. wide and 16 in. deep will contain 4 cu. ft. The vertical height must be taken to a horizontal line from the top of the back. The 16 in. must be taken from the center of the back, or half way between the bottom and the horizontal line from the top of the back. If I were building a flour bin I should fix the bottom just as the old-fashioned table leaves are fixed and use hinges. The measures here given will hold a little more than a barrel of flour.

A Six-Room Bungalow

From W. D. Lewis, Sioux Falls, S. D.—I am enclosing herewith a side elevation and floor plans of a six-room bungalow which I intend to build this season. It is a little different from the general run of bungalow designs, and it may prove of interest



The Left Side Elevation

Floor Plan

A Six-Room Bungalow as Planned by W. D. Lewis

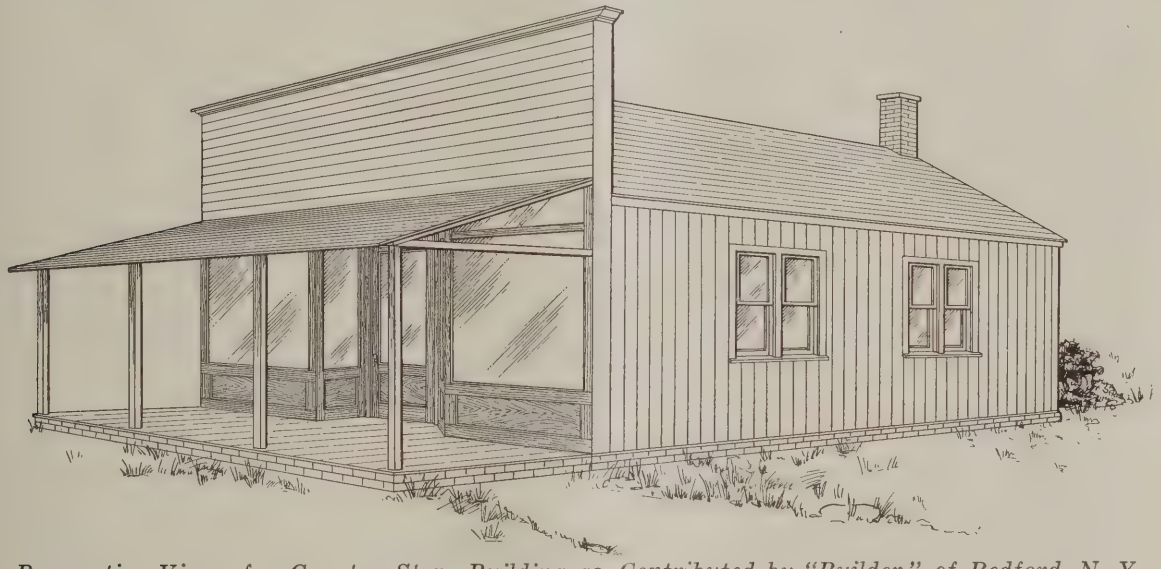
to some of those who are contemplating the erection of homes for themselves. The building is to be 27 x 36 ft. in plan and to have a porch 7 ft. deep extending entirely across the front. The walls of the house are to be hollow and constructed of

boulders and cement blocks, the latter being faced with large pebbles so as to hide the cement.

The hall and dining room are to have beamed ceilings. The lighting is indirect from the center of ceiling. The heating is to be by means of hot air furnace with the smoke passing through the concrete floor to the kitchen chimney, and through iron pipes leading through bath room and kitchen. Screens are hung beneath the sash in the air space. There will be an air-tight cistern to eliminate pumping. These are some of the ideas which I hope to incorporate.

Design for a Store Building

From Builder, Redford, N. Y.—Answering the request of C. B., New Brighton, N. Y., in a recent issue of the paper, I am sending a sketch of a typical country store as built in the past in this section of the country. The correspondent may "touch up" the veranda posts or not as he likes; they are done both ways. We always surface the vertical boards in order to get them to equal thickness and width, and the correspondent will have to arrange his side windows according to his needs as these, of course, vary with different owners. He may use a balloon frame covered with horizontal matched sheathing and cut in girts about 3 ft. apart. The vertical boarding runs up, as shown in the sketch, and nails at the plate. The frieze is put on outside the vertical boarding and the battens are on the under edge of the frieze and flush with it. On the gable the returns are made to carry the gable cornice just as in a pediment. The moulding is handmade. Heavy tar paper should be put between the boarding.



Perspective View of a Country Store Building as Contributed by "Builder," of Redford, N. Y.

Construction of a Small Ice House

From H. G. G., Leslie, Mo.—Will some of the readers of the paper kindly furnish, through the Correspondence Department, the dimensions of a small ice house having a capacity of about 75 tons of ice. What I especially desire to know is the best and cheapest way to build the walls and roof so as to keep the ice through the summer months.

I have been reading THE BUILDING AGE for the past five years and have found it a great help to me.

Note.—If our correspondent will refer to his volume for 1911 he will find in the January, April, June, and July issues, articles relating to the construction of cold storage rooms and houses, and in connection therewith is given information as to the proper manner of insulating the walls. In the issue of the paper for March, 1914, there is also an article describing the construction of a concrete ice house having a capacity of about sixty tons.

We shall, however, be glad to have the readers of the paper describe some of the work which they may have recently executed in the way of ice house construction and to furnish sketches of the work so that their replies may be illustrated for the benefit of the correspondent in question as well as for others who may be interested.

Design for China Closets, Bookcases, Etc.

From Cabinetmaker, Clinton County, N. Y.—I do not believe "W. O. H.," Minatare, Neb., needs any drawings to help him in making his improvements. Let him secure a furniture catalog and find a china closet that suits him. That will give him an idea of what the front should be. Then cut a hole in the wall as large as he requires, say 18 in. deep and ceil it up nicely inside. First put in jambs as for a door; case it up, run the room base across the front, build up level with the base inside and then put in three drawers on a side varying their height according to requirements, and put glass doors above. The drawers should have home-made wooden pulls.

The bookcase should be made in the same way except that only one drawer should be under the doors and the shelves should not be more than 12 in. deep. If the bookcases are high the doors should be in two sections and should slide instead of swinging, which is a sure way to break glass. The kitchen cabinet may be built in about the same manner as the china closet.

The sink is a different proposition. A niche must be cut for that as high as the doors and a foot longer each end of the sink. The back must be lined

with rough lumber and ceiled all around with hard wood. The sink will be fastened at the back to the wall, as it will have no other support, and it must not be boxed in. A small window should be placed on one end of the sink.

For his colonnade the correspondent should build something like a square cornered bay window as high as he likes with as many windows as circumstances require. He should then set up his columns 4 or 5 ft. apart, starting with ¾ columns at the corners. If it is an outside colonnade the work will be different and easier.

Details of Pocket Window Frame

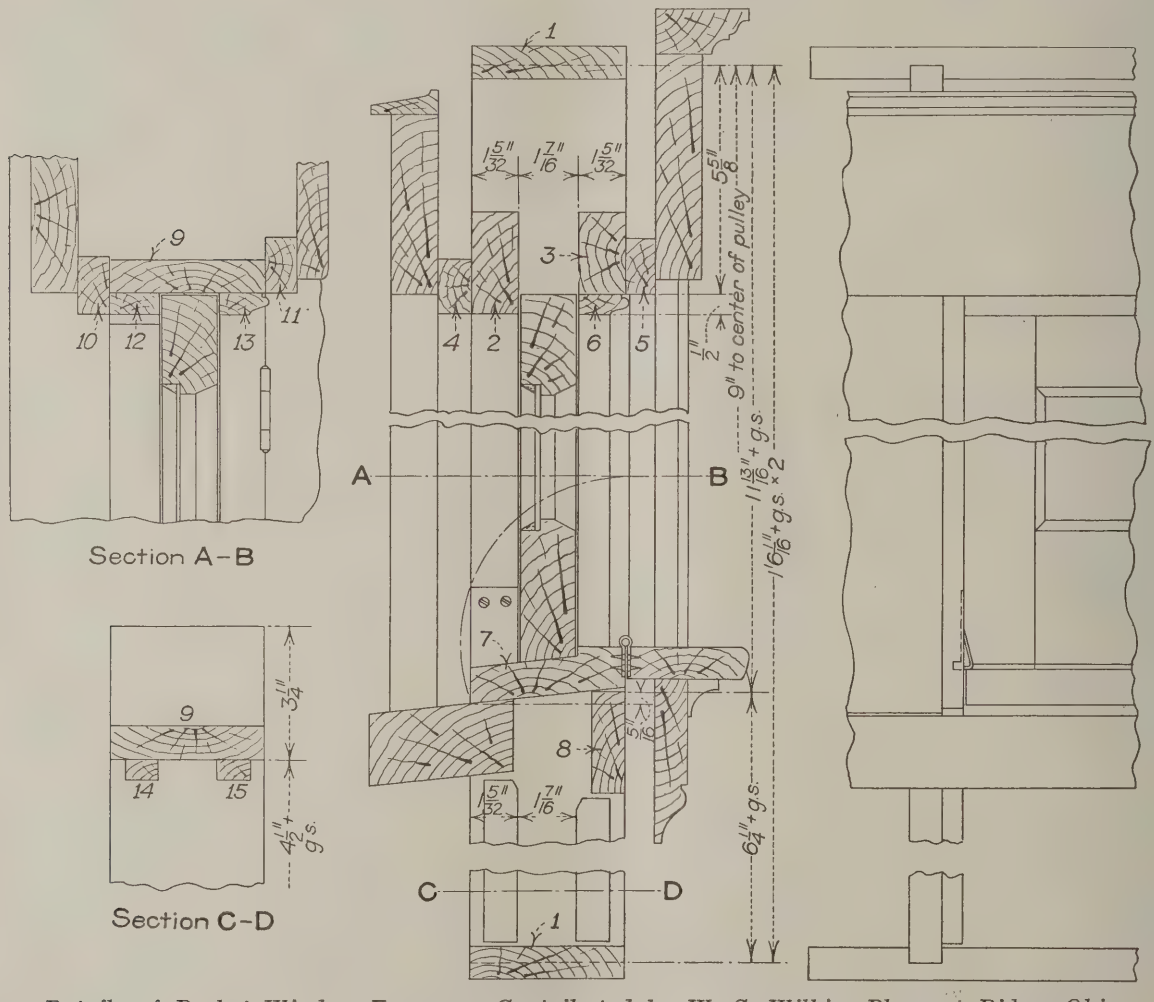
From W. S. Wilkin, Pleasant Ridge, Ohio.—I am inclosing herewith details of a pocket window frame, together with brief description, which may be of interest to some of the readers of THE BUILDING AGE. It is a frame that is sometimes used to inclose a porch for what might be called a "sun parlor" or "sleeping porch." A porch is often screened in for sleeping purposes, but I think the one here shown is better; first, because it can be used the year around; second, it can be heated in the winter months, and third, if the frames are set close together a pair of wide French doors may be used at the steps so that the porch may be opened up on pleasant days and thus obtain all the ventilation needed.

Another nice thing about this porch is that if placed on the first floor the frames may be set up pretty well and sided and ceiled so that the space may be used for sleeping purposes yet the beds will not be seen from the street. If a storm comes up in the night all that it is necessary to do is to close the windows.

I think there are but few frames of this kind in use, or at least I never saw many. We have made a job from two of them something like this. I think both builders and millmen are likely to be interested in frames similar to those here shown, for it is very often the case that the builder will do his own mill work, and even if he does not he should know something about mill work.

It will be seen from an inspection of the drawings that this frame is so made that it can be set up pretty well and still open the whole window by dropping it down instead of raising it up.

There is a small pocket at the top so that the sash will slide up far enough for the sill to run in as shown by the dotted line. It should clear the sill about an inch so that it will not strike the figures when opening the sill. The sash is then dropped down into the pocket below and the sill closed over it.



Details of Pocket Window Frame as Contributed by W. S. Wilkin, Pleasant Ridge, Ohio

It will be noticed in the cutting bill that the sill, No. 7, is cut 1/16 in. shorter than the width of the frame to allow for standard ½-in. stops. The outside stop fills the opening between the end of the sill and the pulley stile to keep out the water.

I have shown a piece of sheet metal bent in the shape of a latch, and housed and screwed to the

outside sash stop as indicated in the sectional and front elevations. This will hold the sill down close and at the same time turn the water. As will be seen, however, there will still be a little opening in front, but this might be overcome by allowing the outside lining to project over it.

The sash pulley must be set high enough so that the weight will have good clearance at the bottom when the sash is in the pocket above and so it will not strike the pulley when the sash is all the way down.

I have not shown any pocket cut in the pulley stile, because I think it just as good practice to leave one or two ceiling boards so that they can be taken out and will not weaken the pulley stile.

Number	Pieces	Thickness	Width	Length
1	2	13/16	3 3/4	11" + g.s.
2	1	1 5/32	2 1/2	6 1/8" + g.s.
3	1	1 5/32	2	6 1/8" + g.s.
4	1	13/16	1 3/8	3 1/2" + g.s.
5	1	3/4	1 3/8	4 1/2" + g.s.
6	1	1/2	1 1/4	4 1/2" + g.s.
7	1	1 1/8	3 15/16	3 7/16" + g.s.
8	1	13/16	2 1/2	6 1/8" + g.s.
9	2	13/16	3 3/4	1'6 1/16" + g.s. × 2
10	2	13/16	1 3/8	7 3/8" + g.s.
11	2	3/4	1 3/8	7 1/2" + g.s.
12	2	1/2	1 5/32	5 3/4" + g.s.
13	2	1/2	1 1/4	6" + g.s.
14	2	1/2	13/16	3 5/8" + g.s.
15	2	1/2	13/16	3 1/8" + g.s.

g.s = glass size

Detail of Pocket Window Frame, the Cutting Bill

The measurements here given are for standard sash in this part of the country; 2¼-in. stiles and top rail and 3¼-in. bottom rail, making the sash opening 4½ to 5½ in. over the glass size. Of course this cutting bill could not be used if the frame was changed in any way.

I have given the dimensions and made out the cutting bill to afford the readers an idea of my method of getting out this kind of work. It will be seen that the cutting bill does not give the full length of the pieces, but just the length plus the glass size.

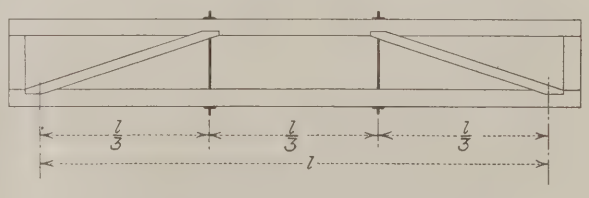
After the cutting bill and detail have been made in this way it will be easy to take the detail at any time and pull out frames for any size glass as long as that detail is followed. This will save time and mistakes for the man doing the billing, and the man doing the cutting can see just where each piece goes, while the man putting them up can see just how they are intended to go together. The pieces, No. 2 and No. 3, are made heavy enough to nail to them the inside and outside finish. I have not given any dimensions for inside and outside finish, for the latter would probably run clear around as the belt course. The runway should be about 1 7/16 in. for 1⅜-in. sash in order to allow it to slide free.

I hope that what is here presented may be of suggestive value at least to some of the readers of the paper.

A Problem in Truss Construction

From Ernest McCullough—The problem of "A. J. G.," Chester, Pa., is one that does not justify the expense and trouble of making such an elaborate truss. The computations are right enough but in computing the sizes of the members not enough additional material was added to allow for cutting of holes and splicing. In such a small truss these items frequently double the sizes fixed by close computations. The verticals should be rods, for it would be difficult to get enough nails in the connections to take the tension. A plank 3-in. x 20-in. would do the work with not enough lateral stiffness to stand the thrust from the sloping rafters resting on it, but if they are spiked to the plank they will of course stiffen it laterally. For the character of truss, considering the large sections necessary with the small depth, the method used for figuring deflection will do. On account of the numerous joints the deflection might easily be two to four times as much as the computed deflection.

If a plank large enough cannot be secured then the best form of truss to use will be a simple trussed beam of the Queen type (two vertical tie rods). Divide the span into three equal parts. The load on each vertical will be one-third the total load and this will be tension. On the sloping ends the compression will be equal to the load on the joint multiplied by the sloping length divided by the depth. On the straight section in the bottom the tension will be equal to the load on one joint multiplied by the length (one-third the span) divided by the depth. The tension in the lower chord will be equal to the compression in the middle section of the top chord. All dimensions in feet. All measurements made on the center line of the pieces and rods. To take care of deflection make the top horizontal section one-quarter of an inch longer than the distance between



A Problem in Truss Construction

the holes in the lower section. Draw up tight with the rods so the bottom chord will have a camber. It will straighten when put in place. This increases the compression and tension.

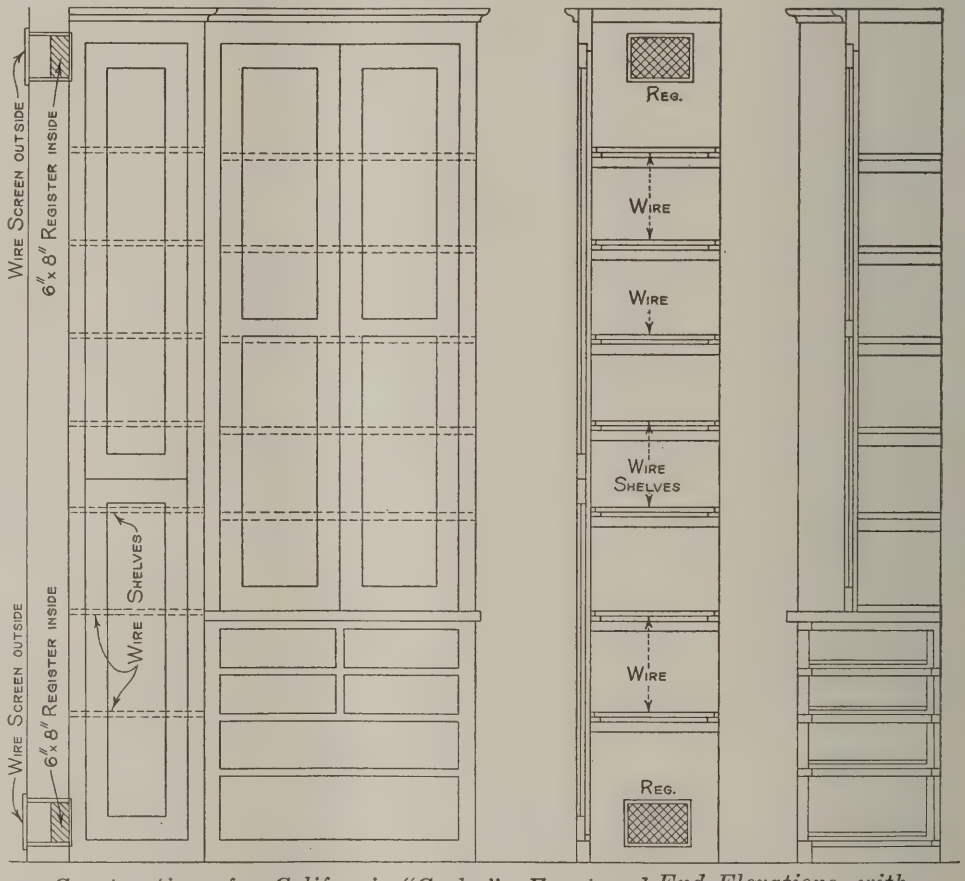
The top chord will also be uniformly loaded with the rafters resting on it. It must be designed for this load and also designed for the compression brought on it as the top chord of the truss. Cut notches in the bottom against which to rest the braces. Add material to the depth to allow for the notches. Cut notches in the top of the bottom chord

against which to rest the braces. Add material to the depth to allow for these notches. Use not to exceed 800 lbs. per sq. in. for compression and not to exceed 1200 lbs. per sq. in. for tension in the wood. At the ends of the truss place uprights to act as supports for the ends of the top chord, which carry the rafters. The clear span is 22 ft. The length of the truss, measured on center lines, should be assumed as not less than the distance center to center of the posts on which it rests. This will bring the vertical reaction over the center of the supporting post at either end and guard against excessive shear.

Construction of a California "Cooler"

From M. H. G., San Diego, Cal.—I would take it as a favor if in some future issue there might be given details for what in this section of the country is called a "cooler." I would say, however, for the benefit of those who are not informed that "it is nothing in a glass," but is a kitchen cupboard or cooler in which provisions may be kept with some degree of safety from spoiling from heat. There are some principles involved relative to insulation, I believe, and I know there are many wood merchants here who would like to know these details.

I am always glad to get my BUILDING AGE. I read it, re-read it, and keep it for reference. The splendid helps we get from the older and experienced mechanics as published in the Correspondence columns are indeed many and various, and I believe they know how we younger members of the tribe appreciate them, especially when, as I have done, we ask for additional information.



Construction of a California "Cooler"—Front and End Elevations, with Vertical Cross Section Showing the Wire Shelving

Note—Some years ago we published designs of houses in which were installed a California "cooler," and we showed in connection therewith detailed drawings which are probably what our correspondent has in mind. We have reproduced herewith drawings of one of these coolers showing front and end elevations and also a cross-section clearly indicating the general arrangement and construction. The cooler is placed against the outside wall of the house in close proximity to the kitchen and with vents near the top and bottom covered with wire screen on the outside and having a 6 x 8-in. register on the inside. The shelves are also made of wire so as to permit of a free circulation of air.

With all this said, however, we trust our architectural friends on the Pacific Coast will furnish for publication details of any recent work along this line which they may have executed.

Discoloration of Brick Work

From W. W. T., Cape Girardeay, Mo.—Last winter we had a job of brick work laying the face brick in red mortar. The mortar froze and pealed out about ½ in. deep. We tried to repoint this work with red mortar but the mortar bleached out white, leaving the wall spotted. Will some of the practical readers tell us what we can use to make a uniform face wall.

Design Wanted for Grange Hall

From L. D., Shippensburg, Pa.—Will some of the architectural readers of the correspondence columns furnish a design for a modest Grange Hall with audience room, ante room, children's and visitors' room, all on one floor, but so arranged that they may be thrown together into one room on special occasions. I would like a kitchen and store room in the cellar. The exterior of the building should be of pleasing appearance and the cost should not exceed much more than $1,500.

According to E. T. Allen, forester of the Western Forestry and Conservation Association, Portland, Ore., lumbering is the greatest American manufacturing industry and is exceeded only by agriculture in supplying the essentials of life.

Conveniences of the Modern Dwelling

A Few of the Many New Wrinkles Which Appeal Strongly to the Judgment of the Home Buyer

By G. D. Crain, Jr.

"WELL, I've seen 'em," said Smithers.

"Whom — the Follies?" inquired his frivolous friend.

"Certainly not," said Smithers, with some asperity. "I mean that I'm going to buy a house, and I've been looking over everything within a radius of 10 miles from the office building where I earn my not-too-luxurious living. And, let me tell you, they're certainly putting some new wrinkles into homes nowadays. It looks as though the architects and builders and real estate men, and everybody else interested in selling houses, have been trying to pull 'new stuff' in every building they put up. And lots of the ideas are good.

"For instance?"

"Well," Smithers said, "one of the best things I saw today was in a house in Woodland, the new suburb. It is a rather large house, but is on a small site. The result is that the basement is restricted in area, and when it is cut into by the furnace, coal-bin, laundry-trays, etc., there isn't much room left. Usually the cold-air intake, which rests on the floor of the basement, uses up so much space that half of the basement is out of commission. In this house the builder met the problem very neatly by putting his cold-air pipe under the basement. That is, he had the furnaceman lay down the pipe before he put his concrete floor in the basement. There is no reason to believe it will ever need attention, and so the position is perfectly all right. And it certainly gives a clean, roomy appearance to the basement.

Construction of the Coal Bin

"Another thing in that basement that attracted me was the coal-bin. Usually the builder, if he puts up anything at all, uses old, rough planks to hold the coal in place, and if the basement is at all 'classy,' its appearance is largely spoiled. In this case the material was pine flooring, tongued and grooved, which undoubtedly cost a little more, but was much more substantial-looking, and improved the appearance of the bin very much. That's a minor detail, but it counts.

"We have a laundress who abhors concrete floors, and in the house we have been occupying it has been necessary to provide an old plank for her to stand on. In one house I saw today I was glad to note that the builder had appreciated the proposition to the extent of placing the tubs on a platform made of wood. The laundress will certainly bless him for this improvement."

"Say, you must have camped out in the basement of the houses you went into," said his friend, who was making a very agreeable audience. Smithers needed a sympathetic outlet for all of the information he had picked up, anyway.

"Well, don't forget that the basement is one of the most important parts of any home," he retorted. "And it's really getting the attention that has long been due it. Take, for instance, the basement garage. That is becoming more general in these days when every man has his buzz wagon. A neat stunt which was worked in that connection in a house I saw had the garage section about 8 in. below the rest of the basement, so that there would be no danger of water used in washing the car running over toward the furnace or coal-bin. A drain was placed at the right point for handling this water, while just outside the heavy doors which admit the automobile was another drain to take care of storm-water.

The Drainage System

"Speaking of drains, another house I saw had a runway leading from the rear yard into the basement and entering a small room just off the basement proper. This is to be used as a toolroom, etc. The coping around the entrance was high enough to keep water from running into the basement from the outside, but while I was there the builder was tearing up the concrete of the runway. He explained that they had found that enough storm water fell into the runway to make the basement very mucky and untidy, and it was necessary to place a drain just outside the door to take care of this. The tool-room idea was very nifty, I thought, and with the water problem disposed of, it ought to be mighty useful to the owner.

"I was told of another stunt used by a contractor who got a belated order to put in a drain in the pantry for the refrigerator. The position of the latter was rather unhandy for a connection with the rest of the piping, but it happened that the servant's toilet had been located in the basement, just below the refrigerator. The idea occurred to him to run his pipe to the water-box of the toilet, and as the water was perfectly clean and pure, this plan was O. K.'d by the architect and put into use. It was a convenient way out of an otherwise unhandy proposition."

"Come on up-stairs, will you?" insisted the audience. "I'm getting tired of this basement business."

"All right," agreed Smithers. "I saw today an attractive Colonial house which had a dream of a living-room. It was very large, with handsome win-

dows, and a tall mantel that carried one back to the days of yore. The door opened directly upon the living-room, and I was told by the man who had the house to sell that in small homes the use of the space for a reception hall was obsolete, and that making the living-room larger was the much better plan. However, it seems to me that this is open to objection. In the first place, the hall protects the living-room from the cold air which comes in when the door is opened. It must be really disagreeable to be sitting in a room and exposed to the elements every time anybody leaves or enters. Besides, there is no place for guests to hang their hats and coats. In this house there is a small hall in the stairway, which is back of the living-room. Consequently the arrival must cross the latter, enter the very small space provided for the hall and remove his outer garment before he is comfortable. It seems to me that the hall is a very necessary part of a house, and that it is a mistake to try to get along without it. But it certainly enables one to present a very impressive living-room.

"I notice that the idea of building porches across the entire front of the house seems to be going out. This is partly because the bungalow idea, which was responsible for this design, appears to have been overworked, and people want to get away from it. Also, I was told, a wide porch darkens the front rooms of the house, and is objectionable on that account. The favored plan now seems to be to run the porch across or around the corner of the house, but to leave most of it uncovered, so that while it offers ample facilities for sitting outside, it does not cut off the sunshine and air.

The Space Well Utilized

"The Colonial house I spoke of is very broad and low. There is a second floor, but the descending eaves cut into the rooms considerably. This made a lot of space between the walls of the rooms and the roof of the house. My attention was called to the fact that instead of making ordinary closets out of this space, a 36-in. door had been provided in one room, making a real trunk-room out of it. And the builder had given the owner the advantage of every cubic foot of this space he could squeeze out, knowing that storage room, especially in a small house without an attic, is at a premium.

"Owing to the fact that high basements are becoming more common, due, I suppose, to the popularity of basement garages and the consequent necessity of providing more space below, the first floors of some houses are so high above the ground that a side entrance must be equipped with a stairway. In two or three houses I visited these stairways were decidedly scant in all respects, and headroom was by no means plentiful. While such a stairway does not seem important, it is likely to be used very frequently, and the owner will surely execrate the designer for causing him to bump his head so frequently.

"Sleeping porches are 'it' now, along with basement garages, and are mighty good things, I believe. The fresh-air idea contains a sound principle, and while many people might not care to use their porches in the winter, they would certainly appreciate them in warm weather, when it is often difficult to sleep comfortably indoors.

"A plan which was used in connection with one sleeping-porch I saw looked good, though there are some objections to it. The porch had been built with 'street-car windows,' which let down into the casement when the owner desires to have the maximum of air. The covers for these openings fit over them snugly, and disappearing hinges were used, so that the appearance of the windows is good. The only trouble suggested was that if the construction were not tip-top, water would work its way inside, the windows would be damaged and other inconvenience experienced. But I could not see why the plan should not work excellently. The use of the windows enables the room to be used during the winter, when it might not be desirable to have all of the air possible. This kind of regulation would appeal to the average person, I'm sure."

"Well, after seeing all the houses," inquired his friend, "which one are you going to buy?"

"To tell you the truth," confessed Smithers, "I got so many good pointers from all those I saw that I'm going around to an architect tomorrow and let him include them in a house built just the way I want it. But if they keep on springing new ideas in home building, I'll be wanting to trade it for a new model about 1917."

The Inspection of a Building Job

"One of the great problems which the contractor has to face," says Leonard C. Wason, in a paper read before the Boston Society of Civil Engineers, "is that of the inspector who represents the engineer on the work. A thoroughly competent inspector is a great help to the contractor and very beneficial in the results obtained; an incompetent one is exactly the reverse." Mr. Wason points out some of the important qualifications which the ideal inspector must have—an even temper not easily ruffled, a considerate yet firm attitude, always diplomatic and capable of performing his duties acceptably to his employer.

"The superintendent for the contractor is necessarily better informed and better trained in construction—an executive who is constantly directing others and is quick to resist, for the good of the service, insubordination or usurpation of the duties for which he is held to strict account by his employer. Trained to be an autocrat, his temperament does not take kindly to being bossed by another man admittedly with less experience."

It is evident that the inspector must not consider it a personal affront when his orders are overruled. He will make some mistakes which the engineer will correct—many more which his chief will never hear about, although they make unnecessary expense and may affect his chief's professional reputation. He is put in a trying position, the most frequent cause of friction in which is when he assumes certain duties inherent in other men. His most common mistake is in giving the workmen orders direct. It is only by following his own duties and those alone that satisfactory results are obtained and the expense of the job kept within limits.

Typical Country Plumbing Installations*

Equipment of a Country Residence—Details of Soil, Vent and Waste Connections to Modern Fixtures

THE roof connection shown in Fig. 6 is about as good and lasting as can be devised. It is only necessary to bring the pipe up to a point where the back part of the hub is on a line with the roof boards and then to beat a piece of sheet lead about 21 in. x 24 in. around the hub in the manner indicated. The lead is cut so that it may be turned down inside the hub to a level which will be beneath the line of the calking lead.

Then when the short piece of iron pipe which is to finish the stack is calked into place the joint between the roof flashing and the pipe is a thoroughly tight one and neither sewer air nor rain can penetrate the connection. The upper part of the flashing is carried up so that it will reach the second course of shingles or slates. Thus no rain can find its way between the joints of the roof covering and so down behind the lead. Whatever comes in then will be carried back to the outside of the flashing. If it only reached to the first course there would be a chance of leakage in windy weather especially. The lower part of the lead is carefully dressed over the courses of slate beneath the line of the pipe, and it is always well to get these flashings in before the slates are placed, so that the sides may be protected also by the slates. If they must be put on over the shingle or slate the lower edge of the flashing should be turned back beneath the lower course and dressed down tightly. This will prevent the edges from being blown up in a wind. The part around the hub need not be dressed closely in unless for good appearance. A good workman can dress the lead so that it will fit the hub closely, but a certain amount of care is necessary to prevent thinning the parts unduly and so weakening them at a vital point.

The kitchen fixtures are served by Stack No. 4. As there are only two sinks on the line it is made of 3-in. diameter cast iron. Any larger size is unnecessary and would, in fact, be a disadvantage, as it would not flush so thoroughly, and there would be some liability to collection of grease on the walls of the pipe. The connection at the base of the stack is made as previously described. The vent and waste connections to the vegetable and dish-

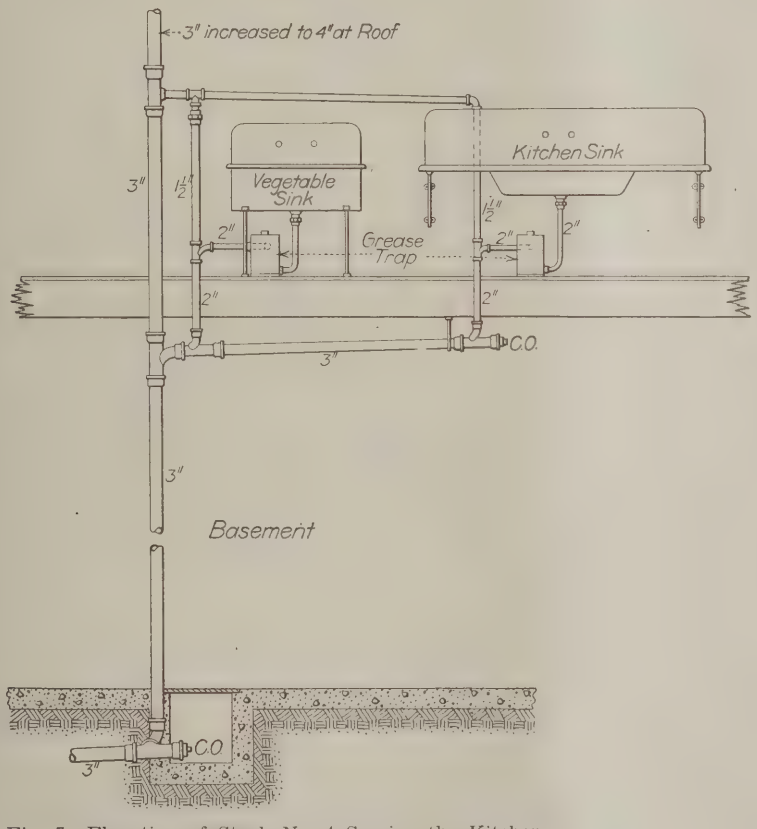


Fig. 7—Elevation of Stack No. 4 Serving the Kitchen Fixtures

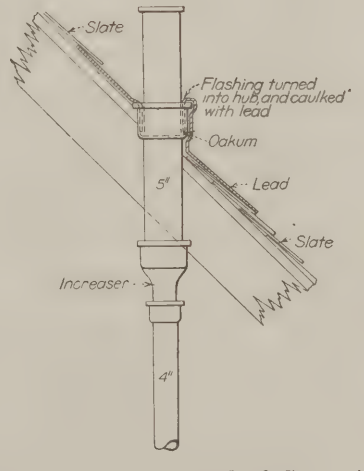


Fig. 6—Detail Showing Roof Connection for Soil and Vent Pipes

Typical Country Plumbing Installations—Equipment of a Country Residence

*Continued from page 57 of the July issue.

washing sinks are as simple as possible, and the traps are connected back into the vertical branch connections so as to afford a continuous vent connection.

The fact that there is more liability to stoppage of the waste pipes at this point than at any other in the system should be borne in mind when arranging the waste lines. If a cleanout is left at the end of the horizontal line catching the wastes from the two sinks access will be easy when necessary, but it is better also to provide grease traps with water-cooled jackets so that the grease will be solidified in the traps and held for removal.

Such traps are illustrated in the sectional elevation of Stack No. 4 in Fig. 7. They are of various sizes to suit the needs of the house, but are always provided with large cleanout tops, easily detached, yet providing gas tight joints. The water supply

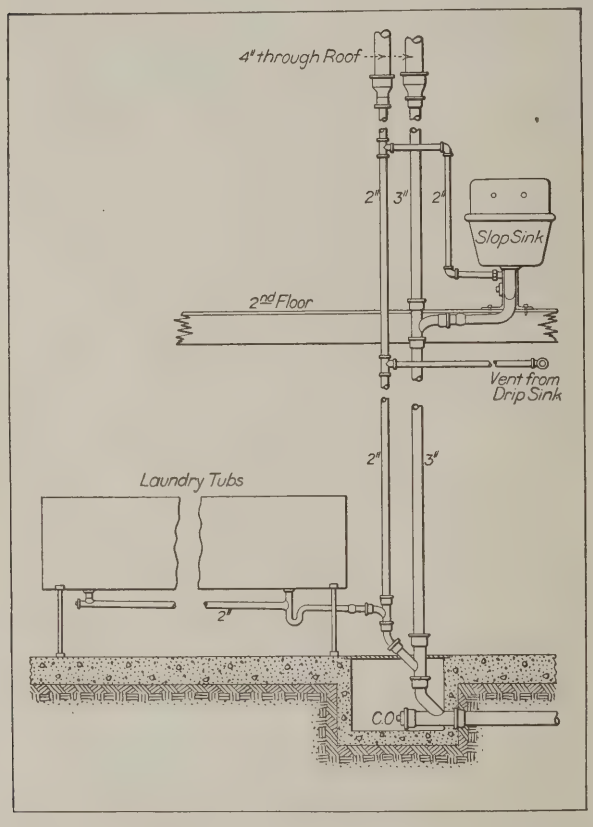


Fig. 8—Stack No. 6 Serving Laundry and Slop Sink

to the sink is caused to circulate around the jacket before it is connected to the faucet.

The vegetable sink may be of any material preferred, but satisfactory results are given by those constructed of galvanized cast iron and these are commonly used. The provision of such a fixture is a great convenience in a kitchen where much cooking is done. In some cases it may be preferable to install it in the cellar, but this is a matter for individual preference to decide. It may be recommended, however, for general use, as it allows of the regular sink being kept free for use in drawing water or in washing dishes while the other is in use in the preparation of the food.

A pantry sink is all that is served by Stack No. 5, while No. 6 serves the laundry tubs in the basement and a slop sink on the second floor. The vent pipe is carried up from the laundry tub waste connection and receives the vent pipe from the drip sink in the laundry and also the revent pipe from the slop sink before it is carried through the roof. It is increased in size to 4 in. a few feet below the roof line, and is flashed with lead as previously described. The waste line from the slop sink is also 3 in. in diameter, and is increased to 4 in. at the same level as the vent line. The slop sink is connected by means of a lead bend and a cast brass ferrule. The waste pipes from the laundry tubs are connected into a common trap of the half S variety. The short pieces connecting the tub outlets with the horizontal pipe are branched in at an angle so as to facilitate the flow. The details of this stack are shown in Fig. 8

Riser No. 7 serves a bath room on the second floor identical with the others in equipment, and also the vent pipe from the photographic room equipment. The connections are made as previously described for fixtures of a similar nature. The sink is of enameled iron supported by concealed hangers and the lavatory of a substantial wall pattern with round front and high back. Wooden drip trays are provided at the sink in preference to enameled iron, this being for greater safety and

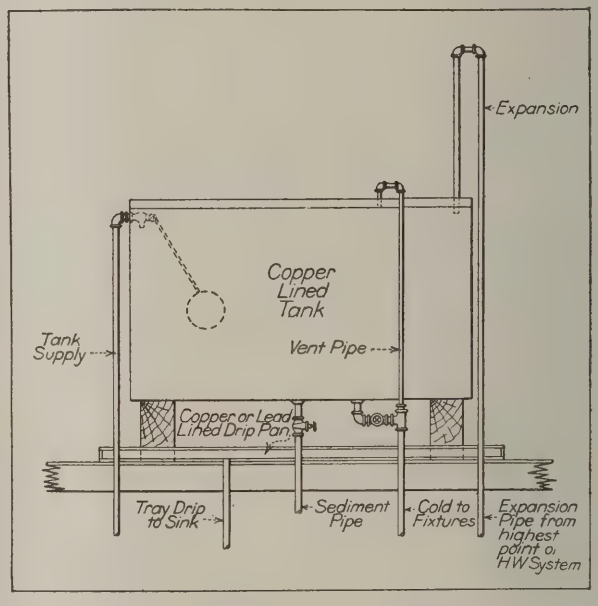


Fig. 9—Connections to Attic Tank and Arrangement of Expansion and Vent Pipes from Hot and Cold Supply System

Typical Country Plumbing Installations—Equipment of a Country Residence

protection against breakage of glasses and bottles when setting them down in the subdued light necessary in that room.

The water supply to the building is by gravity from a spring. There is a collecting reservoir at the spring and in addition a storage tank in the attic. The connections to this latter are seen in Fig. 9. A copper lined tray is placed beneath the tank to take care of any condensation or leakage, and a waste pipe from here is taken to the drip sink in the basement. The tank is of wood built up in sections of about 1 in. thick by 2 in. wide, the ends lapping alternately. The supply to the fixtures is taken off in such a manner as to provide for vent when the valve is closed. Thus the pipe may be drained completely, as no water will hang in the pipe through lack of air. A sediment pipe is also provided whereby the tank may be flushed out

periodically. This is connected to one of the rain water leaders, which is carried to the outside drain serving these in cast iron. Thus there is no connection with the sewer system, while the water is carried away satisfactorily when it is necessary to wash out the tank.

The connections where the main supply pipe from the spring enters the building are shown in Fig. 10. A 2-in. galvanized iron pipe conveys the water from the spring reservoir and this supplies some outbuildings before it reaches the house. A gate valve is placed in hydrant box just outside the wall of the house, so that the supply may be closed off when necessary by those having authority, but avoiding the risk of accidental closing such as might obtain were it placed inside. The reason for the

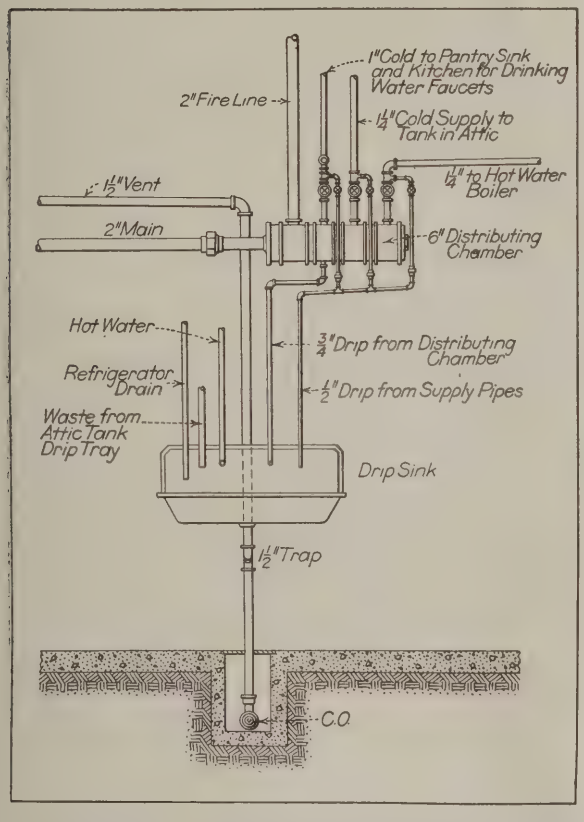


Fig. 10—Distributing Chamber on Main Supply to House with Connections to Hot and Cold Distributing System and Drips to Empty System

safeguarding of this point is that a fire line is provided and there is of course no valve between the main and the hose connections in the halls of the house. Therefore the extra provision on this score, as the water is then immediately available if necessary.

A 6-in. distributing chamber is used at the point where the various connections are made. This insures an ample supply to each branch and a favoring of no one at the expense of another. The chamber is made up of tees with short nipples between and the ends are caps, one of which is tapped to suit the 2-in. pipe, while the other is closed with a plug. It is placed over the drip sink in the laundry and the connection to the drip sink faucet serves also as a drain for the distributing chamber should the water be shut off the house and the pipes drained. Tees are placed behind the control valves on the various lines and drip pipes connected back from these also, as shown.

A connection is taken directly from the chamber to the hot water boiler and the connection there is made as shown in Fig. 11. This provides a means of filling the boiler should the tank in the attic be empty for any reason, although at all other times the supply will come from that tank.

Fig. 11 also shows the method of making the flow and return connection to the heater and to the fixture supply loop. The method of circulating the hot water is extremely simple. A flow pipe is carried direct to the attic and at the highest point a

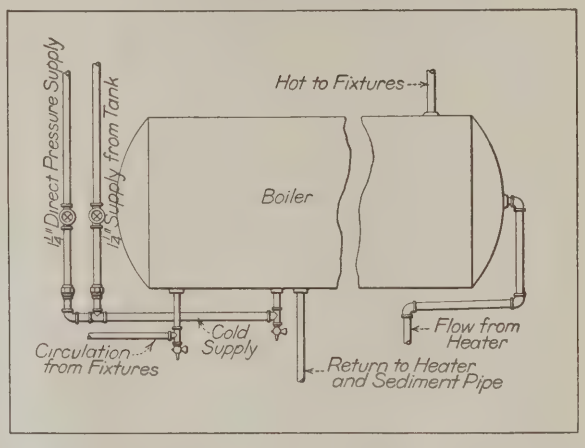


Fig. 11—Connections from Tank and Main Cold Supply to Hot Water Storage Tank

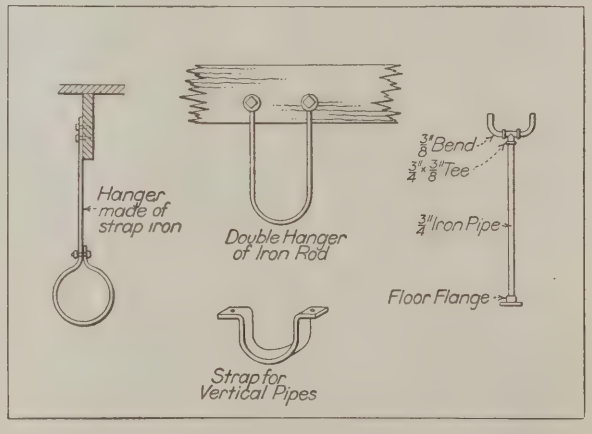


Fig. 12—Various Types of Soil Pipe Hangers and Supports

Typical Country Plumbing Installations—Equipment of a Country Residence

vent pipe shown in the elevation of the tank connections in Fig. 9 is placed. Then the flow pipe is carried around the attic and at the proper points the branches for the various bath rooms are taken off and dropped down to the basement. The connections to the loops in the attic are made from the under side of the pipe and a valve is placed on each branch.

A valve is also placed at each return connection to the corresponding return loop in the basement, and these are closed down so as to maintain the circulation in the branch only sufficiently to balance up the system. Thus the supply to the farthest away fixture is drawn as quickly and at as high a temperature as those nearer the boiler.

In a building of this nature, where the runs are comparatively long and the height inconsiderable, this system is preferable, if it is at all possible to

install the flow pipe in the attic. If it is feared that damage might result from condensation or leakage of the pipes gutters can be formed beneath them where they cross the ceilings of the second floor rooms. It is sometimes done where a particularly expensive finish is provided in rooms over which pipes are carried and does not call for any great expense.

Connections should also be made to some fixtures for the supply of drinking water direct from the spring. As a rule the pantry and kitchen sinks are provided with special faucets for this purpose, and occasionally drinking water faucets are provided in bath rooms, also, besides the regular cold water supply from the attic tank. The outlet of such faucets may be bushed down to provide a smooth running stream without trouble, and this is always appreciated.

Six Months' Building Operations

For several months past the Eastern states have been showing a greater degree of activity in the building line than was the case during the corresponding period a year ago, and it is very interesting, therefore, to note what has taken place in the largest city in this section of the country. The figures given out by the superintendents of the Bureaus of Building in the five boroughs constituting Greater New York, and covering the first six months of the present year are considerably in excess of those for the first half of 1914. For the former period the total was $94,871,433, and for the corresponding period a year ago $81,904,051. Of these totals $86,027,961 and $71,379,408 represent respectively the estimated cost of new structures for which permits were taken out from the first of January to the first of July during the two periods under review. The remaining differences represent the estimated cost of alterations and repairs. Not only was the first half of the current year ahead of 1914 as regards estimated expenditures, but the number of buildings planned in the former period was 235 more than in the latter period.

Taking the figures for the borough of Manhattan it is found that the new buildings planned involve an estimated outlay of $39,638,720 as against $26,276,940 in the first half of 1914, this increase being due largely to the permit for the new $10,000,000 county court house filed in May and to the greater activity in the planning of store and loft buildings costing in excess of $30,000 each. As contrasted with the same period a year ago, the first six months this year show a slight falling off in the planning of office buildings, schoolhouses, manufactories, hospitals, stables and garages.

In the Bronx the feature of the building situation has been the activity in brick tenement house construction, plans having been filed for 303 to cost $13,590,500, which figures compare with 163 buildings estimated to cost $7,438,000 in the first half of last year. The total estimated cost of new construction work this year was $15,897,500, with $610,731 for alterations and repairs, while in the same period of 1914 the estimated expenditures were $10,003,142 and $684,936 respectively.

Brooklyn has been planning more buildings this year than last, but the estimated cost of those for which permits were issued in the first half of 1915 was $3,496,225 below the figures of a year ago. On the other hand, the alterations were more extensive this year than last. The gain in new buildings was due to the large number of tenement houses costing less than $20,000 each. There were 208 of these structures projected to cost $1,926,100, as compared with 70 buildings costing $691,900 in 1914. Two-family dwellings with stores beneath numbered 258, costing $1,503,650 in the first half of the current year, as compared with 132 costing $761,200 last year. The greatest shrinkage was in tenements costing $20,000 to $50,000 each.

In the borough of Queens permits were taken out for buildings costing $10,037,386 and for alterations involving an outlay of $498,036. In the first half of 1914 the new buildings planned were estimated to cost $11,406,717 and alterations $709,290.

In the borough of Richmond, this year is a trifle ahead of last, the estimated cost of new construction work being placed at $1,440,595 as against $1,182,624 last year, and with alterations for the two periods of $27,641 and $23,700 respectively.

Trade Directory of South America

A complete revision and detailed classification of the names of South American importers and merchants has been published by the Department of Commerce, Washington, D. C., as a section of a new edition of the World Trade Directory. A new feature is the listing so far as the information could be obtained of the American and other foreign agents of South American importing firms, also of the names of the parent firms of branch houses located in various South American cities.

The directory is in octavo form, bound in buckram and the price is $1.00 per copy. The necessary order blank can be obtained by applying to the Bureau of Foreign and Domestic Commerce, Washington, D. C.

A Screwless Door Hinge

One of the recent developments in the way of builders' hardware is a screwless hinge which has two steel projections on each end. On the end next to the door stop there is a straight steel projection that enters the wood and on the other end of the hinge there is a clamp projection that enters the door casing. These projections or hooks counteract and offer the same resisting and holding force that the screw offers to the hinges. Besides doing away with the use of nails and screws, the statement is made that it gives the hinge a much neater appearance than those of ordinary construction.

Plans were recently filed for a 16-story building to cost $550,000 which will replace the old Havemeyer mansion on the southwest corner of Madison Avenue and Thirty-eighth Street, New York City. According to A. L. Harmon, the architect, it will have a frontage of 98.9 ft. and a depth of 95 ft.

Some Fine Old Timbered Houses

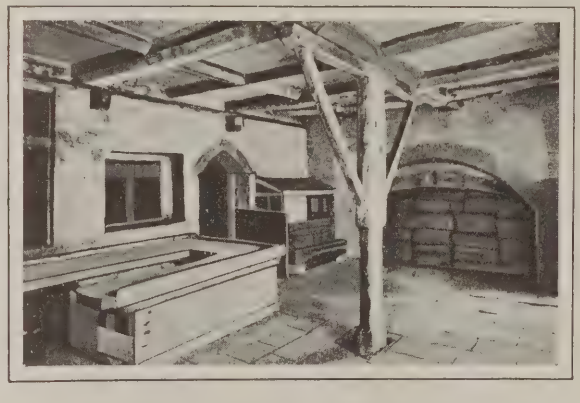
Examples of Old Post and Plaster Work of the 15th and the 16th Centuries Which Is Seen at Its Best in England

THERE is something enchanting about genuine antiques, especially those typical examples of ancient architecture which stand out conspicuous, and yet which from the very nature of their construction, the uses to which they are now put, and more especially their ownership, excludes the possibility of their ever being numbered among the curios of America. England is justly proud of its fine old timbered mansions, and it is only here and there that quite second-rate buildings, often not of great importance in the old country, can be secured in their entirety by the American millionaire. We have before us photographs of two remarkable buildings of interest to architects, and every one associated with the builders' trade—for they tell of earlier times than even Elizabethan days—the period to which so much of the greatly valued black and white architecture is usually associated.

View of Old Morton Hall in Cheshire, England

The grand old Hall-i'-th'-Wood here shown was built in 1483, and is one of the oldest and the best preserved specimens of post and plaster work. The picture shows the east front which embodies the whole of the older portion of the building, but the stone wing, which at first glance looks modern, is by no means so, for it is of very respectable age, having been built in 1591, at a time when the then newer style of architecture was being produced in the baronial halls of England. The walls of the older building are built on the principle that was superseded by the more developed black and white architecture of a century later, for the walls are made of wattle and daub, which in twentieth century language may be explained as being green twigs threaded in and out among stout uprights. This framework, which in green timber may be likened to the metallic ground work of the reinforced concrete of to-day, was covered with mud, and mixed with chopped straw. Like the bricks of old Egypt this mixture was allowed to dry in the sun and the air until it became very hard before it received its final coats of plaster, and its subsequent timber casing which gave it solidity; the whole structure forming a class of architecture which shows that the architects of the fifteenth century had in their minds the constructional germ which five centuries later was to develop into a style of building which has been facetitiously

The Grand Old Hall-i'-th'-Wood at Lancashire



View in the Kitchen of Haddon Hall

Some Fine Old Timbered Houses—Examples Found in England

dubbed "hairpins and cement." In this remarkable building, which is now turned into a museum for local curios, are many objects of intense interest to the dry goods people, for a portion of the building is the one-time residence of Crompton, the inventor of the loom.

Another picture represents a noble pile—old Morton Hall, one of the finest timbered buildings in Cheshire. It was one of the show places visited by the King of Great Britain during one of his recent industrial tours, which incidentally we may say King George has been taking throughout the manufacturing districts of England. The old residence is surrounded by a moat, and once had a drawbridge. The black oak carving in this place is worth a fortune. In our June issue we referred to Haddon Hall, and to the chimneyless houses contrasting with the grand fireplaces of the larger dwellings. Our British correspondent sends us, too, a photograph of the kitchen of Haddon Hall, a small sized view of which we give. The one-time old arched fireplace is seen at the end of the room. The English oak roof which has stood for centuries is supported by a column and cross-beam of the same material. These views of the old are exceptionally interesting, and incidentally no doubt to many of the readers they will suggest the inconveniences of the past, as contrasted with the conveniences of the present.

Painting on Yellow Pine and Cypress

In answer to a question propounded by an Illinois correspondent as to why paint does not wear well or remain firm on yellow pine and cypress when used in connection with the exterior trim of dwellings, the wood showing bare spots after a few months' time, the *Painter's Magazine* offered the following in a recent issue:

Yellow pine is of very sappy or resinous nature and wherever the direct sun strikes the exposed painted surface it draws the sap, which is bound to throw off the paint unless it is specially prepared to withstand the action of direct sunlight. When the pitch or sap is not plentiful and the wood well seasoned, coating it with shellac varnish before painting will in most cases hold back the sap, but the best precaution is to omit the use of shellac varnish and use instead a priming composed of equal parts by weight of white lead in oil (keg lead) and dry red lead, also pure, beating this mixture up with two parts by measure of pure raw linseed oil and one part pure turpentine, using no drier whatever, as the red lead will act as such. When well mixed, strain through a sieve and apply on the same day as it is mixed. Have this priming of the consistency of thin paint and rub well into the wood. If the pink tint given by the red lead is objectionable, add a little lampblack. Mix your next coat stout if made from white lead and oil, but rub it out well.

As for cypress lumber, this is used on cornices and for weather boarding, etc., and there are several varieties with more or less sap, but not like that in yellow or Southern pine. It seems to be more of an oily or greasy nature, but the chief trouble as to throwing off paint appears to be as marked as it is with yellow pine when it comes to severe exposure. We would suggest a similar mixing for the priming coat as that recommended for the yellow pine, with this difference, however: that the white lead in oil and dry red lead mixture be thinned with six parts by measure of raw linseed oil, three parts of turpentine and one part of 90 per cent coal tar benzol, holding the paint fairly thin and rubbing in well. Then follow with stout paint, rubbed out well.

Old Building Restored by Grouting Machine

This is the way in which the London correspondent of one of the New York Sunday newspapers tells how an old building was restored by the use of what very much resembles the cement gum.

Not every one has heard of grouting, the mysterious and almost miraculous process by which old buildings are restored. It is, in fact, a simple process and as easy to understand as the laying of bricks.

In its original sense grout means no more than gruel. In its building sense it is a mixture of sand, cement and water sufficiently thin to be poured. It is not a new thing. It probably was used by the Romans and has been used very much since in engineering work. The new thing is the grouting machine, which enables the grout to be driven into places where it cannot be poured.

It is an extraordinarily simple machine, consisting of two parts, a cylinder of compressed air, the pressure being a hundred pounds to the square inch, and a churn. A flexible hose connects them and another flexible hose with a nozzle leads out of the churn. That is all. Yet when it is at work the machine is as mysterious as a vacuum cleaner.

The dust and decayed mortar are blown out of the cracks between the stones with a jet of compressed air; clean water is then blown in to damp the masonry just enough to make the cement adhere. Meanwhile the cement is put into the churn or grouting pan and is beaten up till it is about the consistency of cream. The preparing of it needs some nicety lest the cement should grow hard in the churn and the hose. The wall being ready, the nozzle is inserted into a crack, the cracks above and below it are covered with clay to prevent the cement from leaking out, the compressed air is turned on and passing through the grouting pan drives the cement deep in between the stones.

Starting at the base of a building and working upward the grouting machine will fill the whole of its walls with a new cement that reaches every crack and hole, so that when it has grown hard the building is as firm as if it were cut out of one stone. And it does this without disturbing a single feature of the building or breaking the weather crumbled surface of its masonry or even rubbing off the mosses and lichens that have grown there.

The government of New South Wales, Australia, intends to extend its workmen's dwelling house scheme, which was initiated at Daceyville in 1912. The cost of erecting dwellings and shops, together with road and other works, is estimated at $600,000.

Facts About Augers and Auger Bits*

An Interesting History Touching These Well-Known Adjuncts of the Mechanic's "Kit" of Tools

JUST when and where augers and auger bits were first manufactured in the United States may be questioned perhaps, but Job T. Pugh, Philadelphia, Pa., says his business was established there in 1774 and is the oldest auger works in the world. Augers were made also as long ago as 1790 in Ware, a post village in Hampshire County, Mass., 27 miles northeast of Springfield and nearly the same distance west of Worcester. John F. Hebard, who was long superintendent of the Snell Mfg. Company, Fiskdale, Mass., in an address before a local historical society, said that Deacon Snell told him personally that his (Snell's) father made augers in Ware in 1790.

The Snells were also the first to manufacture auger bits of American steel. Raw steel stock for this purpose came originally from Sanderson Bros., Sheffield, England, in original cases and the first American steel for augers and auger bits from Gregory & Co., Jersey City, N. J. In 1876 English steel for auger bits brought about 14 cents per pound; American steel for the same kind of tools cost about 9 cents per pound, which gradually fell in price to about 3½ cents.

Difference Between an Auger and an Auger Bit

The main distinction between an auger and auger bit is that an auger is used with a straight handle, and an auger bit in a carpenter's bit brace. Auger cutting edges are flat. Most auger bits have double cutters, that is, a spur and bottom cutter, although there are some exceptions. The bottom cutter tends to keep the bit boring straight and true. Originally all of this type of wood borers were so tanged that they could be driven through a straight wood handle and bent over, thereby fastening securely.

In the Primitive Days

Early in the industry augers made in Ware or the neighborhood were carted about 75 miles to Boston for one of the principal markets, the teamster hauling steel and other needed raw material on the return trip. Now they are universally used throughout the civilized world. Originally they were made in an open die. A blacksmith made a bit, drew it out flat, drawing the tang also, and all by the eye; nothing was polished. Augers were quite commonly painted black until in the 50's.

Benjamin Pugh originated the double twist auger, which was left in the natural black and unfinished as to polish, showing the careful handwork put on it.

The thread or screw point at first was filed by hand, because of the lack of screw-making machinery, and it was long before there were cut threads, because of the spur point projections.

Otis Snell is said to have made the first screw cutter to cut bits about 1854. On ⅜ in. and up to about 1 in. diameter there is a clearance of approximately 1/32 in. What technically is termed "freeing back" is accomplished by grinding away a part of the material forming the twist.

Steel-Cutting Sections and Norway Iron Shanks

At least as recently as the 70's many auger shanks were made of Norway iron and a cutting portion of steel was welded under the body of the tool. At that time Norway iron cost approximately 4½ to 6 cents, and Sanderson steel, 12 cents per pound. Now steel throughout, ranging at from 3 to 4 cents per pound is used, generally an open-hearth mixture, or of crucible steel for best goods up to, say, 10 cents per pound for special work, which gives much better results. Bits at one time were tempered by using charcoal and dipping in spring water; now they are scientifically hardened and drawn to a predetermined degree. In these days a hundred will be treated in the same time that formerly was taken to harden and temper one.

Kinds of Augers

The early auger was shanked, which a blacksmith would heat and drive through a plain wood handle, bending over the end to fasten it in. This was followed by the so-called nut auger, which also went through the handle, but was held by a threaded nut, so that the two parts could be more readily separated for convenience in carrying. Ring augers, having a ring at the end of the shank, are so fashioned to receive a wood handle for turning them. Then followed the adjustable handle to fit different augers, which was a marked improvement on the plain wood handle.

Auger Bit Screw Points

Auger bits are made with single and double threads, with both fine and coarse screw threads. The feed with which the tool bores is regulated by the number of threads per inch. A bit with twelve single threads to the inch will bore an inch in twelve complete turns; a double thread to accomplish like results requires twenty-four threads to the inch.

A double thread screw of six turns to the inch, or a total of twelve threads, will bore twice as fast as a single screw of twelve threads. The smaller bit can stand a higher rate of speed than the larger bit, as with a reduced surface there is less friction proportionately. Where a workman happens to have a bit with a very coarse thread, it is better to use a brace having a much wider sweep. To get the best results a bit must be designed for the class of work for which intended.

*Extracts from an article by E. H. Darville in a recent issue of *Hardware Age*.

There are three main types of twist; the single twist, corresponding to the single thread screw point, with one spiral. Next, the double twist, similar to the double thread screw. Third, the solid center auger bit, which combines both the double twist at the head of the bit and a single twist for the remainder and greater portion of the twist.

Utilizing Archimedes' Principle

The solid center bit is made with a round, solid center, extending from the round shank of bit to the head or cutting end, with the spiral formed around the cutter for discharging the chips as cut. This bit resembles the screw of Archimedes.

A leading characteristic of the solid center bit is the strength obtained at the point where the twist joins the round shank. The purpose of the twist, whether single or double, is to carry upward the chips as cut, to prevent clogging.

An advantage claimed for the double twist is that there is more bearing in the hole as the boring progresses. By this it is not meant that the twist should bear on the walls of the hole for the full length of the twist, as there should be sufficient clearance not to bind in the hole. In hand boring there is always more or less vibration, and in the double twist type all of the outer surface of the twist helps to guide the bit, so that the tendency is to bore a straighter hole.

Single Twist

An important feature of the single twist is that those having but one lip and one spur, bore more easily than the solid center or double twist bit having two lips and two spurs. Single twist bits are made with a heavy back to the twist, which also helps them in boring.

For use in green or wet wood a bit should have considerable clearance from the head to the end of the twist, where it joins the shank, but for boring in well seasoned wood there should be very little clearance from the head of the bit to end of the twist.

Filing Auger Bits

For sharpening an auger bit, a 4-in. half round, dead-smooth file should be used. To sharpen the lip, hold the bit firmly in the left hand with the screw point down on the edge of the bench, slanting the bit slightly to the left. File from inside of the lip backward, being careful to preserve the original bevel, filing lightly until a slight burr or feather edge appears upon the outside of the lip. Remove the burr by a slight brush of the file and a keen cutting edge will be produced. Except for removing such a burr, the file never should be used on the outside of the lip.

If the bit has a side lip, this is next sharpened by filing from the inside, care being taken to preserve the original bevel.

To sharpen the spur, hold the bit in the left hand with the twist resting on the edge of the bench. Turn the bit around until the spur to be sharpened is uppermost. File the side of the spur next to the screw, keeping the original bevel. File lightly until a burr is thrown upon the outside of the spur. Care should be taken to sharpen the opposite lip and spur alike. It is obvious that if the lips or spurs are filed from the outside, it will reduce the size of the head of the bit, and if carried far enough, will cause the bit to bind, as the cutting portion will be smaller than the body.

Center Bits

The primitive center bit was made with a diamond or reamer-like point in the center, without threads, with a spur on the outer side, similar to some washer cutters as now made, with a lip for removing the chips but with no twist. This type of bit resembled a flat countersink, with one edge bent over to form the lip, with a point and spur added. Dowel bits for use in a brace are simply short auger bits with the ordinary square shank, having a twist of but 2 to 3 in. long. The most commonly used auger bits have a twist varying from 4 to 6 in. in length, with square shanks for use in a bit brace.

An expansive bit is a modification of the standard style of auger bit, having usually two removable cutters, ranging from ½ to 1½ in. and from ⅞ to as large as 5 in., but more commonly 3 in. for the large size. These bits may be readily adjusted to bore holes of any wanted diameter within the limits of the adjustable cutter.

Lips and Spurs

There are four styles of lips and spurs: The extension lip or Russell Jennings pattern; the improved lip or C. E. Jennings pattern; the standard lip, and the circular pattern or Cook's lip. The extension lip extends from the base of the spur some distance beyond the spur and is shaped like a knife blade. The improved lip is also an extension lip, but has, in addition to the extension feature an under or side cutter. The standard lip does not extend beyond the base of the spur, but has an under or side cutter, as if the spur was extended on the underside of the lip.

The circular or Cook's pattern lip has a point which is rolled under; bits made with this type of lip have no spurs. The spur of an auger bit is a projection on top of the lip for the purpose of marking out or scoring the holes before the lip lifts the chip, which may be likened to the advance cutter of a rabbet plane, which also in advance marks out the line to be cut by cutter of plane.

Advantages of the Different Lips

An advantage of the extension lip pattern, especially when used on a single twist bit, is that it will bore a very smooth, clean hole, with minimum friction. The improved lip will also cut a very smooth hole and has this advantage over the extension lip bit, that it may be used for boring rough holes, even after the spur has been completely worn away. Being a combination of the extension lip with the standard lip, the mechanic gets an extra amount of wear in that portion of the lip which extends beyond the spur. After filing the lip back to the base of the spur, the workman will still have a bit equal to the standard type of bit. The main value of the circular or Cook lips is in its shear cut. When correctly made, this bit will bore very easily in the harder woods, because there are no spurs and the friction to that extent is reduced. It is not, however, so well adapted for fine work, because of a tendency to tear rather than cut the fiber of the wood.

Construction of a Movable Greenhouse

Structural Details Relating to the Erection of a Portable Greenhouse—Installation of the Hot Water Heating System

WHILE perhaps not directly within the field embraced by the work usually performed by the builder, the construction of a portable greenhouse is something in which he is at least incidentally interested, and we therefore present to the attention of our readers some particulars which were contained in a paper on the subject read by A. Pullen-Burry at a late meeting of the Horticultural Club in London, England. It constituted probably the most detailed account of experiences with traveling greenhouses yet published. The paper was printed in full in *The Florists' Exchange,* to which we are indebted for the following particulars and accompanying illustrations.

An acre of land 440 ft. by 100 ft. is divided up by longitudinal foundations 16 ft. apart center to center, and a cement rail 6 in. by 5 in. cast in molds and placed thereon; a shallow division wall for the sidelights to shut on is provided at intervals of 40 ft. center to center, thus making in 11 traverses 60 beds 13 yd. by 5 yd.—a little over 2 rods—in each bed.

The traverses cost us about £10 each, including two old rails, which act as curbs, and are embedded in the two outer cement rails at either end of the hothouse. In practice we find that only one is necessary, viz., at the end carrying the boiler and multiplying gear.

It is not necessary that the land be level, except in the 100-ft. direction or length of the hothouse. In the other direction there may be varying gradients, as the gutter acts like the back of a book, and thus allows movement.

Construction of a Movable Greenhouse—Exterior View Showing Operating Gear

The house itself is, in motor car language, the "tonneau," and can be of any width or any hight under the ridge of eaves. It can, if necessary, take quite large trees, say 9 ft. high, in successive shifts, the sidelights in these circumstances opening like barn doors, and back to back, passing with the house through the trees over the cement rails. The usual ventilating gear is used, and in our model the sidelights swing on the plate and close against the cement division wall in an oblique direction. We find, however, that if the side shutters are short and independent and simply hooked on to the plate it is quite sufficient, and the draught is more effectively excluded. If in winter there is a draught under the shutters a little soil sprinkled along the division walls effectually checks it.

The ends of the house are glazed in the usual way. The doors are of matchwood, in the center, under the ridge. The step up to the door is 10 in. in hight.

There is a strengthened 1½-in. by 9-in. plank running down the house door to door, on which the watering is done by a hose from Norwich unions fixed to a 1-in. main under the ridge, and traveling with the house. This is most convenient, and it takes only half an hour for the whole 100-ft. by 40-ft. hothouse to be watered satisfactorily by one man. The water is supplied from one left and right jointed socket, connected with a stationary watercock, in one of the houses; a short piece of hose carries the union.

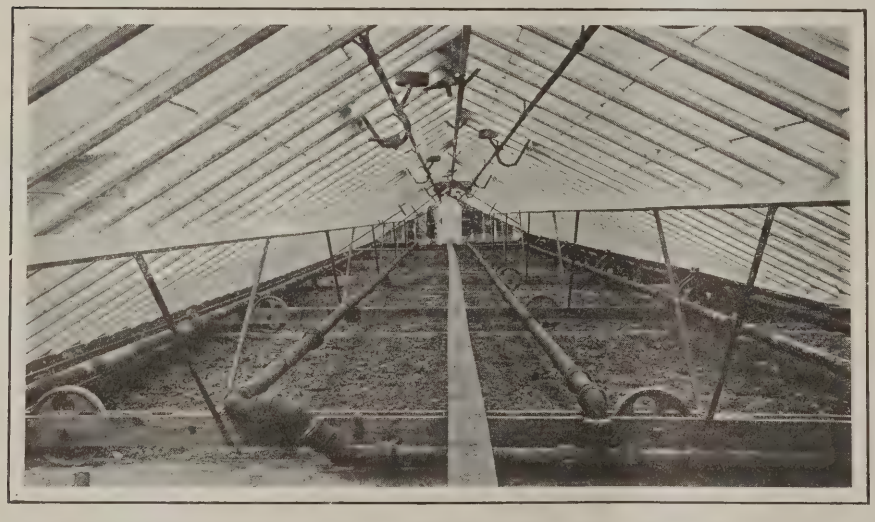
The hot-water pipes are simply laid over the stretchers of the "chassis," and are on a dead level. The lay of the land is against the boiler, as in the 11 traverses there is a rise of 4 ft., making a 6-in. fall from the boiler to the farthest flow pipe.

The returns, two in each house, are collected at the stretcher next to the last. They hang thereon and rise up to the plate, thus allowing the crops to pass underneath, and continue outside the house to the thermodynamic valve just before the boiler is reached. The boiler is mounted on wheels, stayed to the plate, and runs in an upright, balanced position on the outside rail which contains the metal. The flow leaves the top of the boiler and descends to the inside of the last stretcher, passes through both houses under the footway, and rises again with valves at each point to the branch flows. The system works perfectly and there are 1000 ft. of 4-in. pipe on an Anglian boiler, for which the makers only guarantee 900 ft., and the return heat in 1½ hours with a strong northeasterly wind blowing and an uncovered boiler.

A manifest saving in coal will appeal to growers in that heat is raised in far less time than by the usual lazy gravitational system.

The "chassis" is of pitch pine and cast iron. The plate measures 3 in. by 6 in., and the trussed stretchers are simply two planks of 1¼-in. by 7-in. pitch pine, with blocks at intervals, to carry the purlin posts and act as distance pieces for the frames of the gearing. In each stretcher there are four carrying wheels of cast iron with a bolt through. The frames are cast alike and used in pairs. They are bolted through the stretchers on either side and carry a 9-in. by 3½-in. steel gutter, which, with a 2-in. by 4-in. plate bolted to each side, carries the roof. These frames rest upon the bolt through the driving wheel, which has a flat bearing surface, and a set of cogs on its side, turned by a small sleeve pinion keyed to the longitudinal shaft which runs with couplings throughout the house. It is affixed at one end, outside the house, to a large cog-wheel, which in turn is operated by a spur and pinion in the same way as a clock is geared. The final flywheel is driven by hand, or, if required, by a small portable motor (like a bicycle engine), weighing from 28 to 56 lb. and simply fixed by fly nuts to the frame carrying the multiplying gear, which is 4 to 1 at the driving wheel and 120 to 1 in all. One man can easily move the house over the necessary 40 ft. in 20 minutes without undue effort.

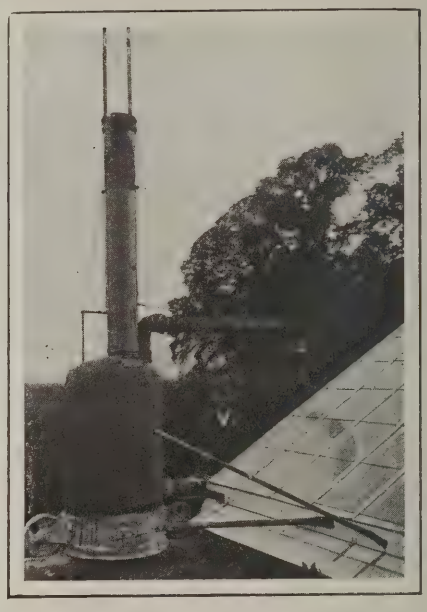
But the most important thing is the manner in which the torque in 100 ft. of shaft is taken up and the work of the shaft synchronized throughout the house. If this difficult problem had not been solved there would have been no transverse traveling hothouses; for the tendency would have been to move the end carrying the multiplying gear first and so set up an inclination in the house to travel in an immense circle. The friction produced by the endeavor to make it travel in a straight line would soon have smashed up something.



Construction of a Movable Greenhouse—Showing How Hot-Water Pipes Are Supported

It is obvious that if both ends move simultaneously the distance traveled is of no moment. One hundred miles might be traveled as well as 100 in. if the gauge were correct, and if the four wheels at the corners which press against the steel rail did their duty.

The spur wheel which moves the driving wheel is loose, and, carrying the shaft, rests one of its sleeves on the flat face of the driving wheel. This engages the driving wheel cogs, so that they are always in true mesh, no matter where the spur wheel is in relation to the driving wheel, thus allowing the shafting a side or lateral movement. The sleeve spur wheel is held in position by a loose guide piece, like a half plummer block upside down; this guide rests its wings on two distance pieces between the two frames which are cast on one of them.



Connections Between Boiler and Portable Greenhouse

Through these distance pieces are two long steel screws, which we call torque-pins, capable of adjustment, and locked by a nut on the outside of the distance pieces. They are easily attainable from the interior of the hothouse.

Thus the shaft turns the sleeve spur wheel, which travels over the flat surface of the driving wheel in its guide, until the guide presses against the torque pins, which give motion to the house.

These torque pins are at the end farther from the multiplying gear, screwed up tight against the guide. At each set of gear and stretcher the amount of torque in the 2-in. shaft is relieved by the lateral movement of the guide, which comes in contact with the torque pins only when desired. It is found by experience that the torque in the shaft when driving a 100-ft. by 40-ft. hothouse, weighing 20 tons, with the boiler at the end farthest from the gear, is about two threads of the torque pins for each 16 ft., so that the pins are screwed out an extra two threads for every set of gears in the house.

An interesting experiment took place when the boiler was added and the pipes filled with water.

The house was adjusted and moved perfectly without the apparatus before mentioned, and when the extra weight (1½ tons) was added, it was found that the farther end, where the great weight

lay, was 3/8 in. lazy in starting. At once we had half a turn of the torque pins eased out, and the same end was then 3/16 in. lazy; it was obvious that another half turn was all that was required.

For all practical purposes the torque pins are set once and for all, and any interference with them without knowing their use would cause trouble.

With reference to the paths, it is found that one bag of cement is about the right proportion for each 40 ft. of cement pathway.

These pathways are more useful for getting at the crops, being narrow, and suitable to every kind of weather. If properly constructed, with a decent foundation, they do not crack or scarify. Even after they have been used dozens of times the brush marks upon their surfaces are still visible.

Constructing Stair Newel Posts

How the Carpenter and the Builder May Make His Own Newel Posts Instead of Buying Them Ready-Made

THERE are occasions when the carpenter-contractor and the builder finds it necessary to construct his own newel posts, instead of buying them ready-made from the mill, and the method here described for doing work of this kind may not be without interest to many of our readers. The sketches with descriptive particulars are contributed by C. L. Oakley to a recent issue of *The Wood Worker*, and relate to a quick and neat way of making newel posts. He says:

"Fig. 1 is a plan of structural parts. *A B* shows the end view of stock, which should be run in molding machine, running the mold on both sides alike. It is plowed as shown to hold in place when gluing

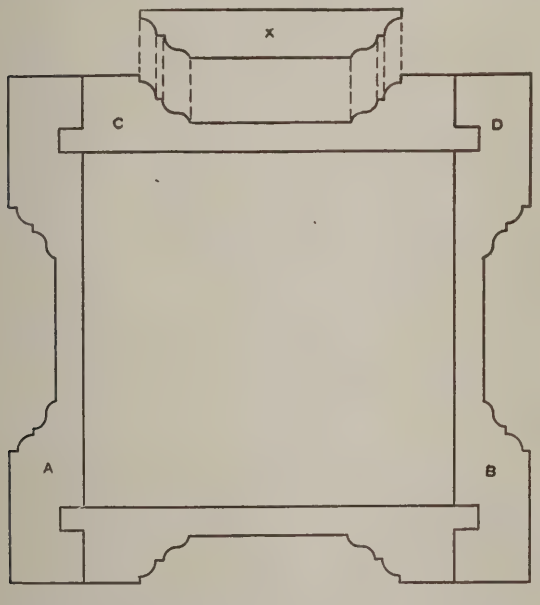


Fig. 1—Plan of Structural Parts of Newel Post

C and *D*, made with the same cutter, and tongued to fit groove in *A B*. This stock can be run in 12 to 16-ft. lengths and placed in some clean, dry place until needed, then cut to the desired lengths and glued together.

"Next make in stock a quantity of cross-work like *X* of Fig. 1, taking short pieces 3-in., more or less, in length, any width. Many small pieces good only for the scrap-pile can be used for this purpose.

"To produce this stock make a set of coping cutters for the shaper, like *E*, and running board, Fig. 2, cutting a hole through at *F* and allowing some side adjustment. Cut out the throat from the under side wide enough to allow the cutters to clear and just room enough to clear the under side—*G*, Fig. 3—allowing the ends to run against the edge of running board, and bear on dotted line at point *H*.

"Hold the stock down flat by using a block with a

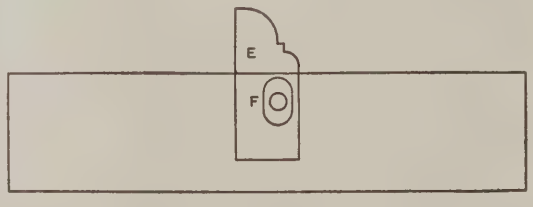


Fig. 2—Making Coping Cutters and Running Board

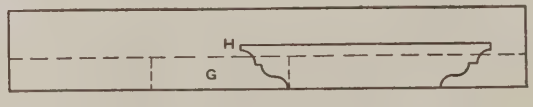


Fig. 3. Fig 6

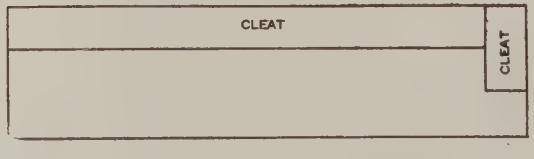


Fig. 4—Device for Holding Stock Down Flat

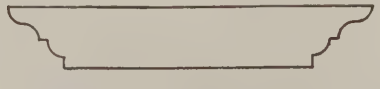


Fig. 5—Showing How Edges Should Be Run

Constructing Stair Newel Posts—Various Details of the Work

cleat on one edge and one end, as in Fig. 4, allowing cutter *E*, Fig. 2, to project out just enough to cut the coping figure. This being done, run both edges like Fig. 5, then you have a piece like Fig. 5 on the edges and Fig. 6 on the ends, all ready, like *X*, Fig. 1, to drop in place and glue together.

"All the short pieces should be cut to length on a sharp, fine-toothed saw before running on the shaper."

A Dictionary of Familiar Trade Terms

A Few "Definitions," Not Found in the "Century" or "Webster's Unabridged," but as Often Understood by the Home Builder

By W. Livingstone Larned

Architect.—A man who never puts closets and windows where you want them.

Nails.—Little pieces of wire, or steel, chopped into conveniently short lengths for baby to bite on. Used extensively by carpenters to sprinkle over the ground.

Shingles.—Flat surfaces of nice, smooth boards cut thin. Used, when sliced, by neighbors as kindling wood.

Carpenter.—A gentleman of uncouth appearance, who stains neat, white pine planks with tobacco juice; is always stopping to eat his lunch and who "strikes" just before the roof is put on.

Saw.—Instrument, with teeth, used to cut the right timber into the wrong lengths.

Masonry.—Expensive stuff upon which to rest the house—Outer "skin" of the cellar. Dam used to hold water in basement when it rains.

Plans.—Diagrams of the way you do **not** want the house.

"Extras."—What the building is really made of.

Water Boy.—A small chap, carrying a bucket half filled with saw-dust and water, who is always on hand when you are **not** thirsty.

Sawdust.—Practically all of a two-by-four, except a half dozen knot-holes.

Hardware.—House jewelry.

Keys.—Little jiggers a locksmith is compelled to bring in a hurry because the originals were lost.

Laborer.—One who stands back and silently admires what somebody else has done.

"Nearing Completion."—The situation from the time the job is started until you decide to sell the place.

Contractor.—Twentieth Century "Pirate." A gentleman of shrewd cunning who always makes more than a legitimate profit. (Sometimes known as a "Boacontractor.")

Wife.—Female person who changes her ideas every time she sees the plans.

Bills.—Something which never stop coming.

Sash.—Bandages for holes in side of house.

Brick.—Little pieces of red earth, in convenient shape to break when dumped from wagon.

Mortar.—Long box of damp, soggy material mixed up for benefit of all children in vicinity—What mason squeezes out from between bricks after he has taken the trouble to put it there.

Hammer.—Instrument of torture used extensively for purpose of crushing fingers.

Trees.—Leafy, green ornaments which must always and invariably be cut down on your property, before building, no matter where they are.

Knotholes.—What they send instead of timber.

Sash Cord.—Wash lines at double the price.

Sash Weight.—Inside decoration.

Putty.—Carpenter's Dough. An article found one year later, in wasteful wads, beneath the back porch chairs.

Laths.—Equivalent to bones in a Shad. Long, slender planks, which permit most of expensive plaster to ooze through and out of sight.

Plaster.—Ingredient employed as a floor-dressing.

Lime.—What a plasterer puts on his face.

Chimney.—Arrangement for drawing smoke down and into rooms.

Trowel.—Irish Tablespoon.

Attic.—Part of house never quite completed.

Wainscoting.—Space used by painters for practicing.

Painter.—Artisan who suggests that green wouldn't be a bad color for shutters.

Pergola.—Where Contractor makes his velvet.

Kitchen.—A place where the bone of contention is cooked.

Plumber.—Chap who tears down and rips out everything as soon as it's completed. (See Brigand.)

Varnish.—Preparation for covering up defects.

Door.—Big piece of wood opening the wrong way.

Roof.—The one part of a house upon which no two people agree.

Staircase.—Device for mussing up proper arrangements of rooms.

Nightwatchman.—Sound Sleeper—human machine for speedily removing all fire wood and wood blocks.

Saw-Horse.—Convenient place for workmen to sit.

Chisel.—Excuse for grind-stone.

One of the first new buildings in New York City to have a portion of its roof arranged as a recreation space for the free use of the tenants is that in course of construction on the northeast corner of Broadway and Twenty-sixth Street. Half of the roof is devoted to a room connected with the roof proper by doors so that the entire area will be a convenient and well-equipped recreation space for the workers in the building.

In one of the new office and salesroom buildings rapidly approaching completion in New York City an ingenious arrangement of duplicate stairs, scissor fashion, has been incorporated so that two staircases are in one shaft with two separate entrances to each loft, thereby saving floor space.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in June, 1915, and June, 1914

IN reviewing the building situation during the past few months a gratifying improvement was noted as compared with the corresponding periods of last year, and the reports for April and May were very gratifying in comparison with the conditions existing earlier in 1915, in that they showed a degree of activity practically equal to that in the months named a year ago. Our figures for June, however, indicate a sudden slackening in the estimated expenditures for new construction work, and there is a falling off of 21 per cent as compared with the same month in 1914. This shrinkage is not confined to any one section of the country, but is general from the Atlantic to the Pacific, and even the Eastern zone, which heretofore has showed an increased activity as compared with last year, records a loss of more than 19½ per cent.

Of the cities reporting from this section seventeen show decreases and thirteen increases. Conspicuous among the latter are Bridgeport, where there was a rush to file plans for frame tenement houses in anticipation of a new building ordinance going into effect; Newark and Paterson, N. J., Scranton, Pa., and Syracuse, N. Y. The important cities showing decreases include Pittsburgh, Buffalo, Brooklyn, Portland, Albany, Springfield, Worcester and Wilkes-Barre.

CITIES OF THE EASTERN STATES

	June, 1915	June, 1914
Albany	$359,405	$860,685
Bridgeport	1,049,524	661,251
Buffalo	1,667,000	2,569,000
East Orange	66,739	94,999
Harrisburg	221,950	131,350
Hartford	287,620	658,672
Holyoke	93,015	127,000
Jersey City	519,958	474,483
Lawrence	147,070	212,525
Manchester	316,917	188,857
Newark, N. J.	770,884	586,220
New Haven	451,025	440,025
New York:		
Manhattan	4,392,190	4,255,391
Bronx	1,286,041	2,882,347
Brooklyn	4,526,677	5,628,863
Queens	1,834,275	2,735,044
Richmond	316,781	310,268
Paterson	314,748	186,326
Philadelphia	3,873,850	3,779,635
Pittsburgh	1,212,472	2,450,281
Portland	460,095	834,435
Rochester	969,632	1,026,327
Scranton	343,121	108,303
Schenectady	91,883	157,660
Springfield	451,538	560,735
Syracuse	414,119	235,935
Troy	93,475	88,663
Utica	272,400	329,815
Wilkes-Barre	58,111	410,811
Worcester	344,148	746,598

Coming now to the cities of the Middle States, there is a shrinkage of 19.7 per cent as compared with June last year, there being twenty cities reporting decreases and five increases. In view of the carpenters' strike in Chicago, it is not surprising that this city should show a heavy falling off in the planning of new building enterprises, but since the first of July the strike has been settled, and it is expected that building operations will now be conducted upon a greatly expanding scale. Cleveland is another important city showing a heavy falling off, as are also Detroit, Minneapolis, St. Louis and St. Paul. Among the few showing increased operations are Duluth, Omaha and Youngstown.

CITIES OF THE MIDDLE STATES

	June, 1915	June, 1914
Akron	$355,225	$424,215
Cedar Rapids	135,000	222,000
Chicago	7,613,500	9,538,300
Cincinnati	940,635	1,116,585
Cleveland	2,378,510	3,126,595
Columbus	410,370	625,650
Des Moines	150,252	193,475

CITIES OF THE MIDDLE STATES—(*Continued*)

Detroit	2,669,265	3,146,110
Duluth	397,240	251,205
Evansville	53,777	133,159
Fort Wayne	173,250	394,450
Grand Rapids	216,008	203,227
Indianapolis	526,299	841,238
Lincoln	137,257	138,850
Milwaukee	838,841	887,889
Minneapolis	1,350,535	1,604,195
Omaha	594,590	404,025
St. Joseph	74,985	52,669
St. Louis	1,465,695	1,598,625
St. Paul	1,159,946	2,048,611
Sioux City	150,250	238,680
Springfield	162,060	293,500
Toledo	762,845	881,113
Topeka	39,065	72,650
Youngstown	433,880	330,720

From the Southern zone we have reports from fifteen cities, of which ten show decreases and five increases, with a resultant loss of a trifle over 26 per cent. The striking shrinkages are found in Chattanooga, Dallas, Nashville and Savannah, while the increases are confined to Norfolk, Oklahoma, Tuscon, Ariz., Tampa, Fla., and Washington, D. C.

CITIES IN THE SOUTHERN STATES

	June, 1915	June, 1914
Atlanta	$334,246	$419,654
Baltimore	840,826	970,949
Chattanooga	61,435	600,450
Corpus Christi, Tex.	28,945	36,540
Dallas	142,125	588,945
Louisville	332,710	526,510
Memphis	285,275	283,012
Nashville	108,491	315,449
New Orleans	279,731	354,599
Norfolk, Va.	245,384	217,827
Oklahoma	85,327	36,590
Savannah	98,310	240,290
Tuscon, Ariz.	60,431	48,030
Tampa	240,285	213,050
Washington	1,142,428	942,325

The extreme western section of the country has also witnessed an appreciable shrinkage in the amount of new work planned last month as compared with June a year ago, the percentage of loss being practically 31½ per cent. There was a very heavy shrinkage in Denver, Los Angeles, San Francisco and Seattle, while Spokane and Berkeley recorded notable increases as compared with last year.

CITIES IN WESTERN STATES

	June, 1915	June, 1914
Berkeley, Cal.	$214,650	$153,050
Denver	179,745	274,015
Los Angeles	997,240	1,682,057
Salt Lake City	199,958	233,600
San Francisco	891,007	1,308,882
Seattle	631,045	1,163,165
Spokane	240,290	83,025
Tacoma	56,828	80,611

It is quite probable that when the figures of the later months of the present year are recorded they will make a more gratifying showing as compared with the second half of 1914, as in that period the conditions growing out of the European conflict were beginning to be reflected in this country.

Striking facts regarding our forest resources, their value and their waste, are condensed in an eight-page illustrated circular of the American Forestry Association just issued. The lumber industry is said to employ 735,000 people, to whom are paid annually $367,000,000 in wages, the worth of products being $1,250,000,000. The forests of the country cover 550,000,000 acres.

Current News of Builders' Exchanges

Outings and Barge Parties—New Offices and Other Matters of Interest to Builders Throughout the Country

Outing of Cincinnati Exchange

THE annual outing of the members of the Builders' & Traders' Exchange of Cincinnati, Ohio, was held on June 30. The steamboat Majestic was chartered for the day, and a trip was made down the Orio River to the Fernbank Dam, and afterward the boat steamed up the river to Maysville, Ky., where the members were guests of the citizens in that city.

Refreshments were served on the boat, and President William Miller, Jr., took advantage of the occasion to carry out his campaign toward getting all the members more closely acquainted with each other.

The entertainment committee was composed of the following members: William Miller, Jr., chairman; C. T. Handman, W. S. Ware, W. T. McGarvey, George W. Baker, J. J. McDermott, A. G. Weist, A. A. Weingartner, assistant secretary.

Meeting of North Carolina Builders' Exchange

The twenty-sixth convention of the North Carolina Builders' Exchange, held the first week in July, was concluded with a banquet at the Langren Hotel in Asheville, N. C. The toastmaster was J. R. McClamroch of Greensboro, and I. Herbert Scates, secretary of the Baltimore Builders' Exchange, delivered the principal address. Other speakers were Bruce Drysdale of Philadelphia, Ben Pillow of Charlotte, and Philip Williams and T. G. Redden of Greensboro. At the last business session of the meeting Greensporo was selected as the place for the next meeting, to be held in January, 1916. Philip Williams of Greensboro, who is also attorney for the exchange, was elected secretary to succeed H. C. Federal, resigned.

Barge Party of Washington Builders' Exchange

On the evening of June 30 nearly 200 members of the Builders' & Manufacturers' Exchange of Washington, D. C., together with their families and friends enjoyed the fourth annual barge party of the organization in question. The Columbia Granite & Dredging Company placed one of its largest barges at the disposal of The Exchange, and the boat was towed about forty miles down the Potomac River and back again, landing its passengers shortly before 11 o'clock. Much attention was given by the committee of arrangements to the decoration of the barge and then provided an excellent programme of entertainment. Refreshments were served during the voyage and the affair was one of the most successful ever held by The Exchange.

Atlanta Builders' Exchange Occupies New Offices

The Builders' Exchange of Atlanta, Ga., moved into its new offices on the sixth floor of the Chamber of Commerce Building the first week in July. At a recent meeting of the Board of Directors President Bernhardt and Secretary Dan Carey were authorized to make a three-year lease, and the chairman of the room committee of the Exchange in connection with the secretary were authorized to expend such amounts as were necessary in fitting up the new quarters in a way to meet the requirements of the organization.

On the evening of June 29 the members of The Builders' Exchange tendered a banquet in the "Georgia Pine Room" of the Hotel Ansley to President H. L. Lewman of the National Association of Builders' Exchanges. There were thirty prominent builders and contractors present and addresses were made by President Lewman, also by Walter G. Cooper, secretary of the Atlanta Chamber of Commerce, and by William H. Horn, secretary of the Georgia Manufacturers' Association. In his address President Lewman emphasized the growth of the organization of which he is the head and attributed much of its success to the efforts of the Atlanta Exchange and individual members.

At the end of the last course of the dinner the custom of each guest introducing his neighbor was carried out.

Growth of Dallas Builders' Exchange

In our issue for last month we referred to the efforts which were being made by the Builders' Exchange at Dallas, Tex., to expand, and since then we learn that thirty-two new members have been taken into the exchange as a result of the work of the officials, which is certainly a very gratifying showing. At the last regular meeting of the exchange the membership and the "Buy-It-in-Texas" campaigns were discussed.

Official Directory for Jacksonville Exchange

Reports which reach us are to the effect that the Builders & Traders' Exchange of Jacksonville, Fla., is contemplating the publication of an "official directory" to be patterned after the recent issue of the directory of the Chicago Builders & Traders' Exchange. It will contain all sorts of information of commercial value to members of the exchange and builders'-material men in general. It will also contain the by-laws, alphabetical list and business classifications of the members in the city, a list of city and State architects and the rules of measurement for mason work.

Builders to Meet at Old Point Comfort

M. Augustus Williams, president of the Inter-States Builders' and Traders' Association, which is composed of the Builders' Exchanges of Baltimore, Washington and Norfolk, has called that body to meet in the Chamberlin Hotel, Old Point Comfort, Va., for a two days' session, beginning Aug. 10.

The association met in Norfolk in February, 1914.

Annual Outing of Detroit Exchange

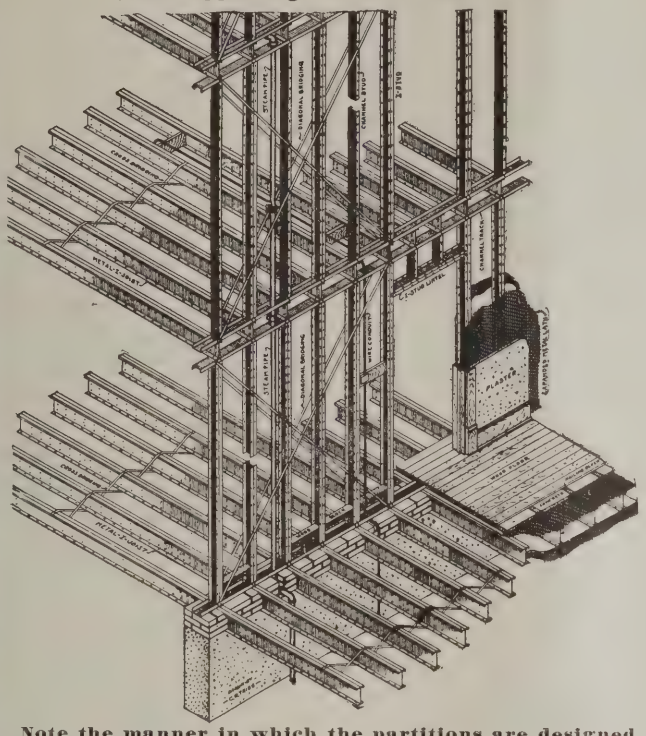
The annual outing of the Builders' and Traders' Exchange of Detroit, Mich., took place according to programme on June 22 and was without doubt one of the most successful in the history of the organization. Fully 500 members with their families and guests made up the party and journeyed to Tashmoo Park, where games of various kinds were the order of the day.

Probably the most popular contest was the baseball game between a nine made up of members of the Exchange and one composed of architects, the score being 10 to 7 in favor of the former. The architects, however, captured the tug-of-war and the soft ball throwing contest, thus averaging up the victories. C. C. Crane of the United States Gypsum Company won the silk umbrella donated by the baseball team.

The entertainment committee selected by the architects was composed of A. E. Harley, George W. Graves and Dewey Halpin, while the Builders' Exchange committee consisted of Edward Krieghoff, H. G. Rothermel, M. J. Kennedy and Gage Cooper.

Berger's Metal Lumber System of Fireproof Construction

Typical Supporting Partition Construction



Note the manner in which the partitions are designed and constructed.

Studs placed directly under I joists to receive floor loads. Wood blocks inserted between studs for nailing baseboard and chair rails.

Note advantages for concealing plumbing pipes and conduit between studs.

Expanded Metal Lath attached to studs and joists by means of prongs.

Residence of Prof. G. B. Pegram of Columbia University, New York City

Architect: Wm. B. Claflin, West Redding, Conn.

This residence was built under the superintendence and direction of *F. W. Conner, Construction Specialist.*

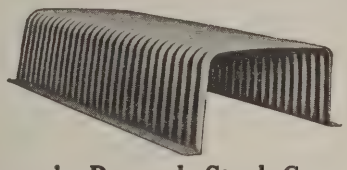
Costs Less Than Wood Construction

Constructed with Berger's Metal Lumber, the residence cost less in fireproof construction than the lowest bid of the general contractor based on the use of wood joists and studs for this building.

The house has now been occupied for more than a year and there isn't a crack in any of the walls or ceilings where plaster was applied on Metal Lumber Studding and Joists.

For full information as to how Berger's Metal Lumber System may be used in any building, regardless of size, purpose or location, see Sweet's Index, Pages 278-285, and *send for our Special Catalog L.B.*

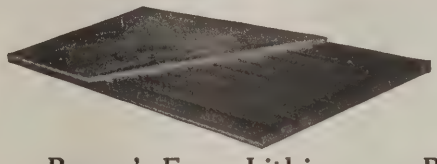
Berger's Reinforcing and Metal Building Materials



Berger's Pressed Steel Core

For Coring Out Concrete Floors and Roofs

Reduces cost and lessens dead load. Used where the construction is designed for long spans, light or heavy construction. Made in several depths, sizes and gauges. Our standard size has a base of 20" with flanges adapted for making concrete joists 24" on centers.



Berger's Ferro-Lithic Reinforcing Plate

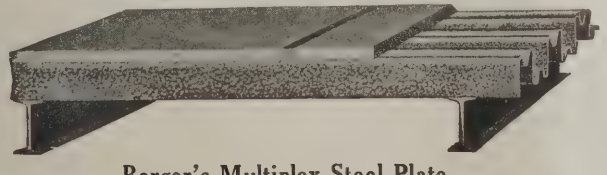
Used Extensively for Floors, Sidings and Roofs

Requires no supports for short spans while putting in the concrete. Made of a series of dovetailed members running full length, which give stiffness and provide a key for bonding the concrete and plaster.

Berger's Expanded Metal Lath

Used on Stucco Walls, Partitions, Ceilings and all kinds of work where plaster is required.

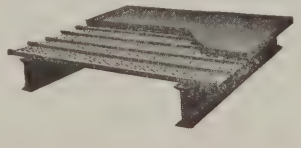
The diamond shaped openings are small and expanded in such a manner as to permit of a perfect clinch of the plaster. A minimum amount of plaster is required for a practical job.



Berger's Multiplex Steel Plate

For Heavy Service Floor Construction

No centering needed. Easily installed. No skilled labor required. Saves concrete and reduces dead load to a minimum. Particularly desirable where under-surface cannot be readily plastered, or in buildings where no plaster ceilings are wanted or required. Made in gauges No. 16 to No. 24 and in lengths up to 10 ft.



Berger's Rib-Truss Reinforcing and Furring Plate

Especially Adapted for Reinforcing Thin Concrete Slabs For Roofs, Floors, Sidewalls and Partitions

The loops or mesh are expanded vertically and ribs run through the length of the sheet on 6-inch centers. Standard height of these ribs is ¾", which give stiffness to the plate and support it while the soft concrete is being applied. No supports are necessary for short spans. Under side of plates can be economically plastered.

See Sweet's Index, pages 210 and 220-224. Mention the products that interest you and *write for Catalog F. B.*

The Berger Mfg. Co., Canton, O.

Our Nearest Branch for Best Service:

Boston Chicago Minneapolis New York Philadelphia San Francisco St. Louis

Export Dept., Berger Building, New York City, U. S. A.

We also make: Berger's Raydiant Vault and Sidewalk Lights—"Classik" Steel Ceilings—Sectional Steel Stock Room Equipment—Steel Lockers—Metal Shingles—Corrugated Steel Pumps—Roofing and Siding—Eaves Trough, Conductor Pipe, etc.—Steel Filing Cabinets and Office Furniture. *Write for information.*

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Sheet Metal Roofing Exhibit at Panama Exposition

One of the attractive exhibits at the Panama-Pacific Exposition is that of Meurer Bros. Co. of Brooklyn, N. Y., and with a branch house in San Francisco, where a full stock of its metal specialties is carried. The company has a booth at the Exposition where various materials which are popular in that section of the country are featured. A front view of it is shown in Fig. 1. It will be noticed that at the top of the booth three Anchor ventilators made by the company, are displayed, and over the entrance of the booth metal Spanish and Mission tiles are shown. On each side of the entrance is a display of various metal roof coverings giving details of construction, together with the method of application. On the left is an exhibit of Meurer's Columbia combination range boilers and water heaters, and farther back one of these devices is shown in operation. Samples of roof covering are displayed together with large copper sheets and special blanks which can be furnished in cold rolled and soft copper, tinned or plain. Just below the copper exhibit, against the back wall is a collection of bright and terne plates for making tinware and for roofing purposes. A. H. McDonald, who is in charge of the company's California office, aided by his son, is in charge of this exhibit.

Fig. 1—A Sheet Metal Roofing Exhibit at the Panama-Pacific Exposition

New Edition of the Hy-Rib Handbook

What is probably the most comprehensive and complete handbook on "Hy-Rib" and metal lath products is comprised in the thirteenth edition of the Hy-Rib handbook, just off the press, and which is being distributed by the Trussed Concrete Steel Company, Youngstown, Ohio. The little work consists of 44 pages, profusely illustrated with line drawings and halftone engravings, and while embracing all the advantageous features and information in previous editions, includes many valuable and important additions. All the various types of Hy-Rib are shown with their applications to all types of construction. The specifications and reading matter have been completely revised and include the most recent development in the way of improvements. Many new details and discussions have been added, while the pictures of installations are particularly comprehensive, including many new applications. Among the new matter to be found are illustrations and descriptive data relating to pressed steel studs and the Kahn pressed steel and Floretyle constructions. The latter consists of rows of hollow steel tile covered with a thin layer of concrete and separated by reinforced concrete joists. The latter are spaced approximately 24½ in. on centers, and carry the load directly to the supports, while the Floretyle acts merely as a filler, saving concrete and reducing dead load. The corrugated Floretyle have deep stiffening ribs across the top and specially formed corners, corrugated sides and corrugated flanges along the bottom edges so as to provide great stiffness in supporting loads. The matter is arranged in a way to be of special value to the architect, the builder and engineer, and the handbook will be found an important addition to his technical library. We understand that a copy of the handbook will be sent free to those of our readers sufficiently interested to make application for it.

"Creo-Dipt" Shingles for Side Walls

An attractive folder which is being sent out by the Standard Stained Shingle Company, 1030 Oliver street, North Tonawanda, N. Y., calls attention to the growing popularity of 24 in. stained "Creo-Dipt" shingles for the side walls of buildings. These shingles have large butts, which give them very much the appear-

ance of the old-fashioned shingles of Colonial days and thus especially adapted to the Colonial style of architecture. The "Creo-Dipt" Royal 24 in. shingles are generally given from 7 to 11 in. exposure, for it has been found that this size costs but very little more than the smaller "Creo-Dipt" shingles since they permit of considerably more exposure, while the cost of laying is less. Another effective method of laying these large shingles on the sides of houses is obtained by exposing one course 3 or 4 in. to the weather and the next one 11 or 12 in. This makes a very effective design, especially for bungalows. There are but three grades in the "Creo-Dipt" 24 in. Royal shingles, namely, Random width, 6 in. and 5 in. The first-named is the more popular and is more extensively used. The large shingles are seldom employed on roofs, as less exposure to the weather is preferred and this is better accomplished by using the smaller shingles, which also make a tighter roof.

Parks New Portable Swing Cut-off Saw

One of the valuable units of the equipment of the modern wood-working establishment is the swing cut-off saw, and a machine of this kind which has just been

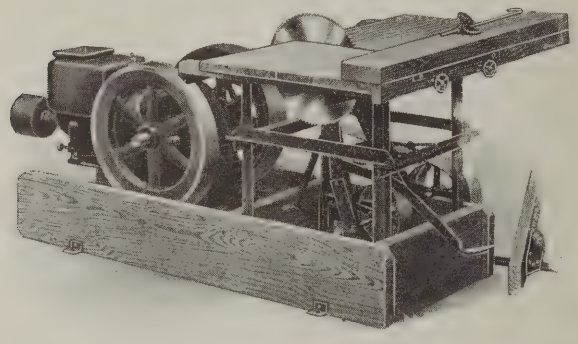


Fig. 2—Parks New Portable Swing Cut-off Saw

placed upon the market is shown in Fig. 2. It is made by the Parks Ball Bearing Machine Company, Station A, Cincinnati, Ohio. This machine is of such a nature that one man can lay the material in position and get the special cut desired, and the swinging frame being short and rigid enables a clean, square cut to be produced. Its construction is such that it can be set ready for instant use and is of great value and convenience in working long material. The company points out that the machine is of such a nature that it will often be used where a regular saw bench, in connection with which it is necessary to change the saw and the guides, would not be utilized. In the machine here shown the saw drops below the table when not in use unless it be set for ripping, in which case the swinging frame is hooked up so that the saw remains above the table. The cross-cut guide is held in place with dowel pins and can be instantly lifted out and the ripping guide, which is held in line with the saw by the two hand wheels in front, can be put on. A 12-in. saw will cut 1-in. stuff 20 in. wide, or 3 in. stuff 15 in. wide. It is arranged to swing back below the table surface and there is an adjustable stop so that it will not swing back further than necessary to take in the width that it is desired to work.

We understand that the company will have ready for distribution about August 1 a new catalogue known as No. 8, and in which will be described a great many improvements in woodworking machinery which the company has effected.

Kaustine Sewage Disposal

Some very interesting information for the architect, the builder and the house owner, relating to the above subject, is contained in an attractively illustrated 16-page pamphlet just issued from the press by the Kaustine Company, Buffalo, N. Y., and with New York City office at 116 Broad street. Among the early pages are to be found interesting comments relative to sewage disposal and to the Kaustine closet system introduced by the concern in question. A description and specifications are given, together with a vertical section through the side wall of a house showing the 1915 model system installed. An understanding of the operation of the system is greatly facilitated by the use of reference letters and the name of each part and its functions are described. Extended reference is also made to the multiple Kaustine systems, clearly indicating the wide variety of arrangements which are available on the ground floor or other floors of factories, schoolhouses, lodge rooms, etc. We understand that a copy of this illustrated pamphlet will be sent to any reader of THE BUILDING AGE who may make application for it.

Announcements of the Universal Portland Cement Co.

R. F. Atkins, formerly assistant credit manager at Chicago, has been appointed Eastern credit manager at Pittsburgh, vice L. S. Fuqua, deceased.

Ray S. Huey, formerly assistant general superintendent, Buffington Plant, Buffington, Ind., has been appointed superintendent of the Duluth Plant, Duluth, Minn. Fred Robinson has been appointed assistant superintendent of that plant.

C. O. Soderquist, formerly superintendent of Mill No. 6 at Buffington Plant, has been appointed assistant general superintendent, Buffington Plant.

J. H. Kempster, formerly chief chemist, Buffington Plant, is now superintendent of mills 3 and 4 of the Buffington Plant.

M. S. Humphreys, formerly chief draftsman, has been appointed superintendent, Mill No. 6, at Buffington, Ind.

Sandusky Portland Cement Co. Goes to Cleveland

The general office of the Sandusky Portland Cement Company, which has been located in Sandusky, Ohio, since the organization of the company, was moved to Cleveland, O., on August 1, 1915. The Cleveland office is already the headquarters of the treasurer, secretary, assistant manager and directors, and will now be combined with the offices of the president and general superintendent, and the sales, publicity and accounting departments. All will be located in the Engineers' Building. The business of the company has increased greatly in the past few years, and the change becomes necessary to handle all matters promptly.

Disston & Sons Awarded Prizes at Panama Exposition

A notable tribute to the excellence of the products of Henry Disston & Sons, Philadelphia, Pa., was the award of first prize for their display at the Panama-Pacific Exposition now in progress in San Francisco. The company exhibited in twelve of the many classes of saws and tools and won first prize in each class. According to advices received "in not a single branch of their manufactures were they excelled, although firms all over the United States competed."

Econ-O-Flax Insulation and Sound Deadener

Among the many methods of insulating walls and rendering them less susceptible to the transmission of sound, special attention is invited to what is known

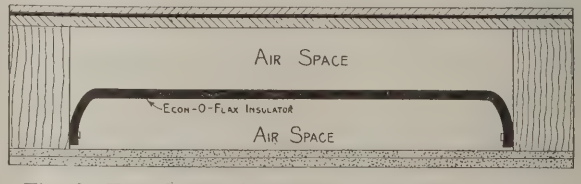


Fig. 3—Econ-O-Flax Insulation and Sound Deadener

as Econ-O-Flax, a flax fibre made by Muckle Bros. Mfg. Company, Clearwater, Minn. The point is made that each air cell is sealed independently, the same as in the formation of cork. The material is carried in

(*Continued on page 80*)

stock in lengths of 2, 3, 4, 6 and 8 ft. and in widths of 16, 24 and 32 in., all sizes being ¼ in. thick. In using the material in connection with floor construction, for example, a strip of it is inserted between the joist with the flange upward, the flange being flush with the top of the joist; a single nail is driven in the flange every 18 in., which is sufficient to hold it in place while laying the floor. To insulate ceilings or rafters the insulator is placed with the flange downward and nails are driven through the flange 18 in. apart. To insulate side walls the insulator is inserted with the flange outward and the nailing is the same as before. In Fig. 3 of the illustrations we show a horizontal section through the wall of a building, from which it will be seen that Econ-O-Flax forms two dead air spaces, thus resisting the passage of heat or cold, while at the same time acting as a sound deadener. On the inside of the wall is the lath and plaster and on the outside of the frame are the sheathing boards, then a heavy layer of building paper and finally the siding.

Columbia Adjustable Window Ventilator

The Columbia Metal Stamping Company, Cleveland, Ohio, is sending out an illustrated folder calling attention to the Columbia adjustable window ventilator, which is made entirely of cold rolled steel and finished in copper-oxidize. The ventilator is referred to as neat and attractive, consisting of two identical pieces of steel bent into an inverted V-shape, and may be placed on the sill below the lower sash or can be used on top of the upper sash and extended or contracted to accommodate the particular width of the window casing. The ventilators are adapted especially for bed rooms, bath and living rooms, hotels, schools, hospitals, office buildings, etc. The folder in question also directs attention to the Columbia safety sash locks by the use of which it is claimed a window cannot be opened from the outside; the ventilator is therefore safe to use in rooms on the ground floor. The company states that a safety sash lock is furnished free with each ventilator. The latter are made in three sizes, one of which is special.

Catalogue of House Moving Equipment

The moving of buildings of all kinds is a business which has assumed large proportions and is one in which many contractors are engaged either directly or in connection with their building operations. They are, however, likely to find much that is of interest in the very attractive catalogue which has been issued from the press by the La Plant-Choate Mfg. Company, 625 Eastlack Court, Cedar Rapids, Iowa. It contains a vast amount of valuable information regarding the equipment furnished by this concern and the illustrations show many examples of house moving operations. Special emphasis is laid upon the steel Giant trucks which are used in moving buildings, attention being called to the ease with which the structure may be guided and corners turned. The various parts are also illustrated and described and the matter is presented in a way to appeal to the builder who is likely to be called upon to execute house moving operations. We understand that the company will ship any truck, capstan or complete outfit and allow the contractor to make a thirty-day test on his own jobs and then decide whether or not he desires to keep it. If the tools do not satisfy him they may be returned at the company's expense and the latter will also refund the money that has been deposited in connection with them.

Saino Fire Doors

An illustrated folder which is being sent out by the Saino Fire Door and Shutter Company, 141 Broadway, New York City, sets forth the merits of Saino fire doors and refers to some of the important buildings in connection with which they have been used. One of the most prominent of these is the new building for the Equitable Life Assurance Society, now in the course of erection on lower Broadway, New York City. These fire doors will be used to protect the elevator shafts and main corridors and will be set in pockets behind tile walls to operate by fusible links. The Saino Fire Door is made of two walls of cross-laid 22 gauge galvanized

(*Continued on page* 82)

steel with air spaces and sheet asbestos between. Provision for expansion and contraction along straight lines is secured through the medium of patented telescopic channels and joints. All structural parts of the door are visible and the fire retardant qualities are said to be not materially affected by the sudden cooling and impact due to the application of a fire stream while under extreme heat. The door is such that the radiation of heat through it and the amount of flame, heat or smoke passing round the edges of it are reduced to a minimum.

A Self-Supporting Barn Roof Truss

Under the suggestive title "How to Build a Barn" there appears in the Barn Builders' Guide sent out by Hewitt-Lea-Funck Company, 259 Crary Building, Seattle, Wash., a very interesting description by John H. Fleming, head of the company's Special Plan Department and a practical builder of wide experience, a very interesting description of a self-supporting roof truss. He points out that for a long time there has been a demand for a truss of this kind which would stand up under any physical or mechanical test and which would do away entirely with tie rods or purlin posts, so that the entire body of the barn above the hay mow floor would be free from obstruction and available for storage purposes. In describing this new self-supporting roof truss, he says among other things:

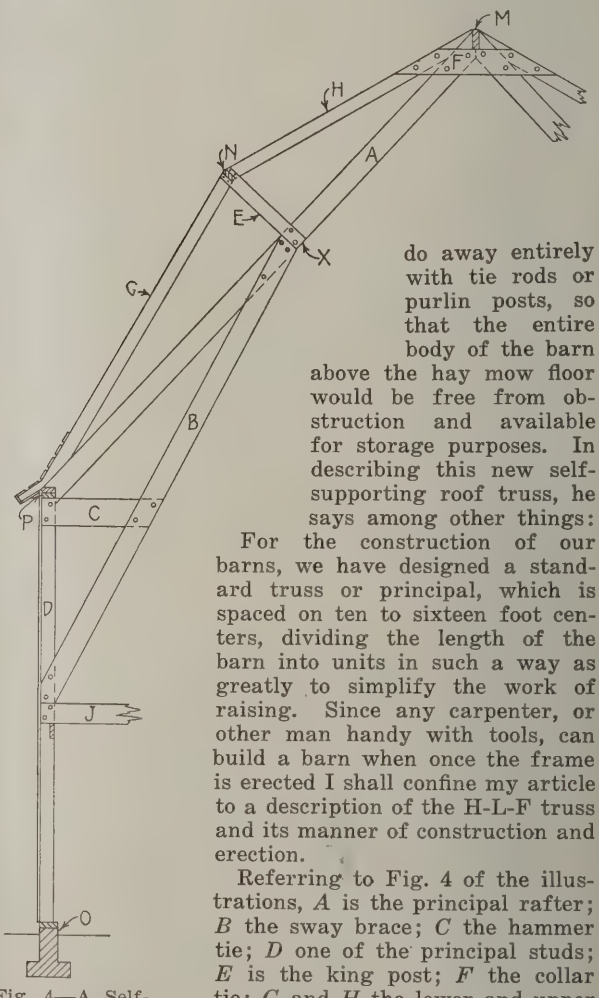


Fig. 4—A Self-supporting Barn Roof Truss

For the construction of our barns, we have designed a standard truss or principal, which is spaced on ten to sixteen foot centers, dividing the length of the barn into units in such a way as greatly to simplify the work of raising. Since any carpenter, or other man handy with tools, can build a barn when once the frame is erected I shall confine my article to a description of the H-L-F truss and its manner of construction and erection.

Referring to Fig. 4 of the illustrations, *A* is the principal rafter; *B* the sway brace; *C* the hammer tie; *D* one of the principal studs; *E* is the king post; *F* the collar tie; *G* and *H* the lower and upper common rafters, and *J* the chord.

It will be seen that the roof truss contains only 18 members or separate pieces of lumber—nine of each half—whereas the next best truss that I know of has 26 members. The sketch indicates a truss for a barn 36 ft. wide and having walls 16 ft. high. The truss has been framed so that it will withstand snow load and wind pressure from without and be capable of carrying an entire wagon load of hay instead of the customary fork full suspended from carrier within. In the sketch the point *M* represents the edge of the ridge board, a piece of 2 x 8 in. timber running the entire length of the barn and properly scarfed or spliced in the center of each principal. This principal consists of the completed bent of 18 members.

A careful study of the sketch will show that the entire load is carried on the upper part of the principal rafter *A*, so that half the load is carried on each side of

(*Continued on page* 84)

the roof and the stress caused by this half load weight will travel down *A* to a point where *E*, *A* and *B* form a junction at *X*. This is the first point of resistance and the greater part of the load will then travel down the principal sway brace *B* to the junction of the chord *J* with the principal stud *D;* that portion of the principal stud from the bottom plate to the under side of the joists forming the chord *J* is of three thicknesses so that the feet of the sway braces *B* rest solidly and transmit the load directly to the foundation.

The part of the load which passes the point *X* becomes a stress and will continue down the principal rafter to the point *P* or to the junction of the principal studs, wall plates and hammer ties. It will be seen that the tendency is for the foot of the principal rafter to press downward and outward, but that it is prevented from so doing by the ties marked *C*. The tie member consists of three pieces, each of 2 x 12 in. timber. The two outside pieces lap the principal stud *D* through which two ⅝ in. bolts pass.

At the inner end, the center piece forms a tenon and passes between the two sway braces marked *B*, so that *B* and *C* are flush and they are fastened together with five-eighths inch bolts. Consequently, whatever pressure is exerted in an outward direction at *P* is immediately transmitted again to the sway brace *B* and then to the foundation at *O*.

It will be noted that the lip on the under side of the principal rafter extends down and presses fairly on inner surface of principal stud, the center piece of hammer tie being framed to permit this. Another important member is the collar tie *F*, a piece of 2 x 12 or 2 x 10, extending to the back line of the common rafter, *H*, and bolted securely to head of both common rafter and principal rafter *A*.

The two common rafters over each principal are cut and spiked directly over the center of the principal rafter *A*, thus with the king post *E* forming a completed truss, with the 2 x 8 purlin *N* extending from end to end of the barn and carrying the common rafters.

The system of construction above outlined requires less lumber, yet results in greater strength, because each piece has a definite work to perform. This means much less expense in building the barn, without in any way impairing stability. This may seem poor policy for people in the lumber business, but it is in accordance with the Hewitt-Lea-Funck idea of giving the customer the greatest possible value for his money.

It is important that material that is strong and true be used for framing barns. We know of no better wood for such purpose than old-growth yellow fir. This material is famous for its great strength. More than 3,000 miles of fir trestle bridges have been built by American railroads.

The Hewitt-Lea-Funck Co. is peculiarly well situated to provide excellent barn lumber, because it owns or controls through its officers great forests of old-growth fir, and also the mills in which this fine wood is made into lumber, and the system of direct selling, from mill to user, results in a big saving in cost.

Wolverine Sanitary Chemical Closet

One of the methods adopted by the Dail Steel Products Company, 825 East Main Street, Lansing, Mich., for bringing the Wolverine system of sanitary chemical closets prominently to the attention of those likely to be interested is through the distribution of large folders printed in colors and carrying numerous illustrations. There are five points of superiority claimed by the company for its Wolverine system, these being economy, sanitation, convenience, absence of odors and small initial cost. Emphasis is laid upon the advantages of this system for homes, schools, churches, lodges, etc. Directions for installing the closet system are given and there is also the guarantee furnished in connection with the company's goods.

How About Your Roof

Under the above suggestive title the Moeschl-Edwards Corrugating Company, Covington, Ky., is distributing what is known as "Catalogue R," which has been prepared with a view to giving the architect, the builder,

(*Continued on page* 86)

the roofer and the property owner some idea of the many varieties of ornamental metal roofing manufactured by the concern in question. The numerous illustrations which are presented, accompanied by descriptive text, are intended to aid prospective customers in determining the style they may require. For the purpose of supplying the rapidly increasing demand for its product the company has greatly enlarged and improved its facilities by adding machinery and augmenting stocks so as to render shipments with promptness and despatch. For the purpose of supplying the demand for a roofing that has "all the artistic effect, the beautiful curves and lines, with all the lights and shades of the ancient roofing tile," the company has recently placed on the market two different constructions of Spanish tile made from painted tin, painted galvanized iron, steel and copper. A number of pages are devoted to illustrations of two types of Spanish tile. These tile are stamped one tile to a sheet with lock joints, or they may be furnished in sheets containing 8 or 10 tile as desired. A number of pages in the catalogue are devoted to ornamental roofing, the designs being carried out in large sheets ranging from 5 to 10 ft. in length, some of them covering a width of 24 in. In the case of the Blue Grass roofing a sheet 24 in. wide and 10 ft. long contains 24 shingles of the standard size of 10x14.

The "Yankee" Bench Vise No. 1993

One of the latest additions to the extensive line of hardware specialties of North Brothers Mfg. Company, Lehigh Avenue, Philadelphia, Pa., is the "Yankee" bench vise No. 1993, illustrated in Figs. 5 and 6 of

The "Yankee" Bench Vise No. 1993. Fig. 5—General View

the engravings. This is the company's No. 993 vise mounted on a swivel base for use on a bench and its upper part is quickly detached for use on drill press, shaper, etc., and can be readily replaced again on the swivel base. This is referred to as an entirely new feature in vises and one that will be greatly appreciated by the mechanic where work can be held rigidly in a vise that can be used either on bench or machine. The body and sliding jaw are of cast iron with hardened steel faces. The sliding jaw extends through a slot 1 in. wide in the body of the vise in one piece and is fitted with two steel keys set in it, thus securing a parallel movement and so constructed as to cause very little wear. The vise is accurately machined so that it can be used on either side or end as well as on its base. The swivel base, Fig. 6 is easily and firmly locked or released

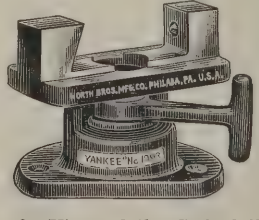


Fig. 6—View of the Swivel Base

by a short movement of the lever on one side. The base is 4½ in. in diameter and has three bosses on the under side to give a level bearing on the bench. The upper part of the swivel has a taper piece to receive the taper end of the sliding jaw with set screw in one end to force the tapers into position, thus readily clamping the vise and base. The jaws of the vise are 2¾ in. wide,

(*Continued on page 88*)

1⅞ in. deep and they open 3⅛ in. The extreme height with swivel base is 5¾ in. and the extreme length over all 8¾ in.

School of Plumbing Instruction

The annual catalog for 1915-1916 of the David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo., now ready for distribution, shows that the first term day classes will open September 7 and the evening classes will open September 27, so that enrollment can now be made. The records of the school show an increase in attendance from seventy-nine in the day classes in the season of 1910 to 243 in the season just closed, and from 136 to 583 evening students. The course of instruction includes carpentry, bricklaying, cement and concrete work, plumbing, painting and decorating, machinery and applied electricity. Supplementary instruction is given in the sciences applying to the various trades. The courses also include sheet metal pattern drafting. The school is open to men and boys over sixteen years of age.

Overhead Carrying Equipment

There has just been issued from the press by the Richards-Wilcox Mfg. Company, Aurora, Ill., an attractive 32-page catalog relating to the overhead trolley and I-beam carrying equipment which it manufactures, and which is adapted to a great variety of uses. The matter is profusely illustrated and the salient features of construction and operation are pointed out in a way to interest all having occasion to use apparatus of the character indicated. The illustrations are for the most part direct photographic reproductions of the finished goods and of some of their many applications. A number of pages are devoted to hoists of various kinds and to fire-door fixtures.

Definition of "Parliament" Hinges

At various intervals in the past there have come to the Stanley Works, New Britain, Conn., inquiries as to the derivation of the word "Parliament" as applied to hinges, and in reply the company obtained from its London representative the facts here given which we publish as likely to interest some of our readers.

"The term 'Parliament' is sometimes applied to the act of turning over; thus 'Parliament-heeling' a boat constitutes turning it over on its keel in order that the bottom may be cleaned and painted. It is also applied to a kind of gingerbread, which was sold in the form of flat cakes turned over. The word 'Parliament' is also used in Scotland to express the turning over of ideas—in conferences, for example. It was possible, therefore, that in the hardware trade the term was used originally to express the idea that the hinges to which it was applied were so made as to enable doors or shutters to be turned or folded right back.

"Another suggestion is that the hinges were so called because they were used on the doors which gave admission to the benches in the House of Commons, but not much importance is attached to that view, because there is evidence that Parliament hinges have been in use in manor houses for 400 to 500 years, at least. A third explanation is that there may have been an act of Parliament passed at some time requiring people to shutter their windows at a certain hour each evening, which gave rise to a demand for hinges of the type under discussion.

"In this connection it has been pointed out that few dealers know how to measure Parliament hinges correctly. The proper function of the Parliament hinge is to give projection, in order to enable the door or shutter to fall right back to the wall. That means that the measurement required by the manufacturer is the space between the inner corners of the two flanges when the hinge is wide open. Most dealers, however, measure the hinges from the extreme corners of the flanges, and this practice frequently leads to mistakes."

(*Continued on page* 90)

Merits of "Linofelt"

Insulating efficiency at an increased cost of 2 per cent. on the price of constructing a building and a reducton of 10 per cent. in the cost of running a heating plant are the features claimed for "Linofelt," an insulating quilt made by the Union Fibre Co., Winona, Minn. It is told in an interesting booklet recently issued by the company that the material used in the manufacture of this product is a flax fiber which is chemically treated to remove all resinous matters. The flax straw is passed through a special machine having corrugated or fluted rolls which crush the woody parts of the stem and they fall away from the fiber. The fiber is then run through another machine which combs it out, removing all particles of woody matter which may have remained after passing through the first machine. When the fiber has been cleaned it is placed in large steel vats, where it is mixed with chemicals and cooked for several hours under steam pressure until the natural resinous gum in the fiber is entirely dissolved. The fiber is then washed and dried and put through a batting or felting machine, from whence it comes in rolls of heavy sheeting like cotton batting. These rolls are placed between two sheets of paper and run through a sewing machine, making veritably a quilt. The paper used for covering "Linofelt" is a tough brown kraft stock, specially made for the company.

There are two styles of "Linofelt," one for sheathing and another which is a substitute for black plaster. The former is made in two qualities, in quarter and half-inch thicknesses, 66 2/3 ft. and 40 ft. long, respectively. The standard width is 36 in., and additional widths are also stocked of 16, 32 and 48 in. The second style is termed "Frost-Proof Linofelt," and is placed between the studding. It has a 2-inch lap on each side of the flax fiber, and the fibrous parts fit snugly against each stud. This type is made for 16 and 24-in. centers, but can be had in any desired width. Readers of *The Building Age* can secure a copy of this catalogue by writing the company.

Waxement Process for Treating Concrete Floors

One of the latest developments in the field of building construction and finish is a process for making dustless concrete floors. It is a well-known fact that a concrete floor surface is made up of countless particles of silica bedded in a cement bond but with their tops protruding and exposed. The continued wear to which a floor is subjected soon grinds these particles into jagged fragments and then into fine dust. What is needed to prevent this abrasive action is a substance that will hold the silica and cement particles more firmly; that will penetrate the mass, and maintain the needed bond as the concrete wears away and which will in a sense lubricate the loose particles and thus minimize their abrasive action. Such substance is said to be Waxement, a non-inflammable combination of specially treated, insoluble organic waxes which are said to be acid and alkali proof. In applying the material the concrete floor is heated by special gas burners to the proper degree and then the hot fluid Waxement is poured on. It penetrates the concrete for a distance ranging from ⅛ to 3/16 of an inch below the surface, quickly cools and hardens and the floor is ready for immediate use. The nature of the material is such that a Waxement treated concrete floor is non-absorbent, waterproof and stainproof. From this it will be seen that Waxement is not a surface treatment but becomes a part of the floor itself, due to the penetration which is obtained by the method of applying the compound. It is made by the Waxement Company, Inc.,

(*Continued on page 92*)

51 Chambers Street, New York City, and the statement is made that Waxement will make any concrete floor dustless, regardless of its condition.

TRADE NOTES

American Woodworking Machinery Company makes announcement of the removal of its New York City offices from 90 West Street to 30 East Forty-second Street.

The prominent feature of the July issue of *Graphite* is an article relating to records made in automobile races, the matter being illustrated by likenesses of four of the winning drivers. The pertinent feature is found in the statements of the drivers regarding the use of Dixon's graphite for lubricating purposes. Another article tells how Dixon's flake graphite helps to operate big water pumps while another deals with a window display in Indianapolis, Ind., of Dixon's graphite automobile lubricants.

Crescent Machine Co., Leetonia, Ohio, has an interesting display of woodworking machinery at the Panama-Pacific Exposition, the exhibit being in charge of the A. L. Machinery Co.

The Universal Portland Cement Company is starting the erection of four buildings in connection with the plant of the Minnesota Steel Company, Duluth, Minn. The largest is the finishing mill, 90 x 165 ft., which will be erected this summer and is to be ready for operation late next fall. Construction work is to be rushed in order to have the plant ready for operation April 1, 1916.

J. S. & G. R. Moore, architects and structural engineers, have just opened an office at Gardiner, Me., and will be glad to receive samples and catalogs from manufacturers of building materials and equipment.

In the July number of *Door-Ways*, the house organ of Richards-Wilcox Mfg. Company, Aurora, Ill., there appears an interesting article by E. J. G. Phillips, the engineer of the company, entitled "Locking Garage Doors." The point is made that the new styles of garage doorhangers present new locking problems which are solved by the use of the company's product. In addition to the article in question there appears more or less reference to sliding doorhangers, interspersed among which are paragraphs of a humorous nature, all tending to hold the attention of the reader whether he be layman or professional.

Joachin G. Giaver, who for the past seventeen years has been chief engineer of structural design and foundations for the well-known architectural firm of D. H. Burnham & Co., has just opened offices of his own at 751 Railway Exchange Building, Chicago, Ill., where he intends to specialize in structural design, foundations and building engineering in general. Coming to America from Norway in 1882 he was one of the pioneers in the structural field and introduced spandrel wind bracing in the modern steel-frame building, and is said to have been the first to drive building foundations to bedrock in Chicago, Milwaukee, Detroit and other Western cities.

Hammacher Schlemmer & Co., Thirteenth Street and Fourth Avenue, New York City, includes in its display at the Panama-Pacific Exposition, set-screws which are shown in the Collective Insurance and Universal Safety Exhibits in the Palace of Mines and Metallurgy.

"What Constitutes a Good Roof" is the title of a pamphlet of a size convenient to carry in the pocket which is being sent out by the metal branch of the National Hardware Association of the United States, 505 Arch street, Philadelphia, Pa. The little work contains three of the prize-winning articles in the contest conducted by the association on the subject of "The Advantages of Terne Plates and Sheet Metals over other Materials for Roofing."

TABLE OF CONTENTS FOR SEPTEMBER, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

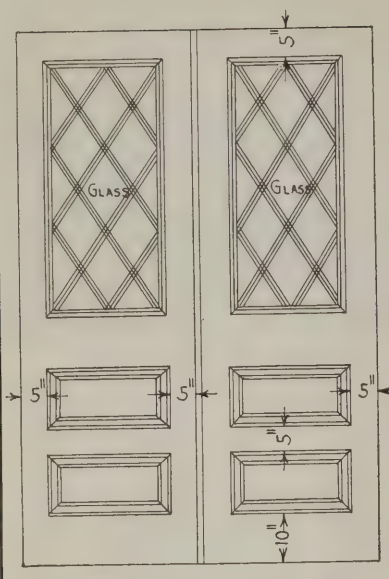
NEW YORK, SEPTEMBER, 1915

Gymnasium for an Industrial School

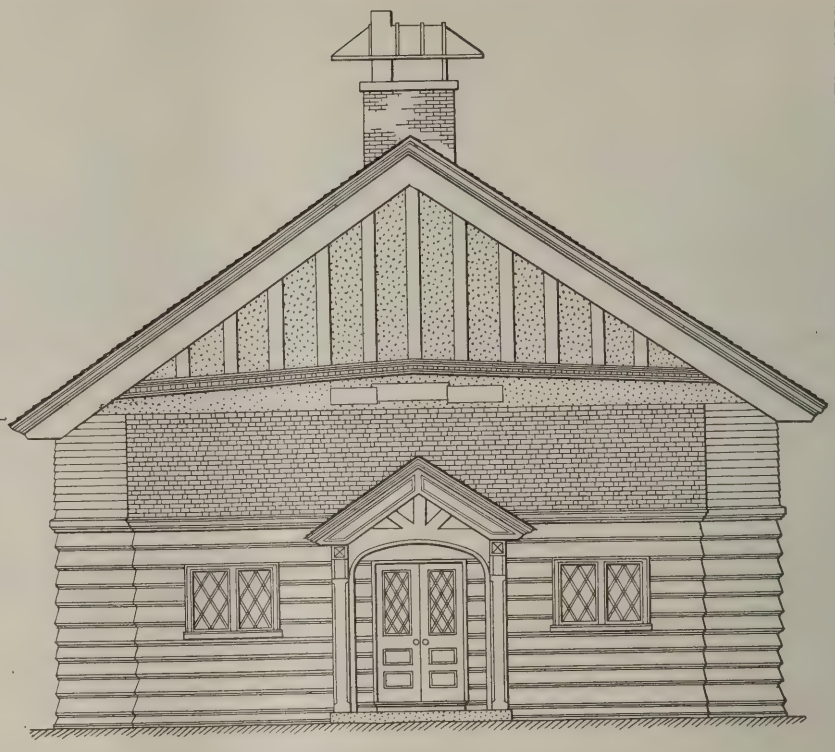
Frame Building with Open Truss Roof and Walls Covered with Cypress Siding—Details of Construction

IN any successful scheme of education it is as essential to develop the physical as it is the mental qualities of the students, and this is usually accomplished through calisthenics and various forms of gymnastic exercise both in and out of doors. For this purpose a well-equipped gymnasium is generally regarded as a very important adjunct of every institution of learning, and in the accompanying illustrations we show a building of this character intended for the students of an industrial school in New York State. As will be seen from the halftone engravings representing exterior views, it is a frame structure with gables finished in English half-timber effect, and with the outside walls covered with cypress siding up to the window sills, above which they are shingled.

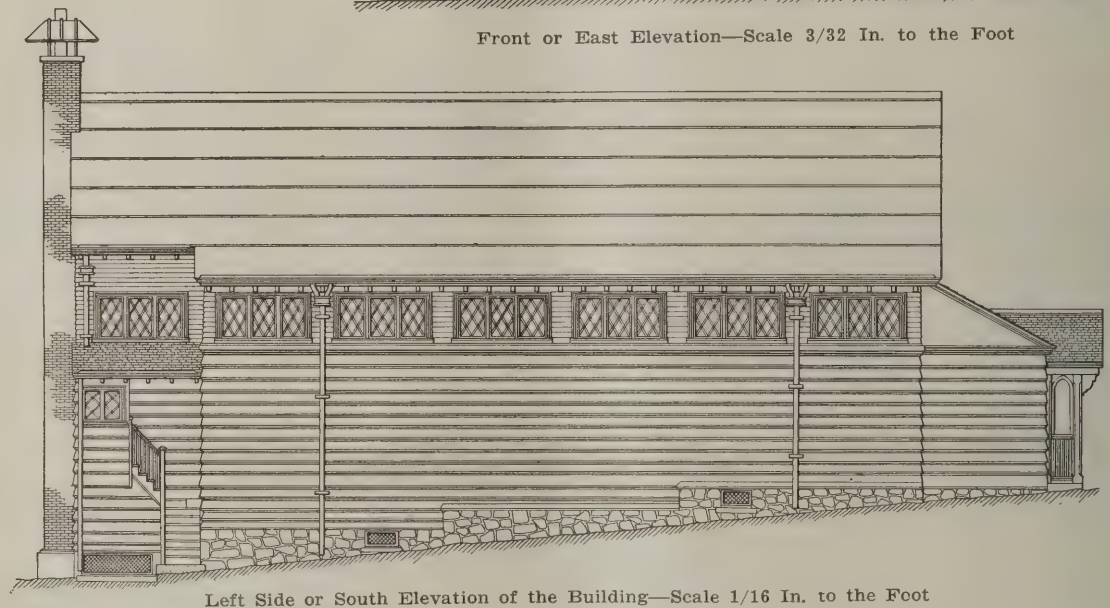
Gymnasium for an Industrial School at Fishkill-on-Hudson, N. Y.—Architects Allen & Collens, Boston, Mass.



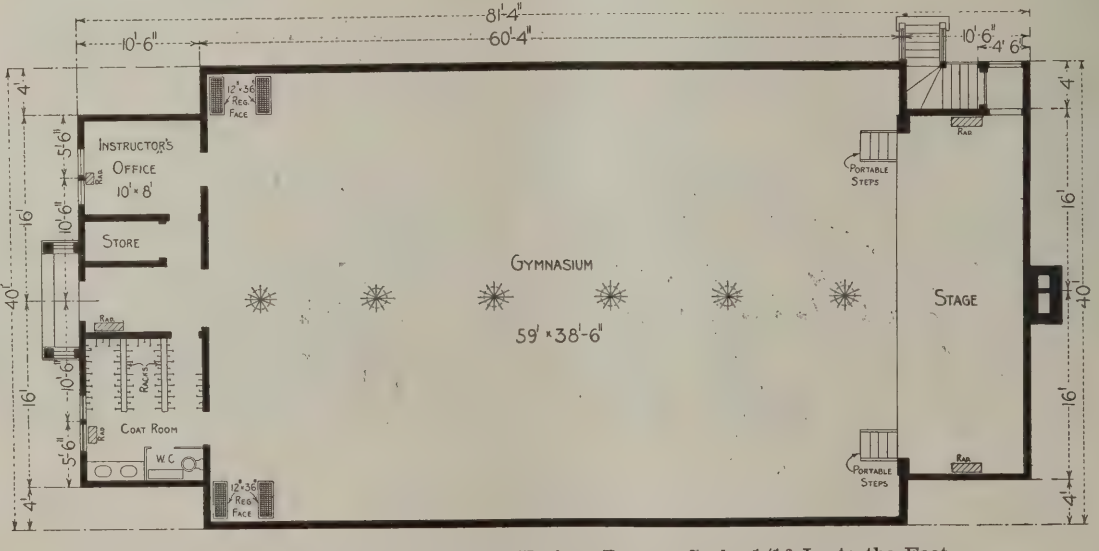
Elevation of Main Entrance Doors —Scale ⅜ In. to the Foot



Front or East Elevation—Scale 3/32 In. to the Foot



Left Side or South Elevation of the Building—Scale 1/16 In. to the Foot



Floor Plan Showing Stage and the Various Rooms—Scale 1/16 In. to the Foot

Gymnasium for an Industrial School at Fishkill-on-Hudson, N. Y.—Plan, Elevations and Details

The foundation walls are of local stone laid dry throughout and pointed on the outside of the wall for a depth of 8 in. The walls of the boiler room are laid in Portland cement entirely through the wall. All exposed walls above grade are also of local stone with joints ¾ in. thick and pointed in Portland cement and sand. The sills are secured to the masonry foundations with ¾-in. anchor bolts.

The frame of the building is thoroughly braced; the sills being 6 x 8 in.; the plate is of two pieces of 2 x 4-in. stuff. The posts are 4 x 8 in.; the saddle boards are 1 x 7-in. dressed cypress; the joists are 2 x 10 in., placed 12 in. on centers; the rafters are 2 x 8 in. and 3 x 8 in., and the studs are 2 x 3 in., 2 x 4 in. and 2 x 6 in., all of spruce. The girders are 6 x 10 in., and the partition cap 2 x 3 in., all of hard pine. The rafters where exposed are dressed and solidly constructed.

The outside frame is covered where shown with 1¼ x 12-in. cypress siding molded and rebated. Above the siding the frame is covered with ⅞-in. spruce sheathing boards over which shingles dipped in Cabot's stain are laid.

The rafters are covered with 1⅛ x 6-in. North Carolina sheathing boards thoroughly nailed to each rafter, and over these are placed one thickness of 2-ply P. & B. building paper, well lapped at all joints. On this in turn are laid extra cedar shingles exposed 5 in. to the weather. Two-ply building paper is also placed between the sheathing boards and shingles on the walls above the siding.

The gutter is built of 4 x 6-in. cypress with very small fascia and molding. The roof boarding over the lookouts is of 1⅛-in. matched and beaded cypress with 2-in. face. The rafter ends are dressed and cut as shown in the details. The frieze board is ⅞ x 10 in. and has a small molding.

A fire stop is provided by filling in around the sill with brick to the height of the joist.

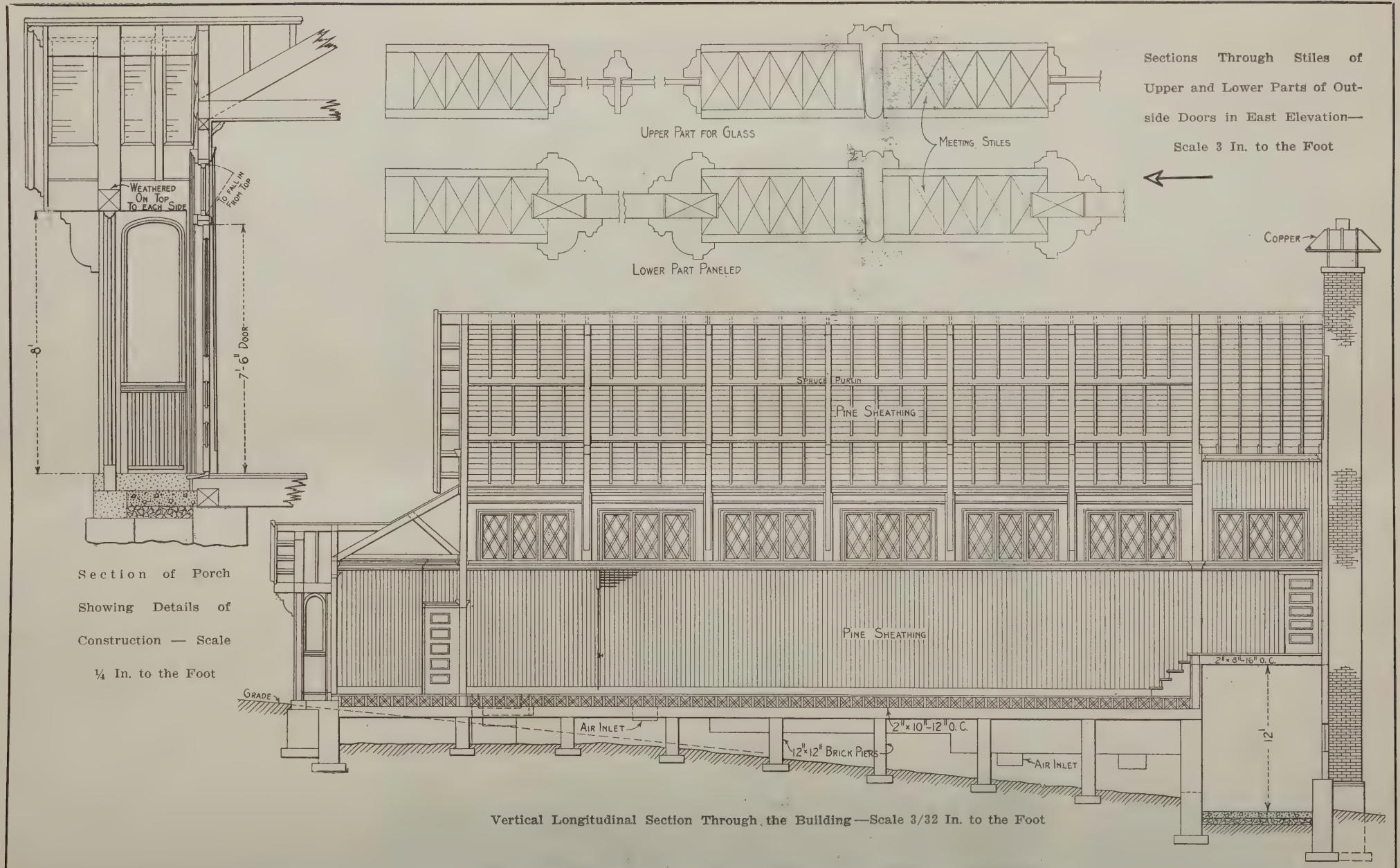
The floors are double, the sub-floor being of ⅞-in. planed hemlock laid diagonally on the joists, while the finish floors are of 2¼-in. face kiln-dried maple, blind nailed and with "Florian" building paper laid between the two. The floors are cross bridged every 8 ft. with 1 x 2-in. spruce. The partitions are also cross bridged, while all openings are double studded and trussed.

Gymnasium for an Industrial School—General View Showing the Picturesque Surroundings

All windows have 2-in. rebated frames and 1½-in. sash, 2-in. rebated sills and ⅞ x 5-in. outside casings with heavy molding. The muntins are of wood. Two casement windows in each set of three are wood and are arranged to fall in at the top, the center one being stationary.

The exterior door frames are 1⅞-in. cypress rebated and beaded. The doors are 1¾-in. thick, veneered, and the front door is of plain oak. The belt course is of cypress and the water table is of ⅞-in. stock with a quarter-round beneath.

The porch is of cypress, the rafters are dressed, the ceiling is sheathed and has single angle molding. The floor is of ⅞-in. rift pine laid open with nosing and molding underneath. The posts are 8



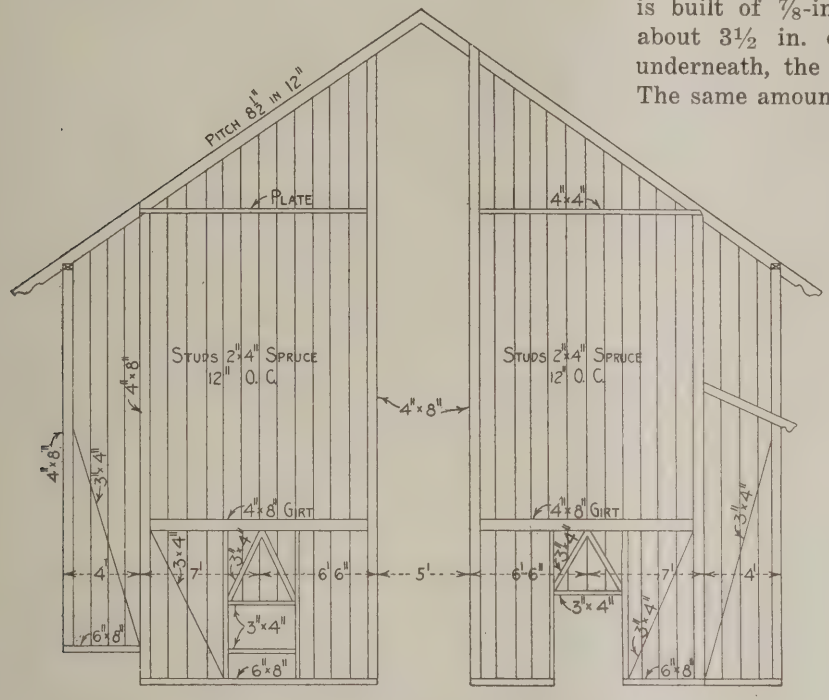
Sections Through Stiles of Upper and Lower Parts of Outside Doors in East Elevation—Scale 3 In. to the Foot

Section of Porch Showing Details of Construction — Scale ¼ In. to the Foot

Vertical Longitudinal Section Through the Building—Scale 3/32 In. to the Foot

Gymnasium for an Industrial School at Fishkill-on-Hudson, N. Y.—Elevation and Various Constructive Details

x 8-in. chamfered, and have molded arch moldings. The verge board is 1¼ x 20 in. and has heavy crown molding, sheathed soffit and 4 x 6-in. lookout. The top rail of the porch is 3 x 4-in. molded and the bottom rail 3 x 4 in. chamfered. The balusters are 1½ in. square in cross section. The rises are ⅞-in. hard pine and the treads are 1¼ in. of the same material. The carriages are 2 x 10-in. spruce placed 20 in. on centers.



Showing Framing of West or Rear Elevation—Scale 3/32 In. to the Foot

Windows ventilating the space under the floor of the gymnasium are fitted with No. 16 gage galvanized iron wire netting.

The chimney is of brick and the exposed portions are laid in cement and sand, colored to match the brick. The last five courses of the chimney are topped off with Portland cement forming a cap on top of 2 in. of clear Portland cement and sand. The chimney has a tile flue lining, an earthenware thimble for the furnace and is plastered in the building to the under side of the roof boarding. Four-pound sheet lead was used for counter flashing at the roof line and in the angle.

The boiler room floor is of 3 in. of concrete resting on a filling of 6 in. of clean gravel. The concrete was made of one part Portland cement, two parts sharp sand and four parts broken stone. The ceiling of the boiler room has one coat of plaster applied to metal lath.

All inside finish of the building is North Carolina pine. The front vestibule has cornice with spring molding and architraves ⅞ x 5 in. molded and mitered. The floor is of 2¼-in. face matched maple, with walls covered with 3-in. V-cut sheathing.

The walls in the gymnasium are also finished with 3-in. V-cut sheathing and 7-in. base with plain casings to windows. The walls in the instruction and coat rooms are similarly finished.

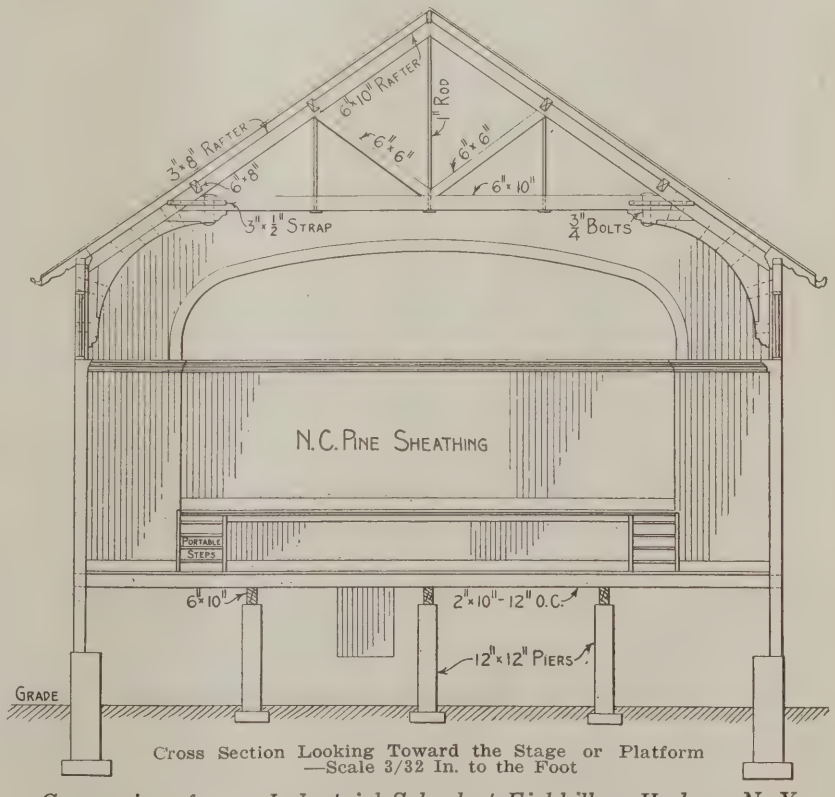
The interior door frames are 1⅞ in. rebated and beaded. The doors are of the five cross panel type 1½ in. thick with rift stiles and rails.

The rack for the dumb bells in the gymnasium is built of ⅞-in. stock and is cut with openings about 3½ in. on centers with 1¼-in. brackets underneath, the rack being 36 in. from the floor. The same amount of hanging space is provided for the clubs, the racks being placed 19 in. on centers. For bar bells the same detail of hanging strip is provided with 60 holes, the shelf being 66 in. from the floor.

The sashes and outside casings to windows and doors, also rear doors and all other flats on the outside are painted three coats of lead and oil, while all remaining outside finish was given two coats of oil stain. The front door was treated to three coats of spar varnish. The hard pine floor was oiled and all interior finish treated to two coats of oil stain. The sashes were also stained and varnished.

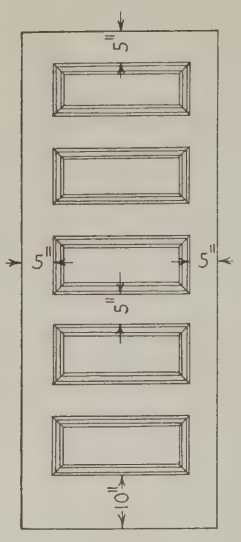
The front vestibule doors are glazed with plate glass while the casement sash has cathedral glass, double thick.

The building is wired for electricity, all being done in accordance with the rules and regulations of the National Board of Fire Underwriters. The switches are of the Diamond H rotary type.



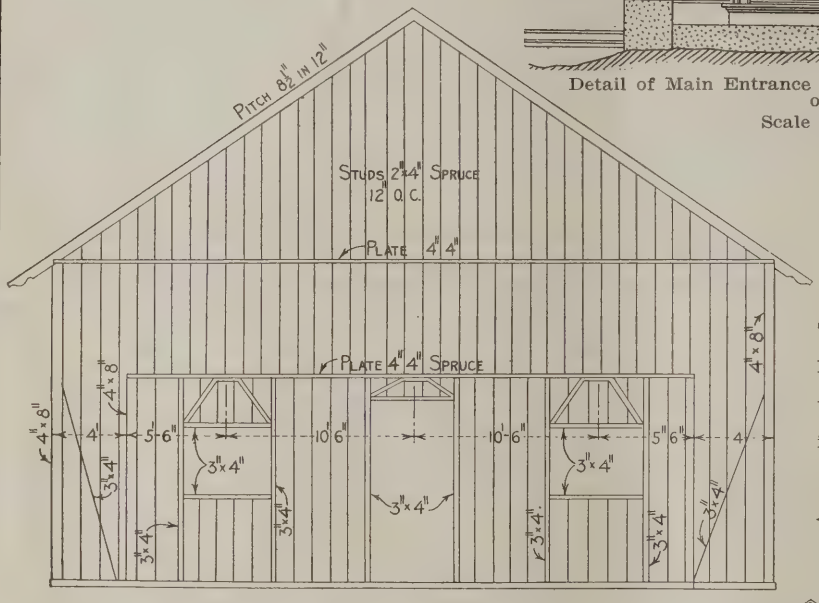
Cross Section Looking Toward the Stage or Platform —Scale 3/32 In. to the Foot

Gymnasium for an Industrial School at Fishkill-on-Hudson, N. Y.

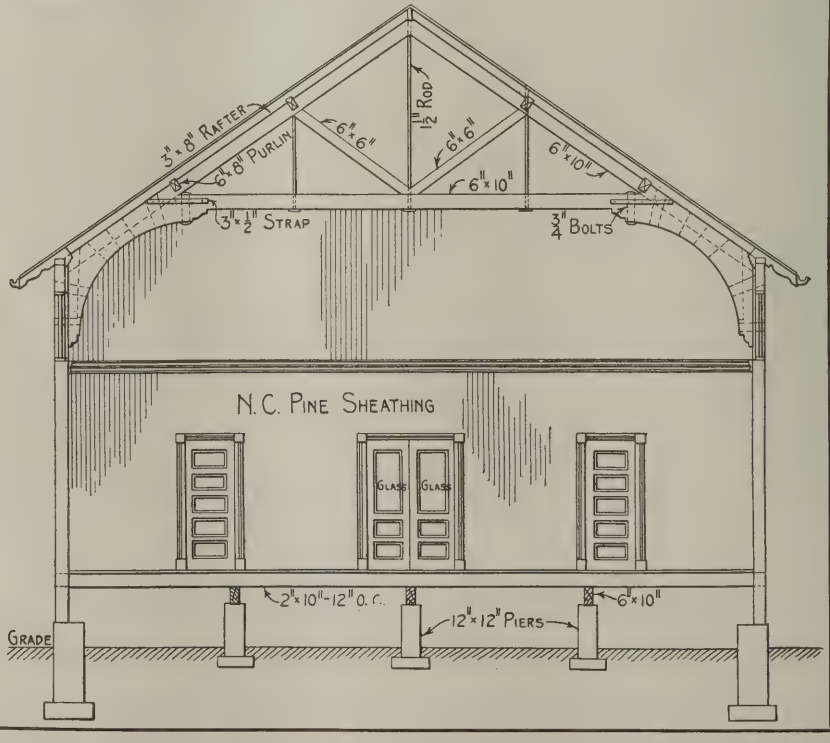


Elevation of Door Leading from Porch to the Stage—Scale ⅜ In. to the Foot

Detail of Main Entrance Showing Porch Construction and Style of Front Doors
Scale ¼ In. to the Foot



The Framing of the East or Front Elevation of the Building—Scale 3/32 In. to the Foot



Cross Section of the Building Looking East or Toward the Front—Scale 3/32 In. to the Foot

Gymnasium for an Industrial School—Sections, Details and Elevation

The plumbing fixtures are of the modern type and located as shown upon the plan. The building is heated with steam, there being radiators on the stage, also in the vestibule, coat room and instructor's office. The registers, each having a 12 x 36-in. face, are located as indicated.

The gymnasium here shown was presented to the Sargent Industrial School at Fishkill Landing, New York, by Mrs. Winthrop Sargent, of Boston, Mass., the cost being about $12,500. The work of construction was carried out by MacDonald & Joslin Company, 161 Devonshire Street, Boston, Mass., in accordance with plans prepared by Architects Allen & Collens, 40 Central Street, Boston, Mass. The plumbing and heating systems were installed by the firm of Pierce & Cox of the same city.

The Trade School Idea at Gary, Ind.

A Unique Vocational Training System Which Includes Two Well Equipped Woodworking Shops

A SYSTEM of vocational training which has proved its worth in a practical way during the four years since it was organized by William Wirt, employed for that purpose by the School Board, is that at Gary, Ind., situated on the south shore of Lake Michigan.

The system is in operation in three schools—the Emerson, Froebel, and Jefferson—in all of which boys are given the opportunity to study technical subjects and commercial problems. At the Emerson and Froebel schools the work centers around carpentry, plumbing, sheet metal work, and the ironworking industries, and many other trades are included in the curriculum. At the Jefferson school general courses in manual training take the place of the more specialized work.

The work in various vocational classes is elective. When a student wishes to take work in any particular shop, he makes application through the employment bureau. There he fills out a blank which calls for the kind of personal information that any employer would seek. This application must be accompanied by references and letters from former teachers and shop instructors.

The Trade School Idea at Gary, Ind.—View in the Woodworking Shop of the Froebel School

The chief purpose of the Gary system is to give the pupil absolute freedom in selecting the right

kind of vocational work, although the parents' consent must first be obtained. The pupil's trade inclination is the first consideration, although the teacher's judgment as to the wisdom of the pupil's choice must also have some weight. The pupil's previous work, if any, must also be considered, and if he enters upon a definite course he is given every opportunity to complete it.

Few books are used in the Gary schools. The program from beginning to end is such that everything can be learned by observation and induction. As long as the pupil remains in the Gary institutions he is subjected to the most ingenious and insidious temptations to become, for instance, a clever woodworker or pattern maker, sheet metal worker, or plumber; one with an appreciation of the moral and cultural values of life.

In all vocational work, a short probation course is provided. This course is for the purpose of assisting the pupil in selecting the kind of work he wishes to pursue. When the pupil has found his vocation, which he feels is the one in which he can achieve the greatest success, the practical teachers make every effort to help him.

The shops at Gary are all practical, and are superintended by practical men. Nearly all of the work done by the boys is some article of value—something that is to be used in or about the school premises. The boys are made to feel that their efforts must be serious.

A boy learns cabinet-making, not as an exercise, but because the school needs desks, cupboards, and lockers. He is taught plumbing because the installations in the schools have to be repaired from time to time. He learns sheet metal work because the school needs waste paper receptacles, office trays, cups, and cans. He is instructed in draftsmanship under the incentive of knowing that a real job of structural ironwork depends on his blueprints. This work is carried on along the same lines in all departments.

Every shop is conducted as if it were under the control of a master mechanic. Every teacher is a special teacher with a special subject.

Since the school repair and construction shops, heating plants, woodworking and electrical departments are all used for industrial education, such facilities are paid for from the customary appropriation for repairs and school maintenance.

No regular courses are provided. The work offered below the seventh grade is primarily of a vocational or trade nature. For the first ten grades, the school is not a technical or professional institution, and yet the preliminary training of the pupil in the vocational school is as fine a preparation as they could possibly have for any technical work they may desire to pursue. And in the Gary schools they are taught their work by practical men.

All the doors are open in the various departments. As the little chaps pass the doors they may stop and look. Presently curiosity takes them in, and they stand around and watch the older pupils at their work. Sometimes they may be asked to fetch a tool—to hold an instrument. Such contacts tend to develop interest and contain the possible chance seed of opportunity. All this time the teacher is on the watch for some boy who may be more adapted for that class of work than others. If it transpires, after careful study, that the course he selects is not well suited to his ability, the pupil tries various classes until he finds his vocation.

The woodworking department in the Emerson school is under the management of S. S. Cowan, who conducts it along strictly business lines, having a cost system, time cards, and other efficient methods for keeping track of his expenses. He is employed by the School Board to do all the necessary carpentry work around the school. In the Froebel school Edward Quilling has charge of all carpentry work, and he uses the same business methods as Mr. Cowan, yet each department is maintained separately.

No boys under sixteen years are allowed on the various modern machines with which the carpentry departments are equipped. The boys in these departments do all the repairing necessary around the schools. They also make tables, cupboards, desks, and stools, or whatever may be needed along carpentry lines.

The woodworking equipment in both carpentry departments is strictly modern and consists of the following machines: Mr. Cowan's department: One 30-in. planer, one shaper, one Universal saw, and one grinder, manufactured by the Oliver Machinery Co.; one 30-in. sander and one 36-in. band saw,

1544 VOCATIONAL SCHOOL TIME CARD
Must be filled out by pupil.

Name R. H. Coffman Class 2
Vocation Cabinet Shop
Rate per hour 40 week ending Oct 17-14 Amt $

	MONDAY	TUESDAY	WED	THURSDAY	FRIDAY	SATURDAY
Work						
Job No.	12		20			
Began	10.30		2.00			
Quit	12.00		2.45			
Time	.90		.45			

4559 S S Cowan Total Time 2.15
Instructor

Daily Material and Production Report

Oct 6 1914 Cabinet Shop S. S. Cowan Instructor

ORDER NO. AND DESCRIPTION	HRS INSTR	PROD HELP	LABOR TOT'L	PRODUCTION COSTS MATER'L	LABOR	TOTAL	CHARGE	MATERIAL USED STORE	STOCK	TRANS	TOTAL
No. 1 Slides	4				240	240	15				
Jefferson School	2			350	120	470	4-1-C		350		350
Work on Table	1			125	60	185	1-C-2		125		125
Cleaning Shop	1				60	60	1-a-2				
Pattern Shop	50	ft	Pop	Lumber						350	350

Gary, Ind. Oct 6 1914

GARY PUBLIC SCHOOLS, (code) 1-C-2
per Janitor

TO Emerson Cabinet Shop DR

Job No.	Quantity	Items	Amount
280	1	repairing Table	$2 00

The Trade School Idea at Gary, Ind.—Fac-simile of Cost Sheets Used in the Cabinet Shop

made by the American Woodworking Machinery Co., and one 12-in. jointer, one combination mortiser and boring machine, made by the J. A. Fay & Egan Co. Mr. Quilling's department contains an 18-in. planer, a 12-in. jointer, a No. 2 variety saw, and a 30-in. band saw, all made by the Crescent Machine Co. In the near future a cut-off saw and a mortiser will be added to the equipment.

Boys Painting a Stack at the Gary Schools

The pattern shop, under the management of R. S. Kauffman, contains the following equipment: One 12-in. Fox "Universal" trimmer, one 26-in. Crescent band saw, one 6-in. "American" jointer, a 30-in. pattern maker's lathe, and a Dixon power grinder. Each department is well lighted, and is replete with small tools and benches. As a safety first precaution, the machines are equipped with special guards to prevent injury to the boys.

The boys are given one hour's instruction each day, and the schools run the year round. In the evening night classes are held, to which anybody in Gary is eligible to make anything he wishes, and materials are sold at cost. All instruction, use of machinery, and drawings are free.

As has been already stated, the public school boys have no regular course to follow in their vocational work. All they do in these practical classes is auxiliary and supplementary to their general school work. The opportunities provided are such that when a boy has nothing to do, whether in school time or out of school, he is at liberty to work overtime. The reason for this will be explained later, when reference will be made to a system of credits accorded each pupil.

The Trade School Idea at Gary, Ind.—A Corner of the Pattern Shop at the Emerson School

Periodically the lecture hall in the Froebel school is used for demonstration purposes. At specified times each department demonstrates before the

entire school what work is being accomplished.

Among the accompanying illustrations are reproduced the cost sheets used in the cabinet shop, and this is typical of all departments. At the head of all industrial departments is G. E. Wulfing, and from him come the orders for the schools' needs. All work is done to save outside labor; in short, the industrial departments are self-sustaining to the point of paying for all materials used and for the cost of the instructors.

It is important to record that the boys are taught to handle their work in a businesslike manner. The students working in the various shops record their own time, putting down the hour and minute of starting and finishing. Blanks are provided for this purpose and kept in the shop. These time sheets are collected daily by the students from the commercial department, who do the routine work prior to the calculation of credits to be explained later on in this article.

Cost Sheets for Cabinet Shop

Reproduced herewith are three sheets: The daily material and production report, the vocational school time card, and a regular charge sheet. It will be seen in the first sheet that provision has been made for entering the work executed and its description in one column. Next to this the hours spent in instruction are entered, and in a third column the labor and material costs entered separately and finally totaled. A code is used in entering the charges to be made, and this end of the work is taken care of by the bookkeeping department. The student's time card and the charge sheet are typical of those made out daily.

In this vocational work credits are given to each student on a school currency basis. As work in these departments is similar to apprenticeship work, and as the essential thing is the completion of a definite amount of work, the check system for giving credits has been adopted.

Ordinarily the per cent mark is used to estimate the student's standing, but the Gary system provides for measuring his work on a money basis. Sixty cents per hour is the maximum allowed for his time in any department of industrial work, and thirty cents the minimum. If he is not worth the latter scale he is considered a failure at that particular class of work and is given something different to work on.

Credit Certificates

When the student's credits amount to $80 he is given a neatly printed certificate stating this fact and also the kind of work accomplished. This certificate entitles the student one credit toward graduation, and is entered accordingly on the school records. Students who cannot earn sixty cents an hour may still earn a credit during a semester by working overtime. This may be done after school hours, on Saturday, or at night school. This plan encourages the student to do his best to earn the maximum wage. It also discourages the feeling indulged in by some students that any kind of passing grade is good enough. The plan develops responsibility and self-reliance. The incentive for the pupil to earn the necessary credit is apparent. He is made responsible for his own time. He cannot afford to make mistakes. He is practically in the position of the journeyman to the master mechanic. He is taught to be careful and honest. And so, while he is young, the necessity for him to be methodical and careful in handling materials and tools is driven home.

However, all is not work in Gary. Prominent in the planning of grounds and buildings was the allowances for playgrounds, which assume the proportions of parks. These grounds are at the disposal of the pupils at all times, and the superintendent has made the schools and grounds the most popular places in the city. Ladders, swings, and even a pigeon house have been built by the carpentry boys.

Skyscraper for the Printing Trades

Work has just been commenced on what will be, when completed, the tallest building in the neighborhood of the Pennsylvania Railroad Terminal, and one of the largest structures in New York City. It will be twenty-two stories in height and cover the entire Eighth Avenue block front on the west side from Thirty-third to Thirty-fourth Streets. The façade will be of rough gray stone up to the fourth story, and above that of plain gray face brick with band courses of white terra cotta on the fourth and seventeenth floors, and a line of pillars extending from the seventeenth to the twentieth floors. The design is to be in harmony with the Pennsylvania Railroad Station and General Post Office, which it faces.

The structure will be known as the Printing Crafts Building, and the floors have been designed to carry a load of 250 lb. to the square foot. It is planned to make the building the headquarters of various large printing firms and space for meeting rooms has been set aside on one of the upper floors. From the thirteenth to the nineteenth floors the building will be devoted to offices.

Special care has been given to the design of the steel framework and an elaborate system of bracing will be installed in order that tenants on the office floors and particularly the engraving departments on the twenty-second floor may be absolutely guaranteed against vibration.

The cost, according to the architect's plans filed a short time ago, is placed at about $2,500,000.

Influence of Climate on Slate

It is said that the moist climate of the west of England has a great influence on the production of slate. The cleavage properties of blocks which have been quarried are seriously impaired if they are allowed to get too dry or if they have been attacked by frost. It follows from this that the output from a given quantity in the cold, dry weather falls short of that obtained in the damp weather characteristic of the west of England but more especially in the winter months. Quarry managers are fully aware of this and consequently never expect the maximum turn-out when the atmosphere is dry. They look for this when the mild, misty weather, which as a rule pervades the mountainous districts, is prevalent. Climate, in point of fact, has had more to do with the establishment of slate quarrying in the west of England than is generally recognized.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

ANOTHER method for carrying the ends of joists on a girder when head room is to be saved and the joists cannot rest on top of girders is shown in Fig. 46. This depends upon shearing resistance of the spikes. First find the width of bearing required for each joist by dividing the reaction by the bearing strength across the grain. Use nails having a length practically three times the thickness of the bearing strip as a minimum, so they will go into the girder a depth about twice the thickness of the bearing strip. The number of nails to use depends on the reaction and the thickness of the nail. Divide the reaction in pounds by 100 to get the number of 20d. nails; by 150 for 30d. nails; by 175 for 40d. nails; by 200 for 50d. nails; by 225 for 60d. nails. There is considerable difference in weight between nails and spikes having the same designation and the above figures refer to nails. The nails should be spaced at least 3 in. apart horizontally and this can be accomplished by putting half near the bottom of the strip and half near the top, thus staggering them. The size of nail to use will therefore be determined by the spacing when the reaction is considerable.

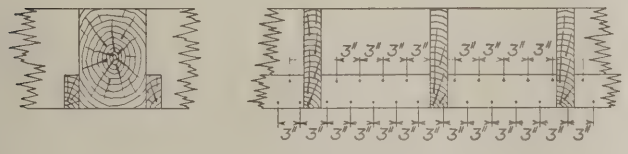


Fig. 46—Wood End Bearings for Joists

6.—Design a laminated floor to carry a total load of 48 lb. per square foot on a span of 16 ft. Use white pine with a fiber stress of 800 lb. per square foot. Ignore deflection.

A laminated floor is a solid floor consisting of 2-in. planks spiked side by side. The width to use in designing is 12 in., the load being in pounds per square foot.

$M = 1.5 \times 48 \times 16^2 = 18{,}432$ in.-lb.

$f = 800 \quad \therefore \quad R = 800 \div 6 = 133$

$$d = \sqrt{\frac{18{,}432}{133 \times 12}} = 3.4 \text{ in.}$$

Use 2 in. × 4 in., which will give an actual depth of 3⅝ in.

If the deflection is not to exceed 1/360 the span the deflection will be $\frac{16 \times 12}{360} = 0.534$ in.

$$\text{Actual deflection} = \frac{L^3}{46h} = \frac{16^2}{46 \times 3.625} = 1.535 \text{ in.}$$

The formulas previously given for deflection are based on the fiber stress and to avoid several trial computations to ascertain the depth with the reduced stress use the rule that:

The deflection in beams varies as the cube of the length in feet divided by the breadth in inches multiplied by the cube of the depth in inches.

Expressed as a formula it appears:

$$\text{Depth varies as } \frac{L^3}{bh^2}.$$

Let L = span in feet.
b = breadth in inches.
h = depth in inches (required for strength).
x = depth in inches (required for deflection).
D = deflection found in inches.
d = allowable deflection in inches.

Then

$$x = \sqrt[3]{\frac{Dh^3}{d}} = \sqrt[3]{\frac{1.535 \times 3.625^3}{0.534}} = 5.15 \text{ in.}$$

Use nominal 2-in. × 6-in. planks.

The formula is developed as follows:

$$\frac{dL^3}{bh^3} = \frac{DL^3}{bx^3}$$

which becomes

$$\frac{dL^3}{bh^3} \times \frac{bx^3}{DL^3}$$

Cancelling common factors we get $\frac{dx^3}{Dh^3}$ and $x^3 = \frac{Dh^3}{d}$, the formula used above.

7.—Assuming the floor is to be carried on joists find the size required for joists 12 in. center to center and 16 in. center to center. Deflection to govern.

$$\text{The allowable deflection} = \frac{16 \times 12}{360} = 0.534 \text{ in.}$$

$$h = \frac{L^2}{46D} = \frac{16^2}{46 \times 0.534} = 10.4 \text{ in.}$$

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 27 of the August issue.

The depth in this example needed to avoid undue deflection is based on the fiber stress used in the design, for the breadth is governed by the depth. In the case of the laminated beam a constant breadth of 12 in. was used and the deflection was fixed by a lower fiber stress than that used for strength only.

The bending moment for a width of 1 ft. = 18,432 in.-lb. (from the last example). The thickness of the joist will be

$$b = \frac{18{,}432}{133 \times 10.625^2} = 1.23 \text{ in.}$$

Use nominal 1.5-in. × 11-in. joists, 12 in. center to center.

With joists spaced 16 in. center to center the bending moment is increased one-third,

$$18{,}432 \times 1.333 = 24{,}600 \text{ in.-lb.}$$

$$b = \frac{24{,}600}{133 \times 10.625^2} = 1.64 \text{ in.}$$

We can use nominal 2-in. × 11-in. joists, 16 in. center to center.

The increase in amount of lumber is about one-fourth while the increased load is one-third, so it will be cheaper to use a spacing of 16 in. center to center than to use the 12-in. spacing. Thinner joists than 2-in. are not advisable when it is possible to avoid them, so this is another reason for using the greater spacing. To make the floors stiff and to avoid bending under load, or warping from any cause, lines of cross bridging should be used on centers approximately twenty times the thickness of the joist.

(To be continued)

Decisions of Courts Affecting Labor

There has just been issued by the United States Bureau of Labor Statistics Bulletin No. 169 and embracing its annual review of court decisions affecting labor. Approximately 265 decisions are summarized, dealing with the application and construction of the laws, or with the application of the principles of the common law to the rights and relations of the worker.

The largest group of cases on a single subject is that relating to the new form of legislation known as workmen's compensation laws. The decisions range from questions of constitutionality, decided adversely in the case of the Kentucky statute and favorably in other State courts, to the determination of definitions or of single points of dispute. In considering occupational diseases, for instance, the Massachusetts courts hold lead poisoning to be within the State act, providing for compensation for "personal injuries arising out of and in the course of employment," while the Michigan courts, under the provisions of a State law similarly expressed, hold that a case of lead poisoning is not entitled to compensation. An optic neuritis induced by inhaling poisonous gases was also compensated in Massachusetts, while in New Jersey the court disallowed a claim on account of eczema said to be caused by acids used in a bleachery. Other decisions relate to the mode of computing benefits, the definition of the term "casual employment," what constitutes dependency, willful act, incapacity, etc. Taken in connection with an earlier bulletin on the same general subject, the Bureau of Labor Statistics has here presented one of the most complete collections of cases on American compensation laws in existence.

The power of an employers' association to enforce its rules is maintained in a case in which such an association was held by the court to be entitled to recover from one of its members the sum of $5,000 as damages for his defection in a struggle against "closed shop" contracts. In connection with this may be mentioned a case deciding the illegality of a combination in restraint of trade undertaken and carried on by an association of retail lumber dealers by blacklisting wholesale dealers who sold directly to the consumer.

"Builders' Week" at Panama Exposition

From the standpoint of many of our readers doubtless the most important coming event of the year in connection with the Panama-Pacific International Exposition is "American Builders' Week," which occurs from Oct. 18 to 23. The importance of the builder as an individual as well as collectively and his intimate connection with all industrial and national progress are at once manifest when it is recalled that 40 per cent of the entire population of the United States is directly or indirectly depending upon the building industry and its success. No one line of business has more to do with progress than the builders of homes, of cities and towns, and those public utilities upon which depend the comfort, health and happiness of the people.

Probably no such opportunity as "American Builders' Week" has ever occurred before for promoting harmony among the building fraternity of the country, nor could a more appropriate place or season for such a gathering have been selected. Actively identified as builders naturally are in the upbuilding and development of our cities and towns, these visitors to San Francisco this year will have not only the opportunity of viewing the greatest collection of exquisitely beautiful Exposition buildings ever erected, but in the city by the Golden Gate they will find what is to-day, without doubt, the most up-to-the-minute, modern city in the world.

From a mass of ashes and complete desolation which covered over 4 square miles in April, 1906, a new city has arisen; a new San Francisco stands to-day an eloquent monument to her local builders—the men who are now cordially inviting their brethern and all who build to come and view their finished work, to share their hospitality and to contribute by their presence to the joy and success of "American Builders' Week."

It may not be without interest to state that additional information may be obtained by addressing the Publicity Committee, American Builders' Week, care of General Contractors' Association, 110 Jessie Street, San Francisco, Cal.

FRONT VIEW OF THE BUILDING FORMING THE BASIS OF THE COST FIGURES PRESENTED IN THIS ARTICLE

Labor Costs in Building Construction

Some Figures of Cost in Connection with the Erection of a Reinforced Concrete and Brick Structure

BY E. W. ROBINSON.*

FIGURES of actual cost are always interesting as a basis for study and comparison by building contractors and architects, and what is here presented may therefore prove of value to many readers of THE BUILDING AGE. The data is taken from the actual cost records on the construction of the "Home for the Aged" for Bexar County, Texas, the building involving an expenditure of about $40,000. The structure is located about ten miles from San Antonio, the county seat, and is about two miles from the nearest railroad siding.

Work was started in August, 1914, and the building completed March 1, 1915. Owing to the distance from town and to the fact that board and lodging could not be secured from residents of the vicinity, it was necessary to establish a camp to insure keeping the workmen on the job. Even with the best of inducements in camp it was hard to get and keep good men on the work at the start of the job, owing to the large amount of other work going at the same time.

*Civil Engineer with McKenzie Construction Co.

The costs given herein do not include any supervision except in such cases as brick work and "form" work where there was a foreman devoting all of his time to that particular item and which was included as a part of the cost of that item. The cost of the superintendent of the whole job and such other supervision as was over many different items, together with waterboy's time, was kept separate on the daily cost reports under the heading of "General." This item amounted to about 16 per cent of the total labor pay-roll on all work not subcontracted, and should be added to the unit costs as given, provided one wanted them to include all field supervision, etc.

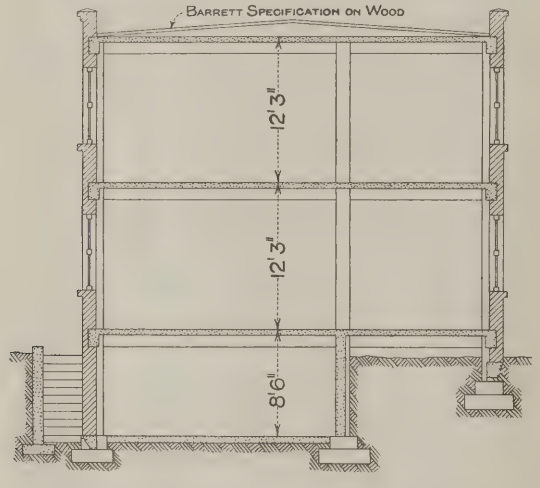
While it is true that costs alone without stating all the conditions under which they were obtained are valueless, the writer believes with the short descriptions of each class of work given the following unit costs should be of considerable value to any one making an estimate of similar work, or in checking his own costs as his work progresses.

As shown on the drawings the main building is

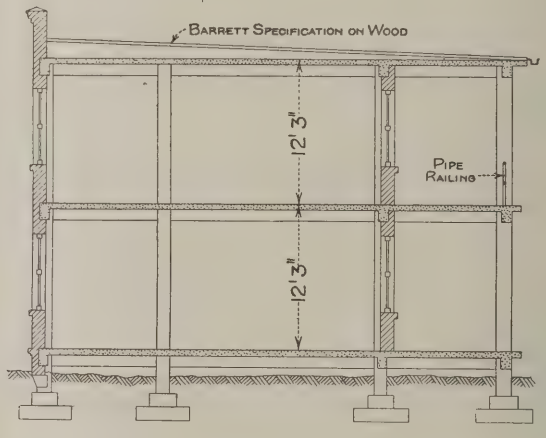
A REAR VIEW OF THE BUILDING SHOWN IN THE PANEL AT THE TOP OF THIS PAGE

carried on concrete piers or columns resting on square concrete footings which vary in size from 3 ft. 6 in. x 3 ft. 6 in. to 4 ft. 6 in. x 6 ft. 6 in., depending upon loading. The depth of bottom of footings below ground surface was in general 4 ft. 6 in., though some footings rested on solid rock at a less depth. There was a total of 175.5 cu. yd. of this excavation, and with common labor at $0.20 per hour it cost $0.879 per cubic yard to take it out. One reason for this high cost was due to the fact that most of it was done intermittently with basement excavation and other work, and therefore the foreman did not devote his whole time to it, but used it to take care of his surplus men at times. Also from the poor class of laborers that were on the job when it started it was almost impossible to get low costs even with constant and efficient supervision.

There was a basement, 20 ft. x 40 ft., under one wing of the building, which was approximately 7 ft. deep below the ground surface. There were 80 cu. yd. of earth and 190 cu. yd. of solid rock, the former costing $0.221 and the latter $2.95 per cubic yard to excavate. The high cost of the rock



Section on Line A-B of the Plan



Section on Line C-D of the Plan

Labor Costs in Building Construction—By E. W. Robinson

excavation was due to the fact that the contractor was not prepared at the time to do this class of work, to the poor class of laborers, and the class of material encountered. The rock was classed as a calcareous sandstone or silicated limestone, and combined the grit of the sandstone with the toughness of the limestone. With the best of temper and skill in sharpening the drill points they would wear blunt in a very few minutes, and it was almost impossible to so load a hole as to realize the proper shattering effect from the shot. In addition to the above given labor costs there was used four cases of 40 per cent dynamite, 600 ft. of single tape fuse, and 300 caps, all costing $36.85, or $0.19 per cubic yard of rock excavated.

Wooden "forms" were used for the concrete work throughout the building with the exception of the clamps on the column forms, which were of steel and adjustable in size. There was a total of 780 cu. yd. of concrete in the whole job, or a surface area of 56,032 sq. ft., touched by forms. The labor cost of erecting forms was $0.038 and of wrecking forms was $0.007 per square foot of surface, or $2.76 and $0.49 per cubic yard of concrete, respectively. Forms on concrete stairs cost to erect $0.08 per square foot or $6 per cubic yard. With the exception of a few men rated at $0.47 per hour all the carpenters received $0.45 per hour. All carpenter helpers received $0.25 per hour, and the number ranged from one for each two carpenters to one to four carpenters, depending upon the class of work engaged upon.

Concrete was mixed and placed with good laborers, receiving $0.25 per hour, and at a total labor cost of $1.021 per cubic yard, which cost included not only actual mixing and placing, but also cost of preparing plant ready to run such as building tower, moving chutes, runways, etc.

There were 54 tons of reinforcing steel in the concrete, 22 tons of which was delivered on the job all cut and bent and which was assembled and placed at a labor cost of $6.28 per ton. The remaining 32 tons was delivered on the job cut to lengths only and was bent, assembled, and placed at a labor cost of $10.39 per ton. These are averages for the whole job, though, of course, much of the slab steel required little or no bending, while some beam bars, stirrups, and column hooping required many bends in each piece. Beam stirrups made of ⅜-in. square twisted steel were bent at a cost of $5.60 per ton or $0.00116 per bend, while the cost of bending spiral hooping out of ⅜-in. round bars cost $17.56 per ton. An average of four men were employed on the steel work, one of which received $0.30 per hour and the rest $0.25 per hour. All column and beam reinforcement was assembled and wired together into unit frames at the bench, so that they only needed to be dropped into place in the forms.

There were 272,800 sand lime brick laid in the building and the actual labor cost for this work, including mixing and carrying mortar, carrying and laying brick, building scaffolds, placing lintels, etc., was $9.33 per thousand. Brick masons received $7 for eight hours' work, foremen $1 per hour, and helpers $0.25 per hour. The high cost of laying was due to the large number of beams, columns, etc., to build around, and also to the fact that the walls were faced on both sides. The actual cost of laying alone was $6.10 per thousand. All walls were 13 in. thick and they averaged 18.5 brick

per square foot of wall. The brick gang were fairly efficient and did an extra good job. The cleaning down of 1640 sq. yd. of brick walls cost $0.06 per square yard, additional.

With carpenter labor at $0.45, $0.47, and $0.50 per hour, one man at each rating, and helpers at $0.25 per hour, the actual cost of setting 182 window frames, fitting sash, cords, weights, etc., complete, was $0.83 each. Only four or five frames were cased on the inside, the rest showing brick work up to edge of opening. About half of the windows were two lights, 32 in. x 38 in., and half two lights, 32 in. x 44 in., though there were a few larger and a few smaller. The above number is the equivalent number of single windows, although some were in double and some in triple frames. All windows were outside openings and were therefore in brick wall.

There were the equivalent of 80 single doors and frames in the building, ten of which were outside openings in brick wall and the rest in 2 in. metal lath partitions. With the labor same as for windows, the actual average cost for the whole job was $3.66 each for labor setting, fitting hardware, etc. A few of the interior doors had sidelights in the same frames, which tended to increase the cost to some extent.

There were 192 outside openings fitted with screens, and the actual average labor cost of fitting same in place with hardware was $0.356 each.

There were twenty panels of wrought iron pipe railings on the second floor galleries, varying in length from nine to nineteen feet, the total length being 228.2 lineal feet. This rail was composed of two lines of 1½-in. black pipe with generally two posts to the panel, the ends of each panel being fastened to the concrete columns. It was made up partly with screw joint fittings and partly with slip joints held with set screws. The posts were anchored to the concrete floor in two ways, by flanges fastened with expansion bolts in holes drilled in the concrete and by cementing them into nipples placed when the concrete was poured. Drilling the holes and other work necessary in getting the floor in shape to receive the railing cost $0.053 per lineal foot of railing. This was done with common labor at $0.25 and $0.30 per hour. One steam fitter at $0.50 and one helper at $0.25 per hour cut and fit the railing in place at an actual labor cost of $0.189 per lineal foot. Most of the pipe cost $0.0804 per foot, and the total material cost of the railing was $0.534 per lineal foot, making a total cost of railing in place of $0.747 per lineal foot.

In addition there was 125 ft. of 2-in. pipe railing on the concrete stairs, which was furnished and erected in place at a total cost of $1.25 per lineal foot by a subcontractor.

The edges of all concrete steps on the job were protected by means of Kahn curb bar placed when the concrete was poured. These bars were delivered on the job cut to proper lengths, and the actual labor cost of placing and securing them in the forms of the risers was $0.0744 per step or $0.0177 per lineal foot. This work was all done by two carpenters at $0.45 per hour with one helper at $0.25 per hour.

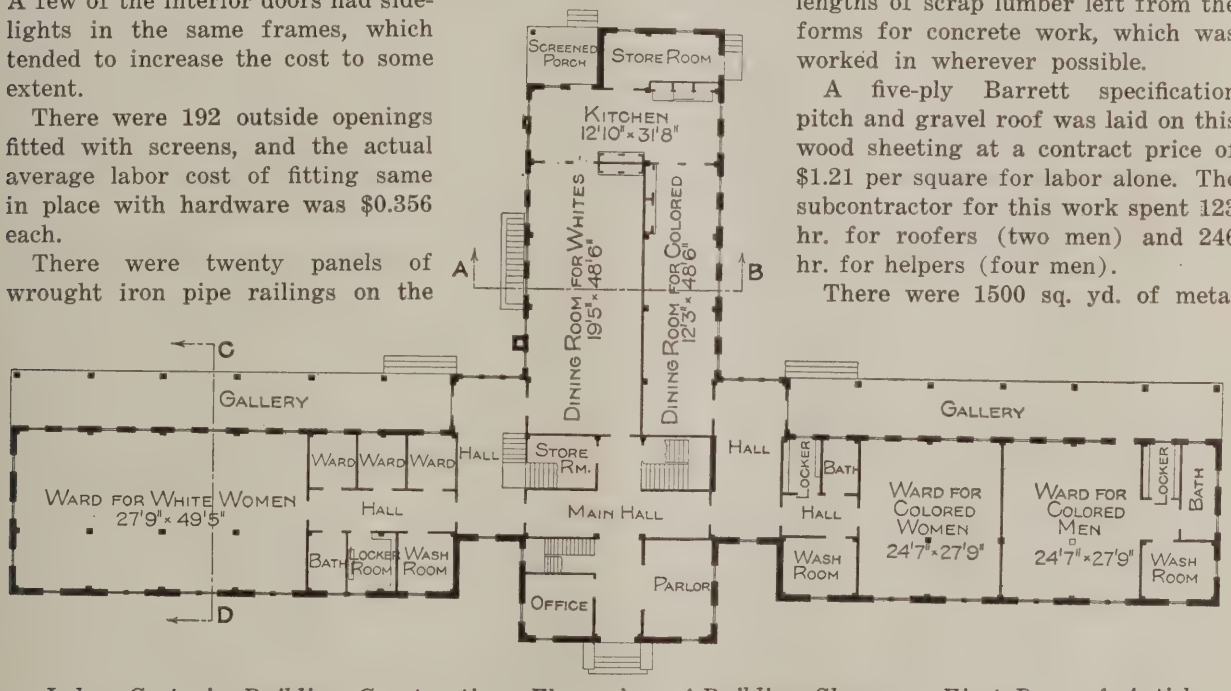
The concrete roof slab was made level, and in order to get proper pitch for drainage a wooden frame to hold the composition roofing was built on top of this. There were 103.34 squares (100 sq. ft. each) of this, which took 25.84 M.B.M. of lumber, which was placed at a labor cost of $1.723 per square, or $6.89 per M.B.M. of lumber. This cost was undoubtedly increased by the use of odd lengths of scrap lumber left from the forms for concrete work, which was worked in wherever possible.

A five-ply Barrett specification pitch and gravel roof was laid on this wood sheeting at a contract price of $1.21 per square for labor alone. The subcontractor for this work spent 123 hr. for roofers (two men) and 246 hr. for helpers (four men).

There were 1500 sq. yd. of metal lath work in the building. This work was subcontracted at a cost of $0.40 per square yard for both material and labor, divided approximately $0.26 for material and $0.14 for labor. Two men did all the erecting in 227 man-hours.

The sub-contract price for labor alone on plastering metal lath partitions was $0.33 per square yard of partition. This was a pretty close figure and the contractor barely broke even, according to his statement.

All labor on cement finish work was sub-contracted. All floors were finished with ¾-in. of 1 to 2 mortar at a labor cost of $0.0125 ad $0.015 per square foot. A 6 in. x 8 in. x ⅝ in. cove base was run around all brick walls and plaster partitions at a labor cost of $0.04 and $0.05 per lineal foot. All window sills were of brick and were topped with cement mortar at a cost of $0.08 per lineal foot. Cement topping on the 13-in. brick



Labor Costs in Building Construction—Floor plan of Building Shown on First Page of Article

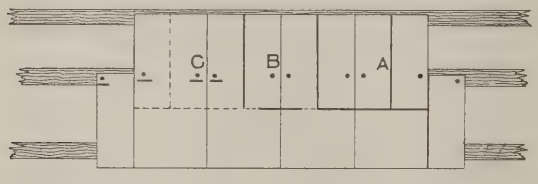
parapet cost $0.05 per lineal foot. All stairs were finished with ¾ in. of mortar on riser and tread at a cost of $0.10 per lineal foot of step, which included one 7-in. riser and one 10-in. tread. Cement finishers were paid $0.50 and $0.625 per hour and helpers were paid $0.25 and $0.30 per hour.

Lockers consisted simply of shelves 18 in. deep, 15 in. apart vertically, and divided into compartments every 18 in., all made of ⅞-in. finish lumber. There were 725 sq. ft. of these, which took 2.654 ft. B.M. of lumber, and the labor cost of making and placing them was $0.129 per square foot, $0.086 per cubic foot, or $35.30 per M.B.M. of lumber. The edges of all shelves and division plates were bound with 1 in. x 4 in. strips.

The McKenzie Construction Co. was general contractor on this work and Alfred Giles Co. and Chapman & Murphy of San Antonio were the architects. W. E. Simpson, Jr., drew the plans for the reinforced concrete frame.

Laying Slates in Putty

The subject of slate roofing is one of never ending interest and various are the methods for performing the work. More especially perhaps is this the case as to the best method of laying slates in putty. A writer in one of our London contemporaries finds that the method often adopted or recommended by architects is not altogether satisfac-



Laying Slates in Putty

tory, being in fact, very expensive and often apt to lead to a great of trouble. He says:

"Its defects are shown in the accompanying sketch: At *A* is shown a fillet of putty laid on the margin line or tail line and up the center of the slate, and the next slate bedded in it, and when the putty gets hard it cracks, owing to the vibration of the roof; water then gets inside the putty, and, there being no other way of escape for it, wells up and gets over the head of the slate underneath and soaks into the roof timbers.

"In the case of a boarded roof, it is often difficult to locate the place at which the water enters, as the roof boarding conducts the water sometimes 20 ft. or 30 ft. from where the leak really is.

"The method shown at *B* is similar to that illustrated at *A*, but in *B* there are two holes left in the tail bed as an outlet for any water that may get inside, which is an improvement on *A*; but an objection to *B* is found in the horizontal joints, which look heavy and are not so capable of resisting the action of the wind.

"At *C* is shown a ball of putty, which (it is about the size of a walnut) is placed just below the two nails, thus stopping the water from drifting up the cross joint, and giving it every chance to escape. The roof should be pointed on the inside with good hair mortar, which tends to keep the slate more rigid.

"The writer has found the method last described to be most satisfactory, and has never had any trouble with it. Where putty is used the slates should be painted, and for method *C* the tilting fillet should be a little thicker. In the illustration the putty is indicated by a thick black line.

"The following is a simple method of lining up a roof before commencing to slate: Gauge up the courses so as to have the same margin from the tail of the tile ridging to the tail of the top course of the slate; a short margin on the top looks bad. To obtain cross joints perpendicular to the ridge, mark off a rod, allowing about 3/16 in. for joint, starting with ½ stone, then 1½ stone, and so on to the length of the rod; or, if preferred, with a wing compass on the ridge piece and down at the eaves, then use a chalk line or a lead-pencil line and a straightedge from point to point.

Providing Skilled Labor in Bricklaying

What must be regarded as an important step in vocational training has just been taken by the Master Builders of Minneapolis, Minn., for the purpose of providing skilled labor in bricklaying. At a late meeting of representatives of the Dunwoody Institute, the Master Builders' Association and the Builders' Exchange, arrangements were made for apprentice bricklayers employed by contractors in the city named to be paid for attending school for the purpose of becoming experts in their trade. A tentative course of study outlined provides for first teaching the students how to make bricks, concrete and cement, and then they will be taught the exact values of sand as used in connection with bricklaying, after which will come instruction in technical problems of building.

The entire course will require a part of three years, the students attending school January and February of each year. They will be required to go to school five days each week and during this time they will be given half their regular pay by their employers. In case of excused absence they will lose one day's pay, and in the event of unexcused absence they will be fined an additional day's wages; the object being to induce regular attendance. While in school the students will not receive their pay, but their entire earnings will be given them in a lump sum together with their diplomas when they graduate.

In commenting upon this step, Eugene Young, Secretary of the Builders' Exchange says: "This is one of the best moves ever made along the line of vocational education. With the introduction of this course of study we can expect to see workmen turned out who are expert in their trade. It will be profitable both to contractors and employees."

Competition in Fireplace Gas Heater Design

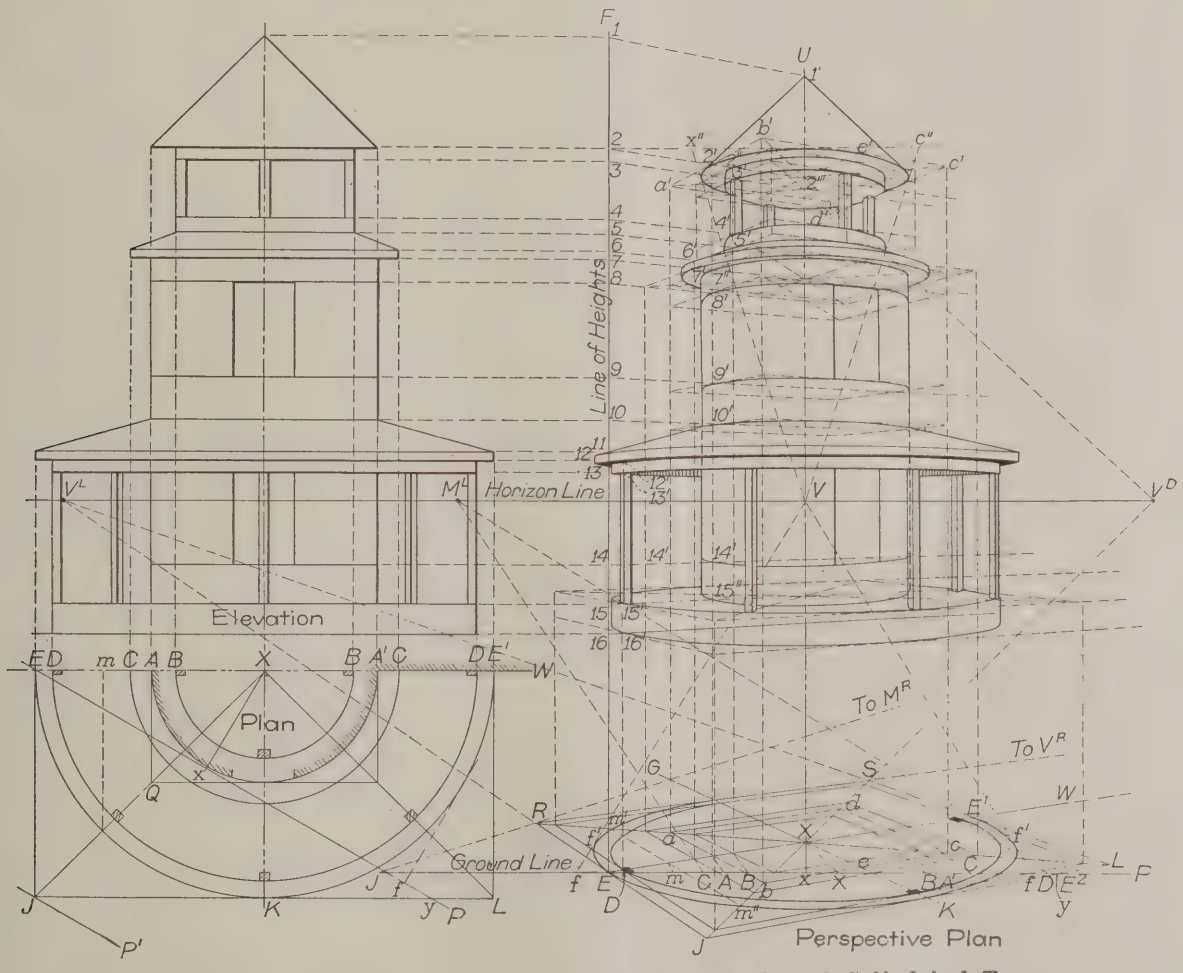
The general committee on fireplace heater design in the case of the competition conducted by the American Gas Institute makes announcement that the award is in favor of R. S. Stokvis & Zonen, Ltd., Rotterdam, Holland. There were seventeen designs submitted in the competition and the judges of award were three Philadelphia architects.

Elementary Perspective Drawing—VI

Representing a Cylindrical Object as, for Example, a Tower, in Perspective—a Simplified Method

By George W. Kittredge*

THE application of the operations illustrated in Fig. 9 to the representation of cylindrical objects in perspective is but a short step, if what has been said relative to those operations is perfectly understood. If, for instance, a circular tower is to be drawn, it is necessary to first locate the height of the planes of the several circles included in the design, such planes being considered for the time being, as horizontal squares, and then to inscribe within each square the required curve, or as much of it as would be visible in the finished structure. In putting the squares in perspective, the positions of the vanishing points become of first importance. So far as the representation of the circles is concerned, one point of view will produce the same result as another, provided the tower is placed opposite the point of sight, or nearly so, as has been shown in Fig. 9; but since a tower is usually designed as part of another structure, the squares should be so drawn as to vanish to the same points as the sides of the rectangular part of the building. Should the tower then be located otherwise than in the center of the field of view, this method will bring all of the circles into proper and corresponding perspective, which, as has been hinted, will be somewhat different from what it would be if the subject occupies the center of the picture.



Elementary Perspective Drawing VI—Fig. 12—Perspective of Cylindrical Tower as Forming a Part of Another Structure

As a subject for treatment, we show in the left side of Fig. 12, the elevation of a round tower in a simplified form, and below it a half plan, in which the line A¹ *W* may represent a portion of the front wall of the building of which the tower is a part. The plan of all that portion of the tower except

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

that of the upper part, which is completely circular, may be supposed to contain three-quarters of a circle that is to extend through another quarter of a circle back of *X E*, and drawn from the same center, *X*, but not shown in the plan, to meet the receding side of the building, shown by *X G* of the perspective plan.

Perspective of a Rectangular Subject

A careful inspection of the elevation will show that the widest part of the tower is the porch cornice, which is represented in the plan by the semi-circle *E K E*^{1}. About this, for the purposes of perspective, is drawn the half square *E J L E*^{1}. In putting a rectangular subject into perspective, it is most convenient to bring its near corner against the picture plane as has been already explained. Since the tower itself has no plane surfaces or angles, it may be considered at first as being rectangular, the half square just mentioned being its plan. In that case the picture plane can be drawn through one of the near corners, as *J*, at the desired angle, as shown by *J P*^{1}, just as though *J L* and *J E* were the plan of two sides of a square tower. Any other point, as *Q*, the corner of the square drawn about the circle *A A*^{1}, which represents the body of the tower, can just as well be assumed for that purpose. With any such point assumed as a starting point, the student should be able by the method explained in connections with Fig. 6 to locate the several squares within which the circles are to be drawn, and then to draw those circles, that is, their representations, in the manner illustrated in Fig. 9. Since, however, the line *E E*^{1}, one of the center lines of the plan, represents a plane which is a continuation of the front wall of the main building of which the tower is a part, it will be found advantageous and quite as simple to select this as a suitable working plane upon which to locate the widths and heights of the various parts of the tower. Through one of the points *E* or *E*^{1}, the line of the picture plane may therefore be drawn across the plane as shown by *E P* at the desired angle, after which the point of sight may be fixed and the vanishing points and measuring points located in the usual way. In the present instance the point of sight may be supposed to be assumed at a point exactly opposite the center or axis of the tower, therefore from *X* draw a line at right angles to *E P*, locating the point *x*, when, after fixing the hight of the horizon, we are ready to begin the perspective drawing.

Drawing the Perspective

Draw first the ground line of the perspective plan as far below the horizon line as convenient, and at any convenient position, and crossing the same draw a vertical line, *x U*, representing the axis of the tower. To the left of this axial line, at a distance equal to *E x* of the plan, locate upon the ground line the point *E* of the perspective plan, from which point draw the line *E W* toward V^r, representing the bottom line of the working or central plane of the tower. Next set off on the ground line, from *E* to the right, all of the distances between the points on *E E*^{1} of the orthographic plan, as shown by corresponding letters between *E* and *E*^{2}. From these points lines are now carried toward M^l to cut *E E*^{1}, as shown, on which line, though not shown for lack of space, they may be known by the same letters as on *E E*^{1}.

In distinguishing between the two plans in Fig. 12, that at the left is properly termed the orthographic plan, while the one at the right is the perspective plan, and the several points in the one are designated by corresponding letters in the other. By this method any point in either plan can be located in the other, and the drawings are thus made in a great measure self-explanatory. Now set off from *E* to the left on the ground line, a distance equal to *E J* of the orthographic plan, as shown by *E J*^{1}, and from *J*^{1} draw a line toward M^r to meet a line drawn through *E* toward V^l. This intersection, *R*, locates one of the points of the large square not shown in the first plan, it being back of the central or so-called working plane. A line drawn from *R* toward V^r, to meet a line from *E*^{1} drawn toward V^l, will locate the farthest point, *S*, of the large square. Having now the further half of the large square and its central point *X*, we have only to draw the diagonal *S X* and continue it forward to meet the line *R E*, also extended forward at *J*. This locates the nearest corner of the square *J* in the perspective plan, after which the point *L* is obtained without difficulty.

Another Method of Obtaining the Perspective

Another method of obtaining this square in perspective without the use of the point *J*^{1} suggests itself, which is perhaps more simple than the foregoing. Since the line *E P* of the orthographic plan represents the picture plane, the position of any points or intersections which may occur thereon may be transferred by measurement from *E* directly to the ground line; therefore, its intersection with *J L* at *y* may be located upon the ground line, as shown at *y* of the perspective plan, through which point a line can be drawn from V^r to meet at *J* a line drawn from V^l drawn through *E*. This gives the point *J*, from which the diagonal may be drawn through *X* and extended to meet at *S* the line from *E*^{1} to V^l. From the points thus obtained the remainder of the square can be easily drawn.

If the other diagonal *R L* be now drawn we have the means of obtaining quite easily the plans of the several squares to be used in delineating the other or inner circles. Through the several points *D, C. A* and *B* on both sides of *X*, previously obtained on *E E*^{1}, lines can now be drawn toward V^l to intersect the diagonals, both forward and back of *E E*^{1}, shown in one case by a *b* and *d c*, after which the corresponding intersections on the two diagonals may be connected by lines drawn toward V^r in both the near and the farther halves of the plan, all as shown, *a d* and *b c* being one pair, thus giving to the perspective plan the squares within which can subsequently be inscribed the curves representing all of the circles shown in the center of the orthographic plan.

Lifting the Squares to the Proper Height

Having got into our perspective plan all of the squares necessary for the various circles in the view, we have now to lift each one, as it were, to its proper height above or below the horizon line. These several heights will, of course, be derived

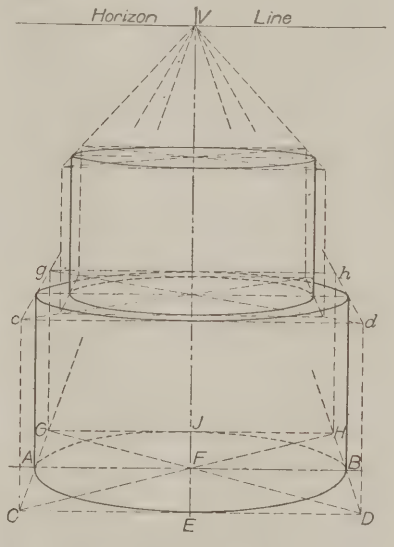
from the elevation either by measurement or by projection, as shown in Fig. 12. Therefore, from *E* of the plan, which represents the intersection of the working plane with the picture plane, erect a perpendicular as shown by *E F*, upon which set off the heights of the several planes in which circles are to be represented as shown by the figures 2 to 16, and from each point thus obtained draw a line toward V^r, cutting the axial line *X U* of the tower. Each of these lines will represent one of the center lines of a circle, or its inclosing square in the perspective—that is, a line exactly above *E* E^1 of the plan. Lines erected now from points *D, C, A* and *B* on *E* E^1 of the plan to cut the lines 2 to 16 just drawn, as shown by 2′, 2″, 3′, 4′, etc., will then give one side of each square at its point of tangency with the required circle. The other center lines of the squares (those transverse to the ones drawn from points on *E F*) may now be drawn through the intersections just obtained on *X U*, toward the other vanishing point V^l. Lines drawn through the points 2′, 2″, 3′, etc., toward V^l will give one side respectively of each square, which sides can be terminated by lines brought up from the angles of the corresponding square of the plan, all as shown.

Design of Tower Simplified

The design of the tower has been simplified to the extent that the three inner circles of the plan represent in that view all the circles indicated in the body of the tower in the elevation, while the two outer circles represent all of those in the portico, the entire number indicated being nineteen, which are designated in the perspective by the figures 2′, 2″, 3′, 4′, etc., to 16′. In constructing the perspective plan it is not necessary to draw therein the circles shown upon the orthographic plan, the perspective plan being constructed only as a matter of convenience and accuracy, as explained in connection with Fig. 9. The square indicated in the plan by *A* A^1 on *E* E^1 incloses an imaginary circle, which represents at once the extreme projection of the conical roof at the top, of which the line beginning at 2 on *E F* is the center line, and the several circles in the body of the tower, whose center lines are indicated by the figures 7, 8, 9, 10, 14 and 15. A line from *A* on *E* E^1 of the plan is therefore erected to cut lines on *E F*, as shown at 2′, 7′, 8′, 9′, 10′, 14′, and 15″. In constructing the square whose center line is drawn from 2 on *E F*, lines are first brought up from *a* and *b* of the plan to intersect the line drawn through 2′, as shown at *a′* and *b′*, from which points lines are drawn toward V^r. The end of this square at the right may be determined either by a line brought up from *a* of the plan to cut the line from *b′*, as shown at *c′*, or by means of a diagonal drawn from *b′* through the center 2‴, to cut the line drawn toward V^r from *a′*, as shown at *d′*. The line from *c′* to *d′* being, of course, drawn toward V^l, either point can be determined from the other.

Since the diagonals of the squares are available, as has been shown, in determining additional points on the circles or curves to be inscribed, it will be of great convenience to locate the vanishing point of which ever diagonal comes nearer the center of the picture. This can most easily be done by continuing the line *J S* of the plan to intersect the horizon line as shown at V^a. All of the diagonals which are parallel to *J S*, and of course directly over it, will then vanish to this point, and they may therefore be used to verify the positions of points obtained by other means. The opposite diagonals (*a′ c′* being that of the uppermost plane), having also been drawn where their presence will be desirable, they may then be employed as a means of locating additional points on the curves to be drawn, all as explained in connection with Figs. 8, 9 and 10, which operations are omitted in Fig. 12 to avoid confusion of lines, one only being located as an example, viz.: The crossing of the outermost circle of the orthographic plan with the diagonal *J X* is projected onto the center line, as shown at *m*. Its position is then located on the ground line at *m*, whence it is carried into perspective to cut the diagonals *X J* and *X R* of the perspective plan, as shown at *m′* and *m″*, which points can then be carried up to cut the diagonals of the proper plane in the perspective.

The use of the diagonals in locating points upon the desired curves is most useful in those planes



Elementary Perspective Drawing VI—Fig. 13—*Simplified Method Applicable to Cylindrical Object in Isolated Position*

which are farthest from the horizon line. As the horizon is approached, however, the circles necessarily appear more and more flattened, when it becomes a matter of greater importance to know exactly how far the curve will extend to the right and left of the center—that is, to locate the points at the extremes of the long diameter of the ellipse. These can be determined by a very simple operation, which is in reality part of another system of perspective, further details of which will be given later. But as all systems which are correct must produce the same result, there need be no fear of clash or confusion. The operation consists in finding the perspective of two lines drawn tangent to the required circle and at right angles to the plane of the view.

As has been explained, the ground line of the perspective plan is the plan of a vertical plane called the picture plane or plane of the view; consequently, any measurements taken directly from

the elevation upon lines representing horizontal planes can be transferred from their positions in the elevation to corresponding lines crossing the picture plane. In illustration of this, take, for instance, the largest circle of the plan shown in part by *E K* E^1 of the orthographic plan. *E P* of that view represents the picture plane, and a tangent to the said circle would meet it at the point *f*. Now, as before explained, the vanishing point of any line in the perspective view is determined by drawing a line from the point of sight parallel to said line to cut the picture plane, whence it is projected into the horizon line. Since in Fig. 12 the point of sight has been taken opposite the center of the tower, as shown by *X x* of both plans, the vanishing point of the receding lines referred to must ultimately fall at *V*. Therefore, take the distance *x f*—that is, the radius of the circle in question—and set it off both ways from *x* of the perspective plan, as shown at *f* and *f*, and from these points draw lines toward *V*, to cut the long diameter of the ellipse drawn through *X*, as shown at *f'* and *f'*. This operation can be applied to a circle at any height in the view, as shown, by the circle at the eave of the tower roof, whose radius is *X C* of the orthographic plan. The line drawn from the elevation to point 2 on *E F* is first extended to cross the axial line *U X* of the tower, and thus becomes a line in the plane of the view. The radius of this circle may now be set off to the right and left of the axial line, as shown at *x''* and *c''*, and lines drawn from these points toward *V*, as shown. In drawing the ellipse, which is circumscribed by the square *a' b' c' d'*, the limit of the curve at the right and left is obtained from *x''* and *c''* toward *V*, as shown.

A Square Unnecessary for Every Circle

In actual practice it will seldom be necessary to construct a square for every circle to be represented. When two circles appear very close together, as is the case with those whose center lines are designated by the figures 6 and 7, it is advisable to construct the square for the one that comes most into view first. In this case the square for the outer circle on line 7, and designated by 7', should be constructed first, since more than one-half of that circle appears in the view. Then inside of this on the same diagonals the circle designated 7'' can easily be formed, after which the circle 6' can be drawn almost by eye parallel to 7' first drawn. Although in most cases only a portion of the circles appear in the finished view, it is advisable to construct the full square in perspective and sketch in the full circle, in order that those parts which do appear shall be correctly drawn. In drawing the outlines of the slanting or conical roofs it will be observed that they are drawn tangent to the curves of the top and eaves of the roof. Thus, the line of the uppermost roof is drawn from 1' tangent to the curve at 2'. This feature is well shown by the line 6' 5', which joins the two circles constructed upon the lines 6 and 5.

In drawing the perspective of a cylindrical object in an entirely isolated position, the system last referred to can be applied in an extremely simple manner, without the use of an orthographic plan or even fixing the distance away of the point of sight, all as shown in Fig. 13. Draw first the axial line, then at any suitable distance below the horizon draw a horizontal line, *A B*, representing the long diameter of the lowest circle, determining its length by scale in accordance with known dimensions. Upon this line an ellipse may be first sketched in a manner to simply satisfy the eye. Through its lowest point *E* draw the horizontal line *C D*, to be terminated by lines drawn from *V* (the vanishing point) through *A* and *B*, as shown. Now draw the diagonal *C F* and continue it to meet the line *D V* at *H* and draw *H G*. The ellipse can now be accurately drawn through the points *A E B* and J, obtaining intermediate points on the diagonals, as previously explained, if desired. The square for a circle at any desired height above the base, as, for instance, that shown by *c d*, can be constructed by erecting lines from the corners *C L H* and *G* to the desired height, and its sides drawn to the vanishing point, as shown by *c g* and *d h*. Squares to contain circles of greater or less diameters can be constructed upon the diagonals, all as shown in the upper part of the figure, and as explained in connection with Fig. 12.

Effect of Position of Point of Sight

In making the preliminary sketch for a cylindrical object to be drawn according to the method just described, it is understood that the nearer, also the higher up, the point of sight is taken the wider from *E* to *J* will be the ellipses representing those circles below the horizon line, and conversely, the lower and more distant the point of sight the flatter will they become. If, then, the ellipse *A J B E* is drawn of such proportions as to give a satisfactory representation of the object under consideration, it is a matter of minor importance to know the exact distance away of the point of sight. Whatever be the assumed proportions of the ellipse representing the lowermost circle of the design, this method of procedure insures the apparent flattening of those circles lying in other planes, in correct proportion as they approach the horizon.

(To be continued.)

Board for Registration of Architects

At the meeting of the Board of Regents, held in Albany, N. Y., the last week in July, the following architects were appointed as members of the Board for the Registration of Architects under the law passed by the State Legislature last April: Arnold W. Brunner, 320 Fifth Avenue, New York; D. Everett Waid, 1 Madison Avenue, New York; William P. Bannister, Brooklyn; A. L. Brockway, Syracuse, and E. B. Green, Buffalo, N. Y.

The new law requires that all practicing architects be granted a certificate by the Board of Registration after the manner prescribed.

Fire Losses in United States

The fire losses in the United States and Canada for the first half of 1915 as compiled by the *Journal of Commerce* reached a total of $93,391,000 against $133,018,250 in the first six months of last year. July, according to the same authority, showed fire losses of $9,006,800 as compared with $17,539,800 in July, 1914.

Details of an Indiana Fishing Lodge

Some Interesting Particulars Relating to a Summer Home for Vacation Time—Cost Complete About $1250

MANY of our readers are likely to be interested in the design of a fishing lodge presented herewith, as it is one readily adapted for execution in any section of the country. The building is of a nature to accommodate four persons, that is, a family of that size, or it may be occupied by four congenial fishermen during their vacation or for the entire summer. The securing of light and air in all rooms for the longest period of time during the day has always been one of the perplexing problems of home builders, and especially of those constructing a house for use during the summer months in a warm climate such, for example, as that experienced in Indiana. The scheme illustrated herewith, however, is regarded as solving the problem in part at least.

The approach to the lodge is from the south and the two wing bedrooms are built at an angle of 45 deg. with the house proper, thus securing the maximum amount of light and air at all times of day.

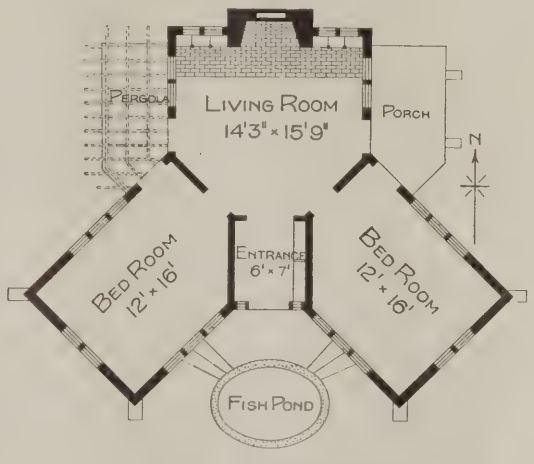
The building is of frame construction covered in the ordinary manner with sheathing boards to which is attached metal lath. This in turn carries a coat of cement "rough cast" a faint creamy yellow in color. The roof is stained red and the exterior woodwork is of cypress stained a rich brown. The front has an extension over all of 41 ft. and, as already stated, presents two interesting gables at angles with the approach.

The foundation is of "poured" concrete. The ground is thoroughly drained with tile and top filled with gravel to the floors, which are of cement. These are covered with thick rugs for comfort and to silence the tread.

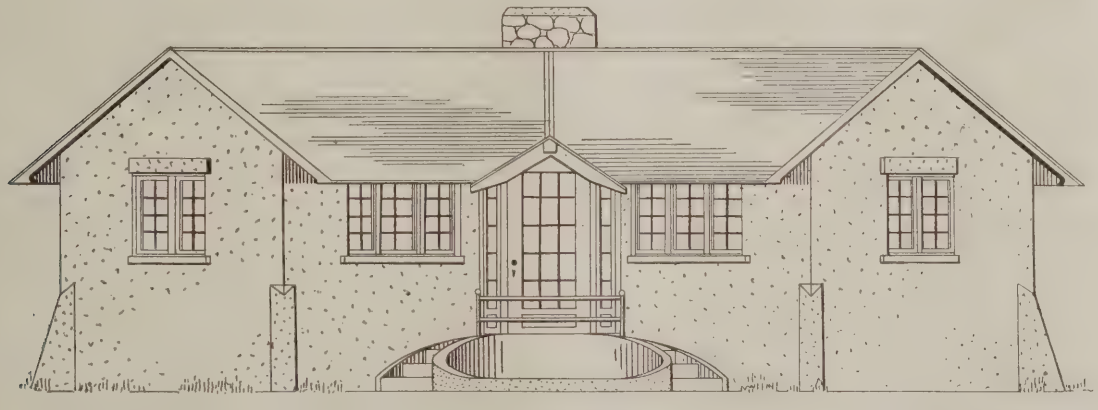
The entrance hall, 6 x 7 ft. in area, is provided with lockers at the sides for bedding and clothing with hooks above on the walls for coats and hats.

A generous living room is the main feature of the plan. The idea carried out is to be in close touch with nature during vacation time and for relief from the cares of housekeeping. The location is within a short distance from an attractive popular Inn, where meals are obtainable and diversion found during stormy, disagreeable days.

This room, 14 ft. 3 in. x 15 ft. 9 in., has a large brick fireplace, the hearth extending across the entire north end of the floor. The fire opening is ample to take in four-foot wood. There are hobbs, andirons and swinging crane to hang kettles or handle large back logs for the night fire. A generous meal can be served from this open fire if desired, or as the young folks have the fancy.



Plan Showing Unique Arrangement of the Interior



Front Elevation of the Indiana Fishing Lodge with Pool in Front of the Main Entrance

On the east a porch leads away from the house to a possible shack for guides' quarters in the rear. The west side of this room is sheltered by a pergola with wild grape vines over and a path leads out to a well, also vine covered.

The south front admits one to a vestibule 6 ft. x 7 ft., having door and side lights of glass giving a clear view of the lake from the inside and presents an interesting, unobstructed view of the room from the lake or shore with the fireplace lighting up the interior. Lockers for storing away fittings and luggage are placed at each side of the chimney with

book shelves over and high windows over the cases for ventilation. The large round table in the center of the room gives an air of fellowship and sociability.

The walls are wainscoted with cypress and a wide plate shelf 5 ft. high caps the wainscoting. The walls above are covered with paper of deep blue tint. The roof timbers are covered with a cypress ceiling laid on the rafters under the roofing and stained a rich brown. The wainscoting and beams are treated with the "Sugi" process, which is by burning the face of the wood with a plumber's torch and then wire brushing the surface, giving emphasis to the grain and the appearance of driftwood.

All windows are 20 in. x 40 in., double hung sash with weights and drop down entirely within the walls, something after the manner indicated in the

West Elevation of An Indiana Fishing Lodge

detail on page 56 of the August issue of THE BUILDING AGE. A hinged sill hides them there completely. Each window is screened on the outside.

The two sleeping rooms are each 12 ft. x 16 ft. in size with large windows on three sides for ventilation, affording the comfort of a sleeping porch with south frontage. The sunlight gets into all sides of each room. Outside cisterns, just under the eaves, take the water from the roof and serve each bedroom. A deep well for drinking water is provided just west of the pergola porch.

An open porch on the front is approached from both sides by steps following the circular ends of the 9 ft. x 12-ft. oval fish pond. The water is 24 in. deep, where water lilies and plants are grown and bass kept alive for the time of need. A wire mesh cage affords separate division for live bait. This basin is also used for a family of goslings or ducks on state occasions. The goose is the lodge emblem. The interior walls carry this motif in many ways. The family launch is named "Wawa," which is the Algonquin Indian name for wild goose.

The lodge here shown and described was designed in the office of The Interior Hardwood Co., Indianapolis, Ind., for Vice-President C. H. Comstock. The figures covering cost complete approximate $1,250.

Architect's Right to Compensation

In the recent case of Johnson vs. O'Neill, 148 Northwestern Reporter 364, the Michigan Supreme Court awarded plaintiff recovery for services rendered as an architect in connection with the construction of a building in Detroit, as against 66 objections urged by defendant owner. In allowing recovery of extra compensation for changing the plans after the contract had been let, the court says: "The record shows that after the contract had been let defendant desired changes to be made, so that the commercial building so-called would contain a larger number of stores and produce a greater rental. There would seem to be no good reason why plaintiff should not recover for this item, if the changes were made at the request of defendant, and after the contract for erection under the original plans had been entered into."

Defendant, also, sought to diminish plaintiff's recovery on the ground that he permitted ornamental plaster to be applied in a defective manner, resulting in quantities of it falling later. This claim was based on the fact that the building was kept insufficiently heated in the course of construction, but was overruled by the Supreme Court in the following language: "It is clear that the contractor was under no obligation under his contract to supply heat. The building was erected in midwinter. * * * Not having, in the contract, provided that the builder should furnish the heat, we think that the owners must be held to have assumed that duty."

Again defendant claimed to have been damaged because the floor of the auditorium was changed from one involving the use of steps to a gradual incline. But the court finds that since this was done at the request of a lessee of the building, and without objection on the part of the owner, who was present and noted the change, no claim could be based on such change.

Another ground on which defendant sought to abate recovery by plaintiff was that plaintiff, who resided in another city, did not inspect the building more than twenty times in the course of its construction, but the court decided this point in the architect's favor on a showing by him that a representative of the owner agreed to act in the capacity of "clerk of the works." Other grounds upon which defendant sought to defeat recovery were disregarded by the court as being palpably untenable.

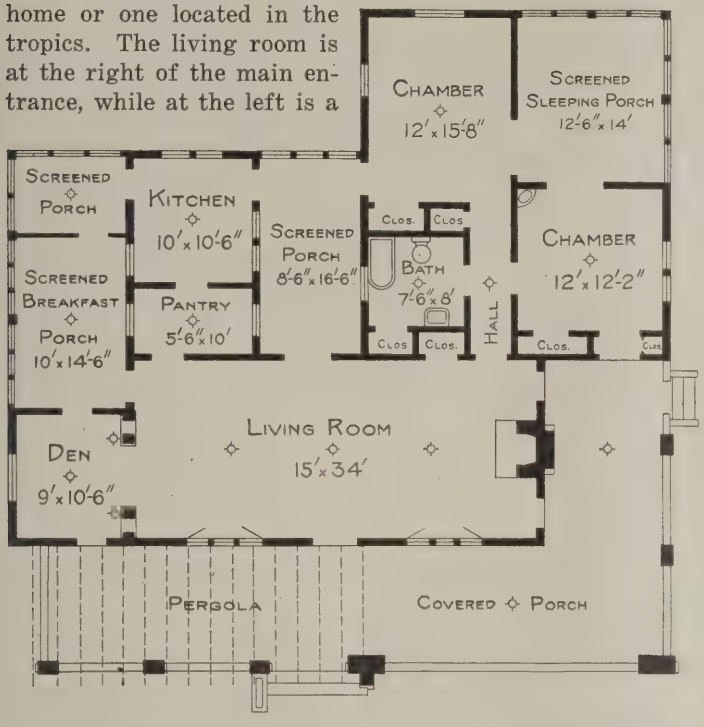
Two Floor Plans for Southern Homes

In sections of the country where land values are not the all-absorbing factor when it comes to the building of a home, and where it is both possible and economical to arrange all the principal rooms on the ground floor, the plans which we present upon this page are likely to prove of more than passing interest to architects and builders. The feature of the upper plan is the capacious living room, which extends nearly across the front of the house and which is fitted at one end with the cheerful open fireplace so common in southern climes, where elaborate heating apparatus is conspicuous by its absence, but where it is desirable to have conveniently available the means for reducing the chill during the fall and winter months. On the right and left of the main entrance are casement windows, one of which gives out upon a covered porch, while the other communicates with a pergola. Separated from the living room by an open colonnade is a den, beyond which is a screened porch that may be utilized as a breakfast room. The regular dining room is the space at one end of the living room, and communication with the kitchen is through a commodious pantry lighted from the screened porches at the right and left.

There are two sleeping rooms and a screened

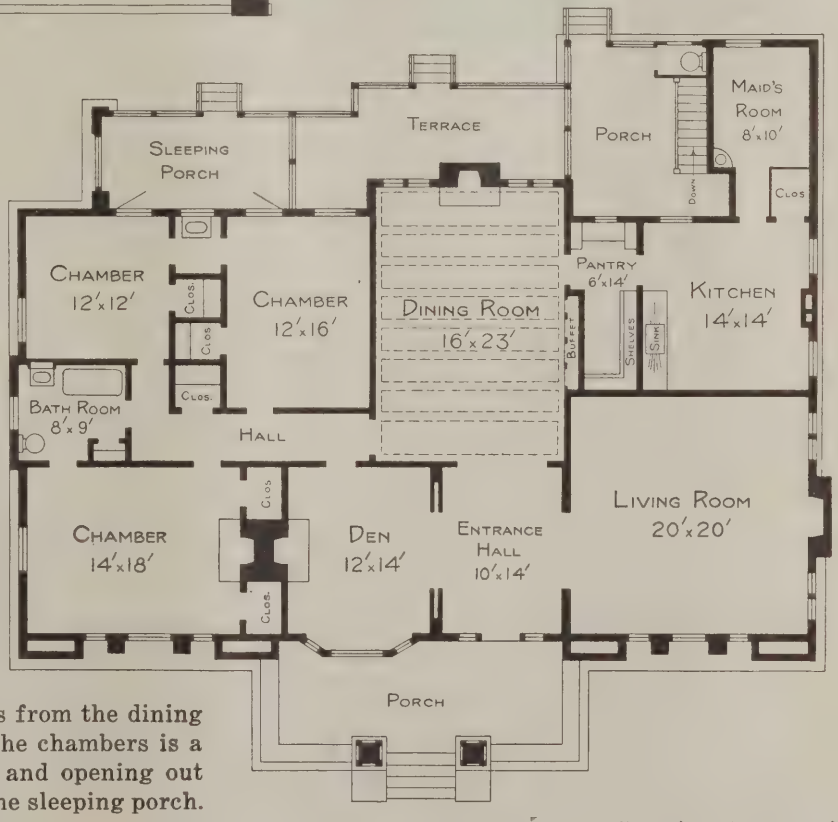
sleeping porch, all of which are convenient to the bath room and are reached from a short hall extending rearward from the living room. Between the bath room and the kitchen is another porch, all giving to the layout of the rooms an air of ample commodiousness.

The lower plan upon the page is of a rather more pretentious nature and its arrangement is well suited for a southern home or one located in the tropics. The living room is at the right of the main entrance, while at the left is a



den with open fireplace, shut off from the entrance hall by means of sliding doors. The dining room is directly in line with the main entrance and extends through the house to the rear terrace. It has a beamed ceiling with built-in buffet and at one end an open fireplace. It communicates with the kitchen through a pantry well equipped with shelving and cupboards. Opening out of the kitchen at the rear is a maid's room, also the porch from which descend the stairs to the cellar. Beyond these stairs and opening from the porch is a toilet.

The sleeping rooms and bath room are at the left of the main entrance and are reached by means of a short hall which leads from the dining room and den. Between two of the chambers is a dressing room, with wash bowl, and opening out of each of the rear bed rooms is the sleeping porch.



Two Plans for Southern Homes Showing Layout of Rooms—Scale 1/16 in. to the Foot

How Sandstones Differ

The products of rock decomposition may be reconsolidated either by great pressure or by the injection of cementing materials, or by both. Thus sands are formed into sandstone, clays become shales, and calcareous deposits yield limestone. Aside from their cementing materials, sandstones differ in composition exactly as did the sands of which they are composed. Sandstone, according to the United States Geological Survey, may be nearly pure quartz, or quartz and feldspar, or quartz, feldspar, and mica and it may vary in texture from the fine to the coarse.

Some sandstone is so coarse that it will hold 6 quarts of water to the cubic foot, and underground deposits of such standstone form excellent reservoirs, which may yield a never-failing supply of water. An arkose sandstone from the quicksilver region of California, made up of granitic detritus, was found to contain quartz, orthoclase, oligoclase, biotite, muscovite, hornblende, titanite, rutile, tourmaline and apatite. In short all the rock-forming minerals which can in any way survive the destruction or grinding up of a rock may be found in sands, and therefore in sandstones.

Plans have just been filed for the construction of a seventeen-story fireproof apartment house in the French renaissance style of architecture to cost about $800,000, and to occupy a plot 200.9 x 66.7 ft. in Park Avenue, between Fifty-fifth and Fifty-sixth Streets, New York City. There are to be accommodations for thirty-two families—two on each floor—and the servants' quarters will be located on the first floor as will also three suites for physicians. The architects are Warren & Wetmore, 16 East Forty-seventh Street, New York City.

Low Cost Cottage with Shingle Roof

Intended for Erection on a Lot Having Forty Feet Frontage—Some Details of Construction

WE have taken for the subject of our colored supplemental plate this month a low cost cottage or bungalow which is likely to appeal to many of those readers who have been inquiring for designs of inexpensive houses. The plan upon the facing page gives a good idea of the general layout of the rooms, while the miscellaneous details afford suggestions as to the interior and exterior style of finish. The house is intended to provide accommodations for a family of four and to be erected upon a lot having a frontage of 40 ft.

Cottage Erected from Slightly Modified Plans Shown on the Facing Page of Drawings

According to the specifications of the architect the footings are to be of concrete 10 in. thick and 18 in. wide carrying foundation walls 8 in. thick.

The framing timbers are to be of spruce, the sills and posts measuring 4 x 6 in., the plate 4 x 4 in., the first and second tier of beams 2 x 8 in., placed 16 in. on centers and braced with two rows of cross bridging; the rafters 2 x 6 in., placed 20 in. on centers, the ridge plate 2 x 8 in. and the ties 1½ x 8 in. let into the studs. The porch rafters are to be 2 x 6 in., the porch ceiling beams 2 x 4 in. and the porch floor beams 2 x 8 in., all placed 20 in. on centers.

All walls and partitions are to be constructed of 2 x 4 in. studs placed 16 in. on centers and doubled at all openings. All walls are to have at least one row of cross bridging.

The exterior of the frame is to be covered with 1 x 9 in, tongued and grooved hemlock sheathing boards laid diagonally, over which is to be two-ply building paper and this in turn covered with red cedar shingles exposed 5½ in. to the weather. The rafters are to be covered with shingle lath upon which shall be laid No. 1 red cedar shingles exposed 5½ in. to the weather and secured with galvanized nails. All shingles are to be dipped at least two-thirds their length in a good quality of shingle stain before being laid. All flashing is to be painted on both sides.

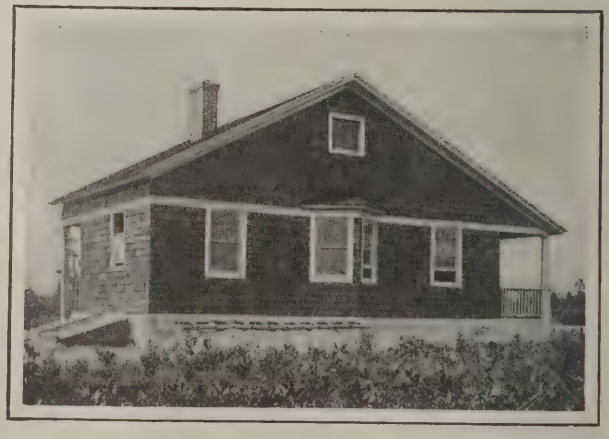
The chimney is to be of hard burned brick laid up in cement mortar and the flues lined with vitrified lining. A trimmer arch is to be turned under the kitchen hearth.

The connection between the kitchen range and chimney can be accomplished by carrying a metal stove pipe of 6-in. diameter below the attic stairs. This pipe is to be encased in brick and cement and the outer surface covered with asbestos. This part of the stack is to be supported on a shelf placed 6 ft. above the fourth tread to the cellar. The stovepipe can also be carried up through the ceiling to the attic and then across the stairs to the chimney. The opening through the ceiling and attic floor is to be lined with metal and asbestos and the pipe covered with the same at this point. This arrangement will also help heat the attic. In the last arrangement the boiler in the kitchen must be vertical.

The walls and ceilings of the rooms on the main floor are to be covered with two coats of plaster, finished white, but the living room is to have a sand finish.

The attic is to be floored but otherwise unfinished and the space can be converted into two sleeping rooms 10 x 14 ft. in size should the owner desire. If only one sleeping room is desired on the main floor, the one nearest the kitchen can be converted into a dining-room by leaving an arched opening between it and the living room, adding one more window and making them casements.

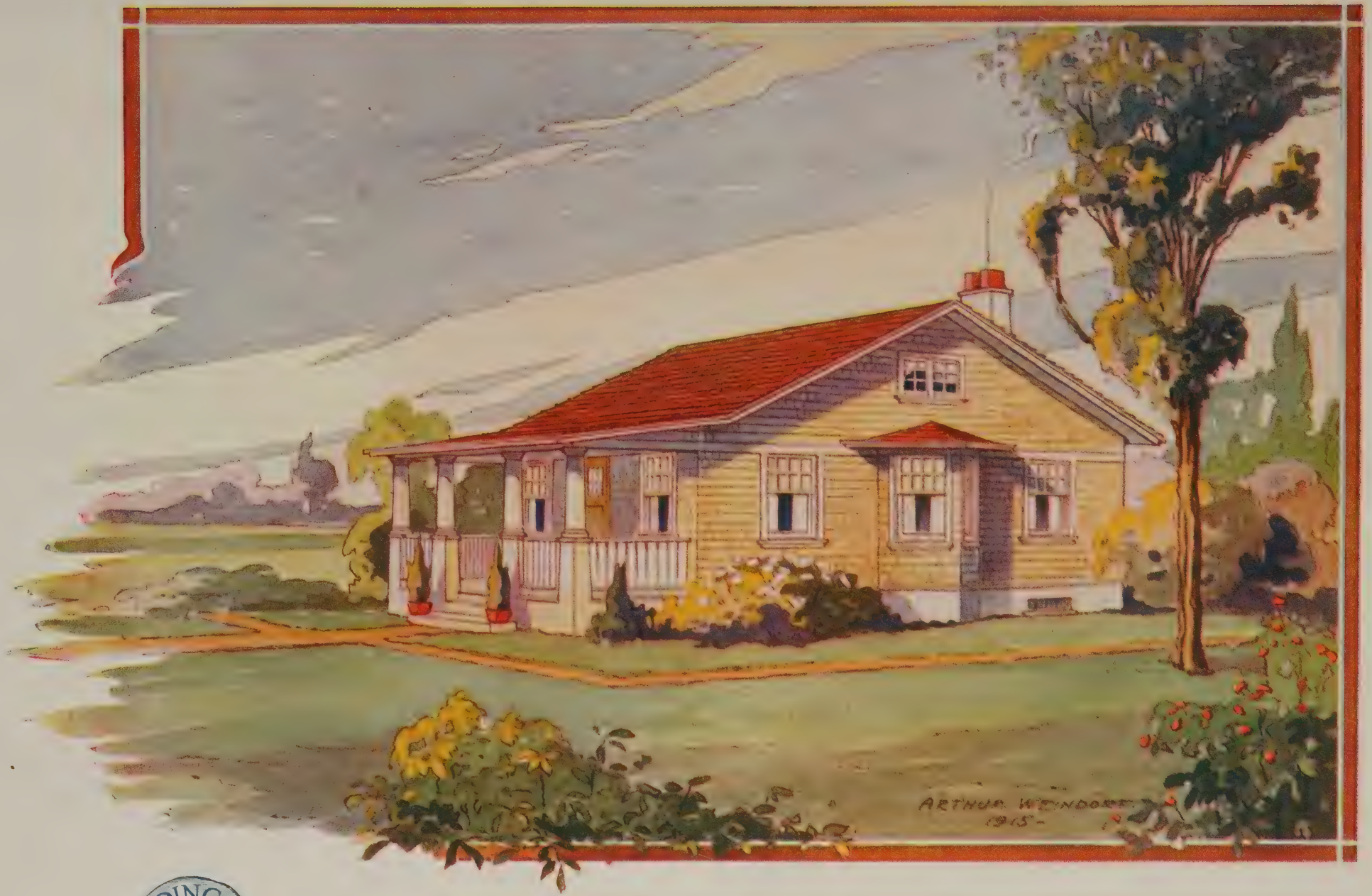
All doors and interior trim are to be of cypress and given two coats of varnish. The floors are to be of 1 x 3 in. matched and dressed North Carolina pine filled and waxed in the rooms of the first floor while those on the second floor are to be 1 x 4 in. North Carolina pine.

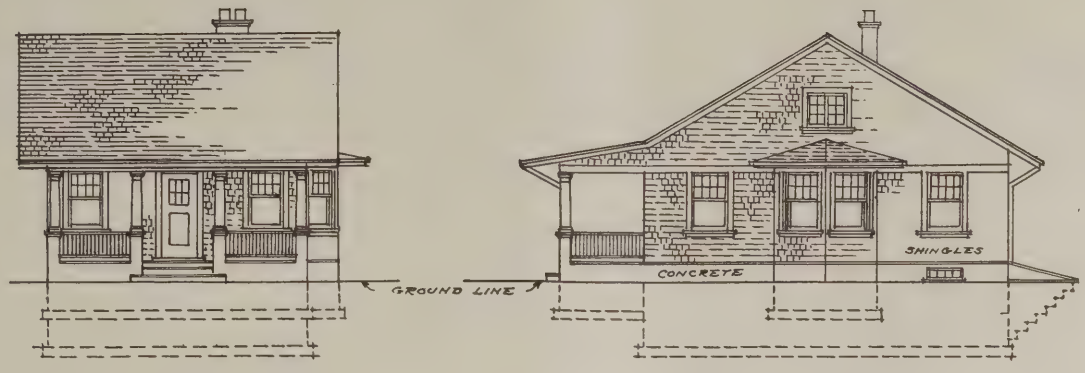


A Side and Rear View of the Cottage Shown in the Upper Picture on This Page

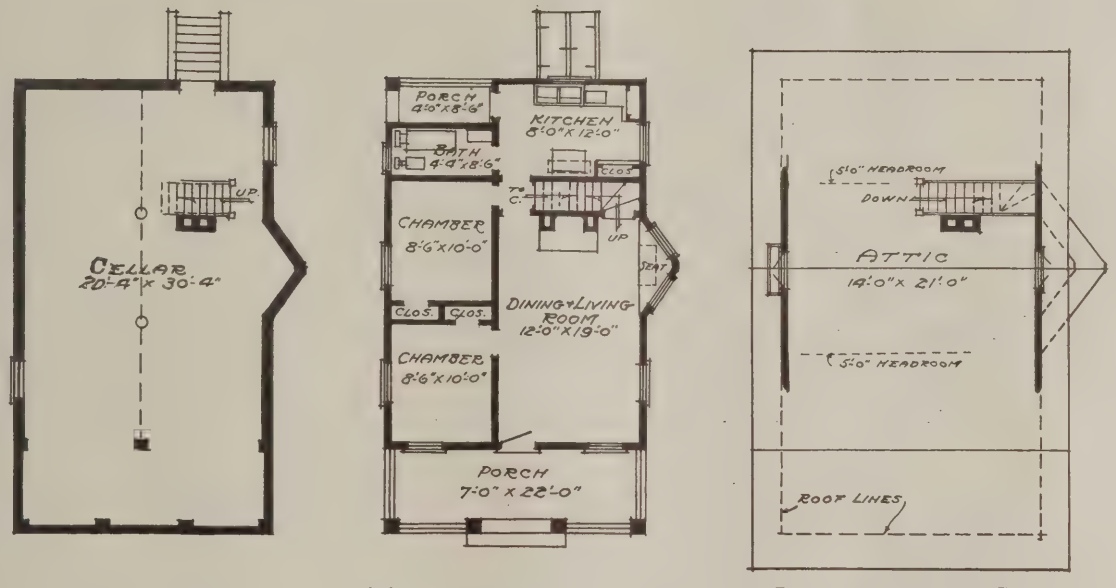
All doors are to be furnished with mortised locks and white knobs except the living room, where all hardware will be of a dull bronze finish.

(*Continued on page* 45)

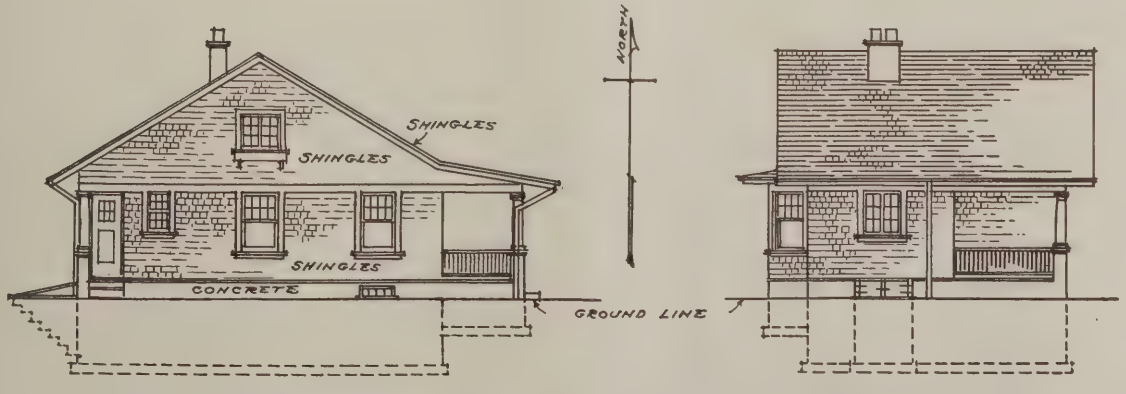




SOUTH ELEVATION EAST ELEVATION



CELLAR FLOOR PLAN. FIRST FLOOR PLAN ATTIC FLOOR PLAN.

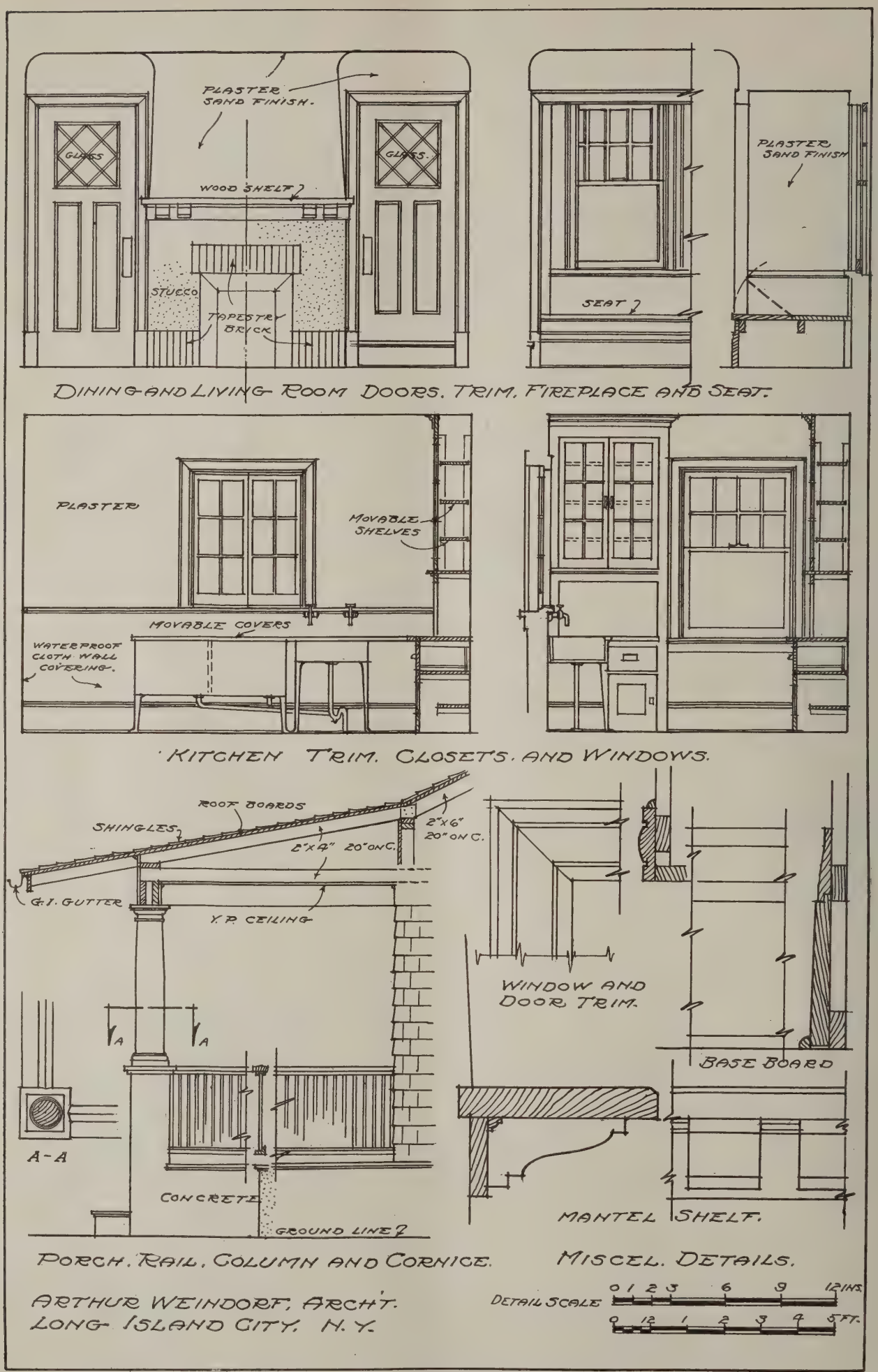


WEST ELEVATION. NORTH ELEVATION

ARTHUR WEINDORF. ARCHT.
LONG ISLAND CITY, N. Y.

SCALE IN FEET

Plans and Elevations of Low-Cost Cottage Shown on the Colored Supplemental Plate



Miscellaneous Constructive Details of Low-Cost Cottage Shown on Colored Supplemental Plate

The bathroom is to contain an iron enameled bathtub and wash basin, water closet with china bowl and tank with chain and pull. The bathtub and wash basin are to be supplied with hot and cold water through nickel-plated fixtures. All exterior pipes in the bathroom are to be nickel-plated.

The kitchen is to contain an iron enameled sink and two-part wash tray of soap stone or enameled iron with removable covers and a 30 gal. galvanized iron boiler over the range or to stand vertically.

One line of plumbing is intended to supply both kitchen and bathroom fixtures and one chimney is sufficient for kitchen and furnace in the cellar.

A hot-air heating system is to be installed in the cellar and to be of sufficient size to properly heat the building to 70 deg. in zero weather, and this to be guaranteed by the contractor. All pipes in the cellar are to have asbestos covering and all registers are to be of a finish to match the hardware.

All rooms are to have electric fixtures. There are to be three lights in the living room and one light all others as well as attic and cellar.

The roof is to be properly drained with hanging gutters and down spouts.

The exterior trim, such as water table, casings, moldings, porch columns and rail, is to be of white pine and the porch ceiling to be of 1 ft. by 2½ in. beaded yellow pine.

All tin and metal work as well as all outside woodwork except the shingles are to be given three coats of a good quality paint. The ceiling under the porch roof and the under side of the main roof are to be varnished. The front door is to be stained.

The cubical content of the cottage is given by the architect as 15,284 cu. ft., which he estimates to cost 12c. per cubic foot, or a total of $1,834. The house has actually been built on Long Island about thirty miles from New York City for $1,350, not including heating, plumbing or lighting, but containing large kitchen, sink and pump with cellar under a portion of the house and water closet built at the rear of the lot. Plaster boards were used in the house instead of plaster and a few minor changes were made in carrying out the design of the exterior. The two small halftone pictures presented in connection herewith show the appearance of the cottage as it was actually built.

The house represented upon the two full-page plates here presented was designed and the plans drawn by Architect Arthur Weindorf, care of THE BUILDING AGE, 239 West Thirty-ninth Street, New York City. The estimate and specifications which he furnishes are based on prices, labor and materials about forty miles from New York on Long Island. Complete working drawings and specifications of the cottage can be had for $10.

Lightning Rods for Farm Buildings

Authentic Data Bearing Upon Their Practical Value and the Best Method of Attaching Them

SOME time ago the official News Letter of the Department of Agriculture printed ten questions about lightning rods, and as the subject is one of considerable interest, especially to builders in the farming districts of the country, we present the matter herewith:

(1) Do lightning rods really protect buildings?

Answer—Yes; but the rods must be of proper character, properly installed, and properly grounded in relatively moist earth. Periodical inspection and maintenance in good condition are indispensable to efficient protection.

(2) Do lightning rods on a building increase the danger of its being struck?

Answer—Opinion is divided; but a properly rodded house may be struck several times without injury, whereas a single stroke without the protection afforded by the rods may cause disaster.

(3) Should lightning rods be put up with or without insulators?

Answer—Without. Buildings with metal roofs, or wherein any metal construction employed is properly connected to earth, are already partly provided with lightning protection. If rods are added to such buildings the rods should be put in direct metallic connection with the roof and other metal work about the building wherever practicable. All down spouts should be led into metal pipes going into the earth to give the proper earth connection, or the spouts should otherwise be well grounded by use of wires or cables. Insulators are entirely unnecessary, and it is proper to have extended metal work in buildings, like heating and water pipes, all electrically connected together and all well grounded. This latter result is gained incidentally through connections made to water pipes, since the latter usually pass through the earth outside the building.

(4) Are gilded or otherwise expensive points of platinum or special metal or of fanciful construction necessary?

Answer—No; not in the least. Sharp needlelike points are effective in dissipating small sustained electrical charges, but such electrical manifestations are perfectly harmless. The imagined superiority of such fanciful points is utterly valueless when the rod is struck by a real lightning flash. The useful qualities lightning rod points must possess are infusibility, mechanical strength and security of installation, and permanence and durability under prolonged exposure to the weather. Stout bluntly pointed iron rods ⅜ or ½ in. in diameter rigidly and securely fastened so as to project 1½ or 2 ft. above the structure to which they are attached satisfy all the requirements.

(5) What material is best for conductors or rods?

This question can not be answered fairly in a single statement. Because of its availability and cheapness, as well as its electrical properties, iron is one of the best materials for rods. Iron, however, rusts and deteriorates under prolonged exposure to the weather. This is only partly overcome by galvanizing; hence galvanized-iron lightning rods should be of ample size (not less than ¼ in. in diameter) carefully installed and subjected to systematic inspection and repair.

Two-strand cable galvanized-iron fence wire of substantial size of the same style as barbed wire but without the barbs furnishes a very good material for cheap iron lightning rods. The presence of the barbs constitutes a rather serious inconvenience in handling and installing such a conductor, and no material benefit is derived from their presence.

Copper is better than iron not only on account of its indestructibility but also because of its softness and pliability, which make it easy to install. Scientists are not in accord in regard to the relative merits of the electrical properties of copper and iron, but in any case questions of cost, durability, etc., outweigh minor differences in electrical properties.

Aluminum is a competitor for iron and copper for lightning rods. Its durability under exposure to weather is in its favor, but its fusibility makes it inferior to iron for points.

If low first cost is the controlling factor, galvanized-iron rods must be chosen, but subsequent inspections must be made and repairs may become necessary.

If higher first cost is not an obstacle, the choice should go to copper first or possible aluminum.

(6) Should lightning conductors be made in the form of solid rods, flat bars or bands, stranded twisted cables, woven stranded ribbons, or hollow twisted cables?

Answer—Any of the forms may properly be employed, or two or more forms may be employed in combination. Conductors should be put up in long continuous pieces as far as possible. Solid round wires ¼ to ½ in. in diameter are best for this purpose. Conductors of a size larger than ¼ in., however, present difficulties in handling and installation if the rods are solid. It then becomes better to use stranded cables and other similar forms. Long continuous lengths, ample cross-section combined with flexibility, and the ease of its installation over crooked courses render stranded cables, in general, better than any other form of conductor available.

Substantial iron points in combination with copper cables from 5/16 in. in diameter, for small farm buildings, to ½ in. in diameter, for large important structures, form one of the best possible systems of conductors for lightning-rod construction.

There is no good reason for purchasing other fanciful forms of cable at materially greater prices per pound than are asked for standard makes of cable of approximately the same cross section.

(7) Must lightning rods be connected to the earth?

Answer—Yes; by all means, and most effectively. Just a few operators in the lightning-rod profession have sought to impose upon the uninformed a system of ungrounded lightning rods. Such rods are a menace instead of a protection. It is impracticable to fully discuss here methods of making connections to earth. In general terms the conductor should be carried down into the earth and away from the building in a trench or other excavation, so as to reach and imbed the conductor itself or plates attached thereto into permanently moist earth. Connections with water pipes or other metal work itself connected to earth constitute good grounds.

(8) Are Government buildings provided with lightning rods?

Answer—Yes; many of them, but not all.

(9) Does the Government use the material or the rods or the system of any particular agency?

Answer—No; there is nothing mysterious or exceptional about lightning rods, the material of which they are composed, or their construction and installation. Suspicion may well be aroused as to the reliability of those making extravagant claims of superiority for their wares to the exclusion of others.

(10) What is the best arrangement of rods on a building?

Answer—A building completely screened and surrounded by and inclosed beneath a cage or network of substantial metallic conductors, all properly interconnected and joined to the earth, would be most effectively protected from lightning discharges. For ordinary purposes a far simpler system is adequate. For example, good protection is afforded by a conductor running along the ridge of a building and extending to the earth, either at the middle of the sides or, preferably, at each of the four corners. Points should rise above any prominent features of the building, such as chimneys or, in the absence of these features, from the ridge of the roof at intervals of 25 ft. or thereabouts. Fuller details of lightning-rod installation are to be found in Farmers' Bulletin 367, obtainable from the Department.

Waterproofing New York's New Subways

One of the many interesting problems in connection with the building of the new subways in New York City is that of rendering the walls and roof waterproof. Between stations the roof is made impervious to moisture by the use of three layers of woven fabric laid in pitch or asphalt mastic. At stations where moisture would damage the plastering one-ply waterproofing and brick in mastic is used. The waterproofing of the side walls depends on local conditions.

Below ground-water one-ply waterproofing with two layers of brick in mastic is used. Above ground-water one-ply waterproofing is used at stations, and between stations no fabric is used, the concrete masonry being extended 6 in. back of the side-wall columns instead, reinforced with ⅝-in. continuous rods placed 18 in. center to center to prevent cracks due to the shrinkage of the concrete in setting. The additional thickness of concrete and the rods make the structure sufficiently waterproof. The floor is not waterproofed unless it is below ground-water, when one-ply waterproofing and two layers of brick in mastic are used.

The waterproofing and brick are protected against external injury by from 4 in. to 6 in. of concrete. The brick in mastic makes a practically water-tight structure as all crevices or cracks are carefully filled with pitch.

A Row of Two-Family Frame Houses

An Arrangement Which Gives Each Apartment Six Rooms and Bath—Cost of Each Building About $3,500

WE present upon this page a general view of a row of low-cost two-family houses together with the floor plan of the building shown in the foreground. The foundations are of concrete 10 in. thick, and consisting of a 1:2:4 mixture, with footings 16 in. wide and 6 in. deep, also base for chimney of the same mixture 8 in. deep and extending 4 in. on either side. The cellar has a floor of concrete resting on 4 in. of cinders and consisting of 1:3 mixture of cement and sharp sand. Above the grade the foundation walls consist of four courses of rock-faced concrete blocks which are 8 x 8 x 20 in. in size.

The framing of the building includes 2 x 8 in. floor joists and 2 x 4 in. studding placed 16 in. on centers and doubled at all openings and under partitions. The rafters are 2 x 6 in. placed 24 in. on centers. The outside frame is covered with 1 x 6 in. tongued and grooved Georgia pine sheathing covered with heavy rosin sized paper doubled under corner boards and window and door frames. This in turn is covered with 5 in. redwood lap siding with ¾-in. lap, and nailed with cement coated box nails. The roof is covered with 16 in. red cedar shingles laid 4½ in. to the weather. The shingles on the side walls of the second story and gables are also exposed 4½ in. to the weather. Before laying they were dipped in a stain consisting of 10 gal. of creosote oil mixed with 2 gal. of raw linseed oil and tinted with colors.

A Row of Two-Family Frame Houses with Floor Plans Below of the Building Shown in the Foreground

The plastering is one-coat work, wood fiber plaster being used for the purpose. The bath rooms are plastered on wire lath 4 ft. high and finished with Keene's cement, marked off to represent 3 x 6 in. tile.

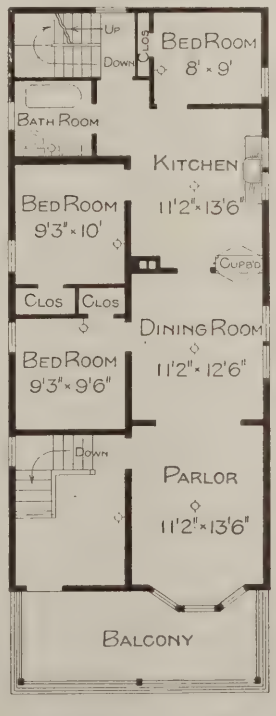
The floors are of Georgia pine smoothed and finished around the sides of the rooms for a distance of 20 in. in the large rooms and 18 in. in the bedrooms. The interior trim is of stock sizes, sanded at the factory on all flat surfaces. The casings are 4½ in., the molded base 7½, and the plimth blocks 10 x 11½ x 4½ in.

The stairs are built of Georgia pine with 10-in. stringers to receive treads and risers, which are housed into them.

The windows are glazed with double strength glass except the attic and cellar, and all are supplied with sash locks and lifts.

The front doors are of mission style, glazed with bevel plate glass, while all inside doors are of fir,

Main Floor Plan — Scale 1/16 In. to the Foot



Second Floor Plan—Scale 1/16 In. to the Foot

A Row of Two-Family Frame Houses—Erected in Buffalo by George B. Davis

mission pattern and 1⅜ in. thick. Glass knobs on all bedrooms and bathrooms. The door between dining room and kitchen is hung to swing both ways and is fitted with push plates.

The bathrooms are fitted with 5 ft. tub, low-down closet, and 18 x 24 in. lavatory, all fittings and supply pipes being nickel plated.

All outside woodwork not stained has two coats of lead and linseed oil tinted with ground colors, while all inside trim as well as the finished portions of the floors has one coat of oil stain and one coat of liquid filler, rubbed down with steel wool, and then given one coat of interior Spar varnish. The stairs and floors have one coat of the best floor varnish.

All rooms are to be supplied with gas connections and the building is wired for electric lights. Each floor is also supplied with electric bell from front door and buzzer for side door.

The heating is done by furnace, and the one connected with the first floor has 24-in. firepot, while the one for heating the upper apartment has 20-in. firepot. All radiators are of the side wall type.

In the cellar are 3-part wash trays connected with the hot water boiler for each floor, and each family also has a coal bin and vegetable room.

The row of houses here shown were built by George B. Davis, 70 Trowbridge Street, Buffalo, N. Y., for the Trowbridge Land Company. They were constructed under what is known as commission, or no-price contract, and cost with only a 5 per cent commission about $3,500 each. The principal items of cost were masonry work $610; lumber $1.200; plumbing $325; heating $180; painting $150; labor $725; hardware $75; fixtures $40; papering $65, and walks $25.

Interior View of a Foreign Bath Room Showing Equipment

Foreign Bath Room Equipment

The disposition of the American to provide his home with comfort is never manifested more to his credit than in the bath room which can be found in homes of all classes. This has had its influence on hotel equipment, with the result that the bath rooms in the new hotels might well be used by a salesman as a display of modern sanitary equipment and achievement. The equipment here frequently vies with that of the finest private residences and visitors from the other side of the ocean receive a pleasant surprise in the character of the bath room outfit which they find in the homes of their friends and in the high class hostelries. Beyond a doubt, their experience has had a very positive effect on the demand and sale for similar graceful and efficient sanitary equipment in several foreign countries.

A just pride may be taken in the fact that the United States was the first country to develop sanitary conveniences, particularly in the bath room, to a high standard and also in the tendency of exporters of American goods to meet in competition the goods of foreign manufacturers, showing that American designs have had a very positive effect on their style and production.

The picture here presented shows the bath room in a house in Switzerland. In the interior decoration it shows no small amount of artistic taste, yet it is quite different from any which have been a feature of American buildings. It will be noted that the bath room is provided with a double lavatory and a large mirror and that it is generously fited with bath room accessories. It also shows, in the corner in the center of the picture, the entrance to the apartment in which the water closet is placed. At the right is the bath tub which is reached from a step and is placed in a recess at one side of the bath room. It is clear that the bath room has ample space to allow the bather considerable freedom of action while enjoying a bath.

Acid Towers of Reinforced Concrete

A rather unique type of tower construction is found in a reinforced concrete structure lately erected at Erie, Pa., for a concern making paper. The work consists of a group of four acid towers, each 10 ft. in diameter by 99 ft. in height set in the form of a square 15 ft. center to center, on a common foundation slab, while a housing at the top connects all four towers. The foundation slab is 32 ft. square by 6 ft. thick, its horizontal reinforcement being engaged by the vertical rods of the tower reinforcement. The shells are 9 in. thick with ½-in. vertical and ⅝-in. rings of steel rods. The lowest tower section has 20 vertical bars in the circumference, but at the top these are reduced to 12 bars. The rings are spaced 5 in. apart in the lower section and 20 in. apart in the top. A floor over the towers carries a housing, 25 ft. 4 in. square by 7 ft. 6 in. high, over which is a water tank 11 ft. square by 3 ft. high.

The Quantity System of Estimating

Valuable Comments by an Expert Builder on a Subject That Is of Vital Interest to the Trade

By Arthur W. Joslin

EVERY trade paper one may read to-day has something on the subject of the Quantity Survey System, from which one must conclude it is very much in the minds of the people who have to do with contracting in connection with building construction. After many years' experience as a contractor, building structures of all kinds throughout New England, I am convinced that there is nothing impractical about this system. To be sure we could not take the English system bodily and use it to-day in the United States, but from the English system we can take many points and work out a system that is practicable, here and now.

Estimating an Economic Waste

Estimating as at present carried on, everybody admits, is an economic waste. Take the average building out for bids: there are probably nine or ten individuals or firms bidding. Each one of these individuals or firms must go laboriously through the plans and specifications and determine the quantities of materials of various kinds required to carry out the work. In the case of large concerns one or more men are engaged at fairly large salaries who do practically nothing else but take off quantities.

We thus have say ten concerns going to the expense of obtaining a bill of materials for a job when it might well be done by one man, or preferably by two men, one being a constant check on the other.

Assume the average cost of taking off a bill of quantities to be $25—and this is very conservative—and the ten concerns spend $250 for their several surveys. Now if this duty were delegated to two men and each of them were paid $50 the total expense would be $100 and the saving $150.

It would also result in more accurate surveys and have the advantage of putting all bidders on the same basis as regards quantities.

But before a survey taken in this way would be of value we must establish some standards.

There are more than the proverbial "fifty-seven varieties" of methods of estimating, and if the bill of quantities were not taken off and presented in the way that a man was in the habit of doing it himself it would be more or less "Greek" to him.

Committee Appointed to Investigate

About a year ago the Master Builders' Association of Boston became interested in the subject of Quantity Surveys and after several meetings of contractors a committee was appointed to look into the matter and report.

The writer was chosen as one of that committee as it was common knowledge among the builders of Boston and vicinity that estimating was his "bug." The other men chosen were Isaac Woodbury of the well known firm of Woodbury & Leighton and Charles Logue also a well known builder, and for several years chairman of the School House Commission of the City of Boston.

The committee was convinced that it was only a matter of time when the Quantity System would come into general use, especially on new work. We concluded, after several conferences, to take it up only so far as it affected the items of work usually estimated by a general contractor in his own office and performed by men on his own payroll.

To go into much detail as to our work would be to write a book so I will briefly outline what we accomplished. Our first labors were to determine the division into, and order of, the items going to make up the part of a building performed by the general contractor.

Next was to determine upon a standard of "Units." This is an important matter as all must get into the habit of talking to one another about any item of work in terms that mean the same to all. For instance, in the case of brick; one man talks in terms of "thousands," another in "cubic feet," and another in "face feet of varying thicknesses of wall."

"Cubic Foot" the Brick Unit

In this case we chose the cubic foot as the unit, as with this established if one man wanted to figure his brick by the "thousand" he could readily change the "cubic feet" to "thousands," figuring a number to the cubic foot to suit local sizes of brick, or the particular brick to be used, and if another man chose to figure by the "cubic yard" he could also readily change the "cubic feet" to "cubic yards" and proceed to price them in his own way.

In determining "units" we had constantly in mind the choice of a "unit" readily understood by all and in most cases changeable into other units to suit local conditions, whims or methods of pricing.

These matters being disposed of we then set about writing a set of rules for taking measurements so that a contractor might know that, no matter who made the survey, it was based on the same methods of measuring a plan.

This is a very vital matter as custom in various offices and in different sections varies greatly in methods of measuring and reporting quantities.

For instance in the case of brick and stone masonry some men measure corners double on the basis that corners take more time and the excess quantity thus obtained compensates for the extra labor. So also with window and door openings; some do not

take out openings below a certain size and take out one-half, one-third, etc., on openings above this size, reasoning on the same basis as for corners.

In my own opinion this is all wrong, as if any attempt is made to check out the costs of an item after the work is done it is worked from the actual quantity of material used as shown by the job records or ledger accounts.

Rules Call for Net Quantities

Consequently our rules for all items call for accurate net quantities. Then, if any contractor chooses, he can make such "waste" and "extra labor compensation" allowances as suit his method or custom. To cover such items of expense as are wholly matters of judgment, and all items coming under what I choose to call "Overhead Expenses," we made a comprehensive list taking in everything that could reasonably occur and be an item of expense on almost any kind of a building anywhere. These are all thus called to the contractor's attention and therefore not overlooked or lost sight of.

I am of the opinion that many contractors make a fairly accurate survey of the quantities of materials in the buildings which they figure but fail to give due consideration to these miscellaneous expenditures, which are really quite a percentage of the cost of a job. This accounts in large measure for the tremendous variation often seen in contractors' bids.

Now, if any considerable group of builders concluded to work over to the "Quantity System" and some of the more competent men now working for contractors taking off quantities were chosen and hired to make "Quantity Surveys" and they followed faithfully the rules laid down for measurements and reported the quantities in the "Units" prescribed, each contractor receiving the survey would know exactly what it meant.

The contractor would then go and look at the site of the operation, examine the plan carefully to see the form the "Units" were to be assembled, and proceed to price out the items and get his total.

Some of the Results Accomplished

What would be some of the results?

1st.—The surveys would be much more accurate than at present, as the men making them would have sufficient time and nothing else on their minds, and due to the saving effected by contractors generally, which would in consequence work back to the owners, they could be well paid, thus attracting to the business of "Quantity Surveying" intelligent, capable men.

2nd.—The contractor being relieved of this expense and the time involved in making, supervising or checking the "surveys," would have more time to give to the purchase of materials and direction of the work, thus bringing about more efficiency, which would tend to enable him to either make lower bids or obtain more profit.

3rd.—The architect would profit from the fact that the quantities would be taken from the plans, in great part, in his office, where he could give all information in regard to the intent of his drawings, where they were a bit vague or susceptible of a double interpretation; be advised by the surveyor in regard to trade classifications as to quality of materials, thereby using the correct technical language in describing qualities and obviate the necessity of entering into long arguments with the contractor as to just what he meant.

This causes me to remark that I once heard a plumber tell an architect during an argument as to the particular kind of set tubs to be used—the architect having told him what he *intended* to have used and the plumber quoting the specifications which were at a variance with the architect's intentions—that he figured that job on the plans and specifications and *not* on the architect's intentions. I have heard many such arguments and I must confess that I have, occasionally, been a party to them.

4th.—The owner would benefit by the increased efficiency of the contractor; the elimination of a considerable part of the "gamble" as to just what the architect intends, and on which any sane contractor will figure to cover himself; a saving in time for estimating, as the surveys could be completed almost simultaneously with the completion of plans, and by at least a part of the general economic saving effected by the reduced cost of estimating under the system.

There are many other reasons benefiting everybody concerned but space does not permit going into them now.

As an example of the detail to which we went in our report I give herewith some parts selected to show our treatment of the overhead and several masonry and carpentry items.

General Conditions

Contractors' attention is particularly called to the following items of "General or Overhead" expenses.

The costs to be used against such of these items as occur in this job will have to be determined by the judgment of the contractor, as they are of such nature that it is impossible to put them on a "Unit of Measure" basis.

It is intended that the contractor's proposal shall include all expense in connection with any or all of these items unless especially eliminated by the specifications.

No. 1—Bond.
No. 2—Quantity Survey.
No. 3—Liability Insurance.
No. 4—Fire Insurance.
No. 5—Permits. Building, Sidewalks, etc.
No. 6—Telephone.
No. 7—Superintendent.
No. 8—Time Keeper.
No. 9—Watchman & Lights.
No. 10—Engineering & Extra Drawings.
No. 11—Batter Boards.
No. 12—Travelling Expenses & Board.
No. 13—Water: Temporary Piping & Building Uses.
No. 14—Derricks, Engine & Special Machinery.
No. 15—Concrete Plant.
No. 16—Small Tools.
No. 17—Temporary Office.
No. 18—Sheds, Lockers & Privy.
No. 19—Temporary Closing of Building.
No. 20—Temporary Heating & Lighting.
No. 21—Protection & Repairs to Streets & Sidewalks.
No. 22—Protection & Repairs to Adjoining Property.
No. 23—Protection of Completed Work.
No. 24—Cleaning out Building.
No. 25—Cleaning Glass.
No. 26—Carting Debris.
No. 27—Cutting & Jobbing for Other Trades.
No. 28—Fences, Barricades, Trestles & Walks.
No. 29—Moving Pipes & Wires.
No. 30—Inspectors: Piles: Concrete.
No. 31—Guarantee Work.
No. 32—Photographs.

Excavation

1—Clearing site. Brush, Trees, etc.
2—Clearing site. Razing Buildings.
3—Pumping and Bailing.
4—Shoring Banks. Unit of Measure, Square Foot.
5—Open Excavation. Unit of Measure, Cubic Yard.
6—Trench Excavation. Unit of Measure, Cubic Yard.
7—Miscellaneous Excavation. Unit of Measure, Cubic Yard. Cesspools, Drywells, Manholes, etc.
8—Rock Excavation. Unit of Measure, Cubic Yard.

RULES FOR MEASURING.

No. 1—Measurements to be always taken 1'-0" outside of walls, except where projection of footings require a greater distance to be excavated.

No. 2—Where a cement or waterproof coating is specified for the outside of walls, measurements to be taken 2'-0" outside of walls.

No. 3—When it is a known fact that banks will have to be shored, measurements to be taken 2'-0" outside of walls where excavation is 10'-0" or less below natural grade, and 1'-0" additional for each 10' 0", or fraction thereof, below said depth.

No. 4—Depth of excavation to be taken to the under side of concrete cellar floor, except in case of a broken stone, cinder, or other similar fill under said floor, in which case, depth to be taken enough deeper to permit of said filling.

No. 5—Excavations for footings, small pits, etc., below general depth as per Rule 4, to be measured as "Trench Excavations."

No. 6—All trenches for drains, pipes, retaining walls, and foundations of all kinds where enclosed space is not excavated to be measured as "Trench Excavations."
Report separately all trench excavation in connection with piles.

No. 7—Rock Excavation. Quantity to always be determined by an actual survey of premises both before and after the work is performed.
All boulders of 1 cu. yd. or more in size to be considered "Rock Excavation."

No. 8—Rock Excavation to always be payed for at an agreed price per cubic yard.

SHORING EXCAVATIONS.

Rule 1—Report surface area of all banks in both open and Trench excavations.

Rule 2—Open and Trench excavations to be reported separately.

BACK FILLING. Unit of Measure, Cu. Yd.

Rule 1—Back Filling shall be assumed to be the cubage of space between the outside of foundation walls of a structure and the face of the excavation; the filling in around trench walls and similar foundations, and the filling in of trenches after pipes, wires, etc., are laid, from bottom of excavations up to natural grade.

Rule 2—Where back filling is of any material other than that derived from the excavation, attention to be called to the fact, and the kinds of materials required to be reported separately.

ROUGH GRADING. Unit of Measure, Cu. Yd.

Rule 1—This item is intended to cover the disposition of the excavated, or purchased, rough materials around the premises, and within the bounds set by the plans and specifications, necessary to bring the grounds to the subgrade required to make them ready for Finished Grading.

Finished Grading and Landscape Work

LOAMING. Unit of Measure, Cu. Yd.

Rule 1—Contractor to use his own judgment as to whether all or any part of this loam is derived from the excavation.

SEEDING. Unit of Measure, Sq. Ft.

Rule 1—Compute and report actual area to be seeded.

SODDING. Unit of Measure, Sq. Ft.

Rule 1—Compute and report actual area to be sodded.

Rule 2—Contractor to use his own judgment as to whether any or all sods are derived from the site.

PLANTING. No Unit of Measure.

Rule 1 —Unless this item is covered by an allowance schedule and number Trees, Shrubs, etc., to be given together with such particulars as to size as possible.

WATERING AND ATTENDANCE.
No Unit of Measure.

Rule 1—Estimator to quote from specifications stating amount of this service called for.

WALKS AND DRIVEWAYS.
Unit of Measure, Sq. Ft.

Rule 1—Give actual area of Walks and Driveways separately, each item being accompanied by a description of the construction called for.

Drains

Unit of Measure, Lin. Ft.

Note—Excavation provided for under head of "Trench Excavations."

Rule 1—Report separately each kind and size of drainage pipes.

Rule 2—Add 1 foot to the actual length for every Elbow, Bend, T and Y, and 3 feet for every trap, that the surveyor can foresee is necessary to install drains as shown or specified.

Drainage Accessories

Manholes, Trap Wells, Cesspools, Dry Wells, etc.

Note—Excavation provided for under the head of "Miscellaneous Excavations."

Rule 1—Report number and size of any of above items entering into this operation.

Rule 2—Where possible, give, in proper units, materials required for the construction of each of any of the above items entering into this operation.

Stone Foundations

Unit of Measure, Cu. Ft.

Rule 1—As near as possible to obtain them from a scale plans, net cubical contents to be computed.

Rule 2—No corners to be measured double, and all openings to be taken out at their full scale, or figured size.

Rule 3—Each kind and quality of stone work to be reported separately.

Rule 4—Give composition of mortar.

Rule 5—If outside of walls are plastered with cement, are tar or asphalt coated, or treated in any manner other than ordinary pointing, give particulars and report area in square feet.

Rule 6—If there is a damp course in any or all walls give particulars and report square feet.

Concrete Foundations

Unit of Measure, Cu. Ft.

Rule 1—As near as possible, from scale plans and figures thereon, compute the actual cube of concrete.

Rule 2—No corners to be measured double, and all openings to be taken out at their full scale, or figured size.

Rule 3—Each different mixture of concrete to be reported separately, and composition of mixture to be given.

Rule 4—Give total area, in square feet, of forms required to carry out the work as planned together with particulars in regard to stock of which said forms are to be built.

Rule 5—If concrete has any form of metal reinforcement report number of pounds in case of rods or bars, and number of square feet if any kind of mesh material, giving trade name, size and weight per square foot.

Rule 6—If any part of the Concrete has any finish other than as it comes from the forms, report area of said finishes in square feet.

Rule 7—If any waterproofing compound, or process, is incorporated in the concrete, give full particulars.

Rule 8—If outside of walls are tar or asphalt coated, give particulars and report area in square feet.

Rule 9—If there is a damp course in any or all walls, give particulars and report square feet.

Brick Work

COMMON BRICK. Unit of Measure, Cu. Ft.

Rule 1—Quantity to be net cubic feet computed as accurately as possible from scale plans and figures thereon.

Rule 2—Corners not to be measured double. All window openings to be taken out at their scale or figures "brick opening" height and 8" wider than their scale or figured "brick opening" width.

Rule 3—Cubage of all stone trim back of the ashlar line and built into common brick to be taken out.

Rule 4—Cubage occupied by steel shapes imbedded in wall to be taken out unless same are filled in between and around with brick.

Rule 5—In case of Terra Cotta trim, with cells filled with brick to the ashlar line, take out 20 per cent of the cubage of terra cotta back of the ashlar line.

Rule 6—Cubage of brick in piers, chimneys and rough fireplaces to be reported separately.

Rule 7—State composition of mortar, size of joint and method of bonding.

HOLLOW BRICK. FIRE BRICK. } Unit of Measure, Cu. Ft.

Compute and report according to Rules 1 to 7 inclusive for Common Brick.

FACE BRICK. Unit of Measure, Sq. Ft.

Rule 1—Compute net square feet as accurately as possible from scale plans and figures thereon.

Rule 2—Windows, doors and all other openings to be taken out at their full scale or figured face opening sizes.

Rule 3—In all cases where window, door, or other opening reveals are more than 4", the excess over said 4" to be included in the survey.

Rule 4—All space occupied by trimmings of any kind to be deducted from the survey.

Rule 5—Measurements to all re-entering angles to be taken 4" longer on one side than actual face measurements.

Rule 6—Ground, cut, or specially made arch brick, to be surveyed in square feet, the depth of the reveal over 4" being added to the survey. Sketches to be given when necessary to make matters clear.

Rule 7—Bull noze, octagon corner, or any similar special shaped brick, to be reported in linear feet. Sketches of shapes to be given with survey.

Rule 8—Space occupied by brick coming under Rules 6 and 7 to be taken out of the Face Brick survey.

Rule 9—Give particulars as to kind and quality of brick, size of joints, method of bonding, washing and pointing, and composition of mortar.

Rule 10—If there are several kinds of face, glazed or similar brick, the net face feet of each kind to be given separately.

BRICK PAVING. Unit of Measure, Sq. Ft.

Rule 1—Survey actual net area as near as possible from scale plans and figures thereon.

Rule 2—When there are several kinds of brick paving, or the paving is on different basis, give area of each kind separately and describe bases.

Rule 3—If the base is of concrete, same should be surveyed under "Concrete Floors." See note under "Concrete Floors.'

Rule 4—Give particulars as to kind and quality of brick and whether laid flat or edgeways, in sand, mortar, pitch, asphalt, or any other material.

FINISHED FIREPLACES.

Rule 1—Give number, sizes, kinds of brick or tile, particulars as to dampers and dumps, etc. Give sketches if necessary to make matters clear.

Rule 2—If any fireplaces are entirely of tile or marble except firebox and underfire, describe brick parts, dampers and dumps, and see that marble or tile work is called for under these headings in specifications. If not called for there, give brief description and call particular attention to this discrepancy.

Rule 3—If fireplaces are covered by allowance, disregard all measurements and quantities and state sum of said allowance.

FLUE LININGS. Unit of Measure, Lin. Ft.

Rule 1—Give linear feet of each kind and size.

Rule 2—Unless otherwise provided in the specifications, or shown on plans, linings in ordinary flues are to be assumed to run from the basement floor to the top of the chimney, and in fireplace flues from a point 5 feet above the floor where fireplace occurs to the top of the chimney.

CHIMNEY POTS.

Rule 1—Give number, size and other necessary particulars.

BRICK NOGGING AND FIRE STOPPING.

Unit of Measure, Cu. Ft.

Rule 1—Report net cubage as near as possible to obtain same.

BRICK RANGE AND BOILER SETTING.

Rule1—Give quantity of materials in proper units and such particulars as necessary to make matters clear.

Frame

Unit of Measure, 1 Ft. Board Measure.

Rule 1—Each item of frame such as Sills, Girders, Columns, Isolated Posts, Floor Joists, Rafters, Collar Beams, etc., to be scheduled separately.

Rule 2—All frame in Trusses to be given as a separate item.

Rule 3—All frame in the walls of a frame structure except sills, to be reported as "Wall Frame."

Rule 4—All lengths of frame lumber shall be scheduled in feet of length. Where length is of a certain number of feet and some inches, it shall be scheduled in whole feet next above exact length. Thus 15 pieces of 2″ x 12″—13′-9″ long would be scheduled as follows 2″ x 12″ 15/14′.

Rule 5—Due allowance to be made, in scheduling lengths, for tenons, splices, etc., the length shown, required, or known as necessary being added to the actual length, subject to Rule 4.

Rule 6—Every sub-division of the schedule to be computed into Board Measure Feet (net) and the kind and grade of lumber to be stated. Any dressing, adzing, chamfering or crowning, to be stated and fully explained.

Notice—That certain classes of "Frame," where stock is lighter than 2″ x 6″, are to be surveyed under the head of "Studding." See Rules 3 and 4 under "Studding."

Studding

Unit of Measure, Sq. Ft.

Notice—That studding in walls of frame structures are provided for by Rule 3, under the head of "Frame."

Rule 1—All partitions, irrespective of size and spacing of studding, to be computed into square feet net.

Rule 2—Furring of masonry walls with stock 2″ x 3″ or larger to be considered and measured as "Studding."

Rule 3—Collar beams and hung ceilings, when stock is of smaller material than 2″ x 6″, to be scheduled under this heading (Studding), but reported as "Collar Beams" or "Hung Ceilings."

Rule 4—Stock for furred-up roofs, when stock is of smaller material than 2″ x 6″ to be scheduled under this heading (Studding) but reported as "Furred-up Roofs."

Rule 5—All openings in frame from 10 sq. ft. to 50 sq. ft. to be taken out at one half of their actual scale or figured dimensions. Over 50 sq. ft. to be taken out at three-fourths of their actual scale or figured dimensions.

Rule 6—Each size and different spacing of studding, collar beams, hung ceilings, and furred-up roofs to be scheduled separately. Give kinds and grades of lumber and give all particulars in regard to sizing, planing, bridging, etc.

Furring

Unit of Measure, Sq. Ft.

Rule 1—Compute all areas to be furred as accurtely as possible from scale plans and figures thereon, and report square feet.

Rule 2—Curved and other irregular surfaces to be reported separately and particulars given.

Rule 3—Give all possible particulars in regard to kind and size of furring, spacing, nailing, etc.

Rule 4—Each kind, size and spacing to be reported separately.

Rule 5—Furring on masonry walls to be reported separately. See Rule 2 under the head of "Studding."

Rule 6—Furring around pipes, for false beams, for plaster cornices, or for any purpose other than set forth in Rules preceding, to be reported in either square or linear feet, as seems most logical, and to be accompanied by sketches.

Boards

Unit of Measure, Sq. Ft.

Rule 1—Compute areas to be covered as accurately as possible from scale plans and dimensions thereon.

Rule 2—Take out all openings of 4 sq. ft. or more at their full scale or figured dimensions.

Rule 3—Floors, Roofs, Walls, etc., to be reported separately.

Rule 4—Give particulars as to kind and quality of lumber, widths, thicknesses, planing, matching, whether laid straight or diagonally, nailing, etc.

PLANK. For Floors, Roofs, etc.

Rules 1, 2, 3, 4 as above.

Rule 5—Give multiples of length, and if splined, size of and kind of wood for splines.

BOARDS AND PLANKS.

Used for purposes other than above.

All Rules as above.

Rule 6—State the several separate uses to which stock is put together with surface area of quantity in each case.

Hints for the Building of Bungalows

The Location—Foundation Walls—Use of Field Stone—Some Suggested Floor Plans—Shape of Roof

By J. Gordon Dempsey

WHEN thinking of building a bungalow the first thing to consider is the location. It is very necessary to consider carefully the surroundings or outlook, including the exposures to the southern and eastern sunlight, the prevailing winds, the best sanitary conditions, the ease of approach, etc. The success of the house and comfort of the inmates depend on these details. Very often houses are built the wrong way, so that besides being sunny at all times the servants' quarters and the bathroom command the best views.

The foundation walls should be started on a good hard footing of small stone, of such size that they will act as a complete drainage for any kind of water which may find its way either down or about the walls, or may spring through under the wall. The footing course should be so graded that any water which collects will drain off to that corner of the building nearest the lowland, or should be connected to a tile drain to carry it away. This footing course can be eliminated if a good quality of soil is found. The walls below grade can be made of field stone, brick or concrete.

The use of field stone for building purposes is of great value if it is easy to obtain. Field stone for walls and veranda columns are very effective. The exposed portions above grade may be left natural, or may be broken and laid up to show a clean square surface. If the former way, the moss coverings and variegated colorings produced by exposure are laid up in view, with wide deep joints, which produce a very good effect of light and shade. The stone walls may be run up to the sills of the first floor or to the eaves according to the plans of the bungalow.

The next consideration should be given to the layout and size of the various rooms, for therein lies the keynote for making the exterior design. The layout of the halls and living rooms is one of very vital importance as we must give to those who are to occupy it all the conveniences and comforts within our ability. Simple as a building apparently appears when finished, much skill and thought is

required to give easy access to the various rooms without a long narrow hall. The principal rooms of the first floor should be grouped around the main hall or living room.

The following is a good idea of the rooms which every bungalow of size should have, although actually this would be determined by the owner:

Bungalow 1½ Stories in Hight

Cellar	1st Floor	2nd Floor
Laundry Cold Storage	Hall or Living Room Dining Room Pantry Kitchen 2 Bedrooms Bath or W. C.	4 Bedrooms 1 Bathroom Sewing Room

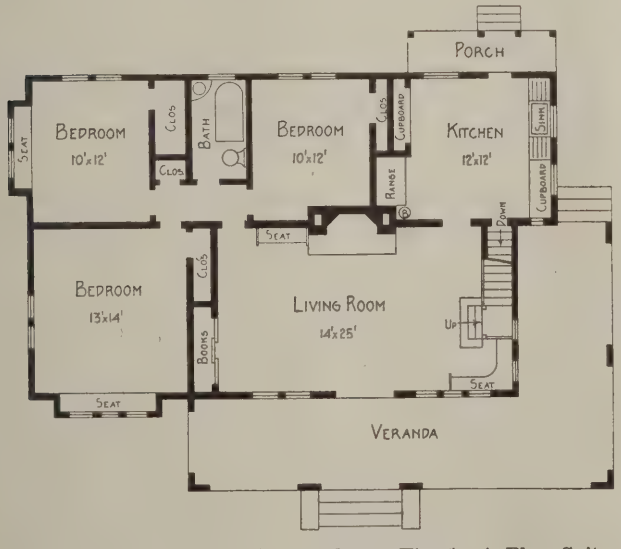
Bungalow 1 Story in Hight

Cellar	Main Floor
Laundry Cold Storage	Hall or Living Room Kitchen Pantry 4 Bedrooms and Bathroom

The cold storage should be located as directed by the plan of the cellar. It should project underground from the side of the house, preferably under the rear porch if there is one. The walls and roof can be made of brick or concrete; if of brick the roof should be arched, 12 in. thick, and if of concrete, flat and reinforced. The hight from the floor to the ceiling should be about 5 ft. The floor should be made of the same material as the main cellar floor and pitched from the back to the front, the high point being about 2 in. above the main floor.

The laundry should also be in the cellar, this being the coolest place within the walls of any house in the summer time. The ordinary laundry equipment is all that is necessary. A small laundry stove will also be found of great convenience.

The kitchen, which is so often forgotten by those who only see the picturesque parts of the house, is one of the most important rooms. The simplifying of the service as much as possible is of very great value. It should be well lighted, ventilated and of such a size that will suit conditions best. Every



Hints for the Building of Bungalows—Fig. 1—A Plan Suitable for a 1½-Story Structure

inch of the space should be utilized to the best of advantage. The location of the pantry, cupboards, cold storage, laundry, etc., should be given careful consideration so as to be as convenient as possible. The bathroom should be conveniently located. There should be a small porch if possible on one of the shady sides of the house for servants' use so they can have privacy and comfort when needed.

The dining room should be located so that there will be an entrance from the pantry which has a door leading from the kitchen. The use of two doors will do much toward preventing the odor of the cooking escaping to the other rooms when passing from the kitchen to the dining room. If it is

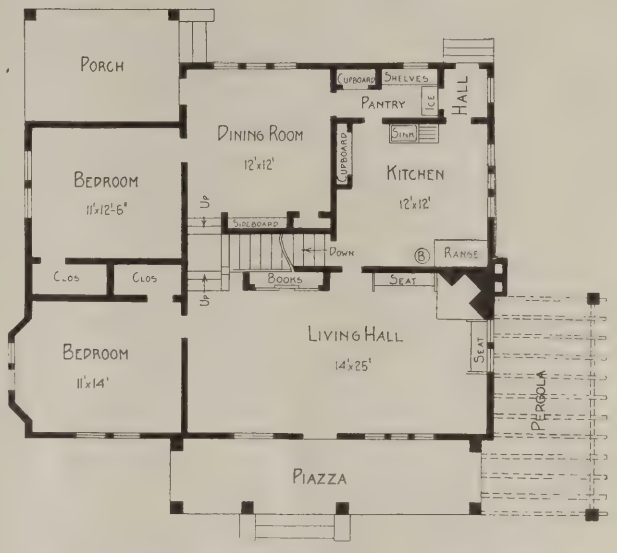


Fig. 2—Another Arrangement for a 1½-Story Bungalow

consistent in laying out the floor plan the dining room should be open on two sides to allow for plenty of light and ventilation. A sideboard should be located in the dining room to provide for the easy handling of dishes, etc. There should be at least one door opening from the living room or hall.

The living room or hall should be the largest of the rooms located on the first floor, for it is here that we pass the majority of our time spent indoors. It should be at least 14 ft. by 18 ft. A pleasant fireplace with an abundance of built-in furniture consisting of seats, bookcases, etc., makes a living room one of welcome to all. It should be located at the front of the house and have easy access to the bedrooms and bath.

If convenient two or three bedrooms should be located on the first floor while the others should be located on the second floor if the bungalow is a story and a half high.

The wide veranda is one of the characteristic features of a bungalow. It should harmonize completely with the plan of the house. In reality it should be an outdoor living room, as in warm weather the greater part of our time is spent in this pleasant place. The veranda should be at least 12 ft. wide and extend across the entire front of the house. Some of us may prefer to have the sunlight in our rooms and in that case the veranda should be designed to meet that requirement. Field stone is the natural material for piers and columns, if the design calls for them to be of stone.

A method of making a porch balustrade which gives a very pretty and decorative appearance is made of a framework of heavy logs without the bark. They should be squared on two sides for laying and then bolted together. The logs should be well oiled and stained. We should keep in mind the fact in designing a bungalow that all the moldings, eaves, brackets, piers and other details are far more effective if large in scale. Small and delicate details are out of place in buildings of this type.

There is no other outside feature of a bungalow which can add or detract from its quality and

beauty as much as the chimney. The material used in the construction of the chimney should harmonize with the rest of the building. An open fireplace should be located in the living room or the dining room, for the comfort of a wood fire in the country cannot be over-estimated on a cool night in the fall. The living room fireplace should be large and able to admit of logs 3 or 4 ft. long. If the bungalow is in the mountains, by the lake or seashore, there is always plenty of wood to be had, and the fire on the hearth will be one of the main attractions in the evening. If the fireplace is of cement, tile or stone, it should be lined with firebrick and have a good flue.

The shape and construction of the roof of a bungalow is a very important matter and the consideration of the designing and the building of it involve the solution of a great many nice problems. The first requirement of the roof is that it shall not leak. This leads up to the question of the best shape of roofs that are both economical and simple. The hip and "A" shape roof are the ones which come the nearest. They are used more than any others in bungalow construction, being able to withstand the strongest wind without vibration.

For those who dislike to sleep on the ground floor, and also for more room, we must design our bungalow so that we are able to place some of our bedrooms on the second floor. The first difficulty comes when the attempt is made to put windows in the bedrooms. At once the graceful simplicity of the roof disappears. If the dormers are small the general effect outside is very spotty and the inside is distinctly inconvenient. An item that should be avoided if possible is the roof cutting into the ceiling and sloping halfway over the bedroom. One way to obtain good bedrooms in a sloping roof is to

Hints for Building Bungalows—Fig. 3—A Plan for a One-Story Building

continue the slope of the dormer from the main roof but at a less pitch.

The roof must appear to descend almost to the ground at the ends. If the eave line is raised the building may be much finer and more handsome, but it is no longer of the bungalow type.

It is essential that the roofing be substantial beyond question. It must be made of material that will withstand the vigorous and continual onslaughts of the elements. Hence the material must be impervious to dampness, and as a whole should be of a sound character that the constant recurrence of moisture, dryness, freezing, etc., will not eventually destroy it.

The floor plan shown in Fig. 1 is for a bungalow one and one-half stories in hight. The living room being large is also used for a dining room. The

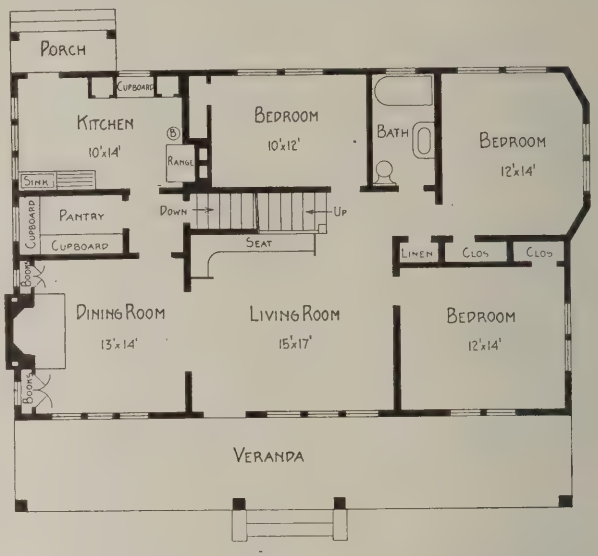


Fig. 4—A Well Arranged Plan for a 1½-Story Bungalow

fireplace is recessed with a seat at one side. A built-in bookcase is also located in this room. The pantry has been omitted and two cupboards are built in the kitchen as part of the house. The bathroom is located conveniently to all bedrooms, which are practically separate from the living room. Built-in window seats are used in two of the bedrooms. It has a large and spacious veranda with built-up rectangular columns.

The floor plan, Fig. 2, is also for a bungalow one and one-half stories high. In the living room are located seats at both sides of the fireplace and a bookcase is built against the stairs. The dining room has an entrance from the rear porch. A sideboard and closet are built-in for keeping the silver, glassware and table linen. The pantry is located in a good place so that it is convenient to the dining room and rear entrance. The ice box is located in the pantry at the entrance side and a door made in the wall for putting in the ice. The bathroom is located on the second floor.

A pergola, which is part of the veranda, is located at the side. Pergolas are useful as well as ornamental for the shade and privacy which they give.

Floor plan, Fig. 3, is for a one-story bungalow. The living room is rich in built-in furniture, the bookcases being conveniently arranged at both sides of the fireplace, seats extending along the front side of the room and a built-in sideboard helps to offset the fixed appearance. The kitchen is made a good size so that it can be used for serving the meals in also. The entrance to the cellar is close at hand and makes the cold storage easy to reach.

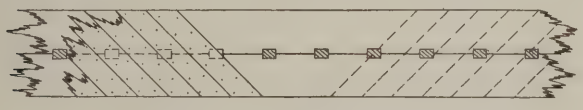
The floor plan, Fig. 4, is for a one-and-one-half-story bungalow. The floor is well laid out, the dining and living room being practically one with only a suggestion of a division between them. Bookcases are located both sides of the chimney.

CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

A Problem in Truss Construction

From Builder, Clinton Co., N. Y.—In regard to the truss problem presented by "A. J. G.," Chester, Pa., I would say that in my opinion it is a most flimsy affair and violates the most important law in building, namely, proportion. If there is any reason why he must use that sort of thing the



A Problem in Truss Construction

pieces should be three times the thickness he indicates. The verticals must be dapped into the chords and the chords must be rodded together on each vertical.

In the first place I should discard the truss as out of place and use in that span an 8-in. or 10-in. I-beam and cover it with wood. If the correspondent does not like that he might get two pieces 5 x 12 in. in cross-section and 22 ft. in length, joint them, set them on edge, key them with hardwood as in the accompanying sketch, then cover both sides with inch material thoroughly nailed. The inch material should run opposite on each side as shown. This will make a satisfactory job in all respects.

Strength should be displayed in such places as that referred to. A tie rod under the upper chord is better than the plan of the correspondent to carry the load.

Contractor's Liability for Breach of Building Subcontract

From H. B., West Pittston, Pa.—I wrote a proposal to a contractor to do a certain piece of work as a subcontractor for a sum of, say $600, and I finished one part of it, when he tells me that it will be a week or two before he will be ready for the rest, and then while my men are off the job he gets someone else to complete the job. His only excuse is that he could save a little money that way. Has he a right to do that without me having some 'come back' for the time and trouble that I wasted on that job? We had no formal contract; but he accepted my proposition and I started the job, showing that we had an agreement between us.

Answer.—On the facts stated by the correspondent he is entitled to recover against the subcontractor the reasonable value of the work furnished under the subcontract, based upon $600 as the price for the entire job. That is, if he completed half of the agreed work he is entitled to $300. And, in addition to this, he is entitled to recover damages for breach of the contract as to the unfinished part of the job, to be measured by the excess he would have received for doing the uncompleted part of the work above the expense to him of doing it. If he can prove the terms of the verbal agreement, it will be just as binding upon the contractor as if the contract had been reduced to writing.

A. L. H. STREET.

Why Do the Chimney Tops Overhang?

From E. A. N., Rockville, Conn.—In sight of my house are six chimney tops that overhang about 2 in. They are 4½ or 5 ft. high and every one overhangs to the east. Can any of the readers tell me the cause of this phenomenon?

An Architect's Estimate Blank

From F. J. Manley, Lexington, Ky.—Thinking that possibly some of the readers of the paper might be interested, I am sending a copy of the estimate blank which I use in connection with

SUMMARY OF ESTIMATE AND COST

No. 148

Kind of Building Graded School Architect F. J. M.

For

Address 73' x 61.8 x 37=. 167,000 cu ft

	ESTIMATE			ESTIMATE
1 Wrecking			32 Superintendent	150
2 Excavation 800 yds 35¢	270		33 Plumbing, Drainage and Gas-fittings	400
3 Extra Excavation			34 Plastering	900
4 Brick Work 218M 14.00	2600		35 Stucco Work	
5 Extra Brick Work			36 Painting and Varnishing	200
6 Tile Partitions			37 Glass, window and plate	
7 Waterproofing			38 Art Glass	
8 Rubble Masonry			39 Glazing	
9 Extra Rubble Masonry			40 Tin Work	
10 Wall Coping	12		41 Galvanized Iron Work	100
11 Flue Lining			42 Metal Ceilings	
12 Concrete, plain 5000 cu ft 30¢	1468		43 Roofings	400
13 Concrete, reinforced			44 Electric Wiring and Bells	
14 Concrete, reinforcing			45 Tile and Mosaic Floors	
15 Concrete forms			46 Rough Hardware	100
16 Extra Cementa steps	40		47 Finish Hardware	60
17 Cement Floors 2000 sq ft 12¢	250		48 Building Paper and Felt	84
18 Cement Walks and Paving			49 Structural Steel, painting and erecting	160
19 Extra			50 Cast and Ornamental Iron	
20 Brick Paving			51 Joist Hangers and Roof Anchors	
21 Cut-Stone Set	180		52 Elevators and Machinery	
22 Extra			53 Heating	1200
23 Marble Work			54 Mantels	
24 Extra			55 Blackboards	160
25 Lumber	1200		56 Water Rent	
26 Extra Mill-Work	1100		57 Temporary Heat	
28 Extra			58 Cleaning up rubbish	
29 Carpentry Work, rough and framing	850		59 Traveling Expense	
30 Carpentry Work, finishers			60 Plans and preliminary work	
31 Laborers			61 General Hauling	
			62 Bond	

TOTAL COST

PERCENTAGE ADDED

PRICE SUBMITTED

Facsimile of Architect's Estimate Blank

my work and which I think every architect would find of value when making his own estimates of work, as it covers everything that occurs in a building. The blank is such that it is equally advantageous for use by the building contractor.

Schedule of Minimum Charges for Architects

From C. R. C., Roswell, N. M.—I wish to suggest to the editor of THE BUILDING AGE, why not publish the schedule of fees of the American Institute of Architects? This would be very interesting as well as instructive to your many readers. The general public out West needs to be educated along this line, as many of our best business men do not seem to draw the line or know the difference between the architect and contractor. I would be very glad to see something along this line in an early issue of the paper.

Answer—The professional practice of architects and schedule of proper minimum charges as revised at the Washington Convention of the American Institute of Architects in December, 1908, are as follows:

1. The architect's professional services consist of the necessary conferences, the preparation of preliminary studies, working drawings, specifications, large-scale and full-size detail drawings, and of the general direction and supervision of the work, for which, except as hereinafter mentioned, the minimum charge, based upon the total cost* of the work complete, is 6 per cent.

2. On residential work, on alterations to existing buildings, on monuments, furniture, decorative and cabinet work and landscape architecture, it is proper to make a higher charge than above indicated.

3. The architect is entitled to compensation for articles purchased under his direction, even though not designated by him.

4. If an operation is conducted under separate contracts, rather than under a general contract, it is proper to charge a special fee in addition to the charges mentioned elsewhere in this schedule.

5. Where the architect is not otherwise retained, consultation fees for professional advice are to be paid in proportion to the importance of the questions involved and services rendered.

6. Where heating, ventilating, mechanical-structural, electrical and sanitary problems are of such a nature as to require the services of a specialist, the owner is to pay for such services. Chemical and mechanical tests and surveys, when required, are to be paid for by the owner.

7. Necessary traveling expenses are to be paid by the owner.

8. If, after a definite scheme has been approved, changes in drawings, specifications or other documents are required by the owner; or if the architect be put to extra labor or expense by the delinquency or insolvency of a contractor the architect shall be paid for such additional services and expense.

9. Payments to the architect are due as his work progresses in the following order: Upon completion of the preliminary studies, one-fifth of the entire fee; upon completion of specifications and general working drawings (exclusive of details), two-fifths additional, the remainder being due from time to time in proportion to the amount of service rendered. Until an actual estimate is received charges are based upon the proposed cost of the work, and payments received are on account of the entire fee.

10. In the case of the abandonment or suspension of the work the basis of settlement is to be as follows: For preliminary studies, a fee in accordance with the character and magnitude of the work; for preliminary studies, specifications and general working drawings (exclusive of details), three-fifths of the fee for complete services.

11. The supervision of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk-of-the-works or superintendent of construction) means such inspection by the architect or his deputy, of work in studios and shops or a building or other work in process of erection, completion or alteration as he finds necessary to ascertain whether it is being executed in general conformity with his drawings and specifications or directions. He has authority to reject any part of the work which does not so conform and to order its removal and reconstruction. He has authority to act in emergencies that may arise in the course of construction, to order necessary changes, and to define the intent and meaning of the drawings and specifications. On operations where a clerk-of-the-works or superintendent of construction is required, the architect shall employ such assistance at the owner's expense.

12. Drawings and specifications, as instruments of service, are the property of the architect.

*The total cost is to be interpreted as the cost of all materials and labor necessary to complete the work, plus contractors' profits and expenses, as such cost would be if all materials were new and all labor fully paid, at market prices curent when the work was ordered.

Discoloration of Brick Work

From H. B., West Pittston, Pa.—In regard to the problem of "W. W. T.," Cape Girardeau, Mo., I would say that I had the same thing happen to me the past winter. I raked out the joints about an inch or a little more, scrubbed the wall with a weak solution of muriatic acid, after which I washed off clean so that no acid remained. I then pointed up with a good rich red mortar, using a much darker red than ordinary, as it will tend to grow lighter as it sets.

From D. P. B., Redford, N. Y.—Referring to the query of "W. W. T.," Cape Girardeau, Mo., in the August issue of the paper, I would say that the trouble mentioned is very common in connection with brick and cement walls. In my opinion efflorescence is the disease. It is a white powder that frequently disfigures the surface of brick walls in a moist climate or in damp places. The deposit generally forms in the mortar and will some time spread over the entire surface of the wall. Water absorbed by the mortar dissolves the salts of the soda, potash and magnesia contained in the lime or cement and spreads it over the surface. With lime mortar the deposit is frequently very heavy, and with natural cement it is much heavier than with Portland. The efflorescence originates in the brick if the latter was burned with sulphurous coal, or was made from clay containing iron pyrites. When the brick get wet the water dissolves the sulphates of lime and magnesia and on evaporating leaves the crystals of the salts on the surface. It is also caused by the brick absorbing the water holding the salts in solution.

The surface may be rendered impervious by the application of one or more pairs of the Sylvester washes which consist of an alum solution made by dissolving 1 lb. of alum per gallon of water and a soap solution made by dissolving 2.2 lb. of reasonably pure hard soap in a gallon of water. The brick masonry should be clean and dry and not colder than 50 deg. Fahr. The soap wash should be applied boiling hot, but the alum wash may be of 60 or 70 deg. when applied. One wash should be put on and allowed to dry 24 hr. before the other is applied. These washes have long been used to render walls impervious, but instead of alum it is better to use aluminum sulphate, sometimes, but improperly called alum. It

is cheaper than alum and only two-thirds as much is required.

The efflorescence will gradually be blown away by the winds and washed away by the rains, but it can be entirely removed by scrubbing brushes and hydrochloric acid mixed with at least four or five times its volume of water. Before applying the acid the walls should be well dampened and after scrubbing well washed with clear water.

A Combination Rolling Bed

From Albert Marple, Tropico, Cal.—Something new has been devised in California for the home, this being simply a sliding bed that may, at the desire of the owner, be used as either an indoor or outdoor sleeping affair. For years outdoor sleeping in that sunny climate has been practiced and with beneficial results to the health, but it remains for this home owner to present something, the benefits of which are twofold. It will be noticed by a glance at the illustrations that above the bed, when drawn out, there is nothing but the blue sky. By this method the sleeper may obtain all of the benefits to be derived from the clear, open air, and may enjoy the outdoor life to the full. Should a rainy night come, it is a simple matter to push the bed, which runs on casters, inside the room.

Fig. 1—The Bed Drawn Out onto the Platform

Fig. 2—The Bed Pushed into the Room in Stormy Weather

During the construction of this home an opening was left in the wall, and into this opening the bed was built. It is regulation in size and is so constructed that when drawn to either extreme an almost weatherproof connection is made, this being effected by the head and foot-boards being made alike. In order to assure plenty of fresh air, even on stormy nights, a series of three casement windows have been constructed immediately above the bed. The outer two of these swing in over the bed.

To construct this bed a concrete platform is required, this being constructed at the side of the building, and upon this the bed runs. This platform is 7 ft. from the house and is 10 ft. wide. It is 18 in. in height, and around the top is a cap 4 in. in width. In constructing this platform the walls were built first. After these were thoroughly set, about 11 in. of dirt was dumped into the opening, this being 11 in., however, after the dirt has been water soaked and tamped. Upon this, 6 in. of concrete, using an eight to one mixture, was laid, then the final coating, 1 in. of cement, was poured over the concrete. This makes a very substantial platform without a great deal of expense.

The floor of the platform is finished smooth, while the sides have been given a stucco finish, so that they might harmonize with the concrete chimney at the side and pillars at the front of the home. This bed feature is not a costly affair, but is one of the latest ideas for the bungalow home, or, in fact, any type of residence.

Fig. 3—Showing How Rolling Curtains May Be Used to Make the Sleeping Quarters More Private

A Combination Rolling Bed—By Albert Marple

Questions for the Practical Readers

From G. A. T., Minneapolis, Minn.—I have a few questions which I should like to place before the reads of the paper as they relate to matters concerning which many carpenters and builders are not familiar.

1—What is the difference in the character of lumber between that which is seasoned and that which is kiln dried?

2—What precautions should be observed in designing terra cotta trimmings, and what are some of the advantages of terra cotta for exterior work?

3—What are the objects of "slow-burning" construction?

4—What inquiry should be made to insure the validity of a contract with a corporation?

5—What guarantee is required of the heating contractor and also of the electrical contractor?

Information Wanted on the Line Level

From W. S. W., Pleasant Ridge, Ohio.—I would like to ask some of the readers of the paper for a little information regarding the line level. There are two kinds—one for the center of the line and one for the end. I would like to hear from users of both kinds and would like to know which, in their experience, gives the best results. Will the levels work as well on a long line as on a short one? Can the end level be used without trying it on both ends of the line? Are the devices as good for leveling foundations, piers, etc., as the level or transit?

Waterproof Enclosure for Sleeping Porch

From Builder, Redford, N. Y.—Referring to the inquiry of "C. C. H.," Brookville, Pa., regarding waterproof enclosure for a sleeping porch, I would say that he will not find any material that will stand the many tests he requires of it. If he wants a temporary roof, such as may be periodically removed, he must put on a sheet metal roof, say 20-gage galvanized, corrugated, pressed standing seam. This may be taken off at any time. The joints should be calked on the under side with white lead and oakum. If this is kept painted white on the outside it will never become very warm and will cool off quicker than canvas. Of course no roof boarding should be used.

He should try this for awhile, and if found too warm then he might put in a cheap canvas insulator on the under side a foot below the metal. It need not be sewed together as the strips may be held in place by hooks and eyes. If the hooks and eyes are likely to cause trouble in future washing, the strips may be fastened together with eyelets and thongs.

Polishing Plate Glass

From Expert, Moffittsville, N. Y.—In a recent issue of the paper "G. W. N.," Toledo, Iowa, made inquiry regarding the best way to polish plate glass. Somewhere I have seen a recipe which said that putting a tablespoonful of turpentine in the pail of water used for washing windows and rubbing dry with paper would give a good polish. In my boyhood the ruins of a great glass factory stood here almost intact, but now only the stone work of two buildings remain. The way glass was polished here was as follows: The glass was placed in a horizontal position and a rubber was made, say of soft white pine 6 x 10 in. in size and 2 in. thick and provided with a handle. This was covered with fine felt and supplied with rouge (peroxide of iron) in a liquid state. The rubbing should be done with a circular motion, care being taken that all parts of the plate will be well rubbed.

Safe Loads for Spruce and Yellow Pine

From J. C. W., New York City.—Will some of the readers of the correspondence columns of THE BUILDING AGE furnish for publication, a chart of the safe distributed load in pounds per square foot spruce and yellow pine beams will carry, 3 in. wide and 16 in. on centers. I desire the figures compiled in accordance with the stresses contained in the revised Building Code for New York City. I am sure that this information will be very useful for everybody in the building line in the city.

Note—It may be of assistance to the correspondent above if he will secure from the Superintendent of Buildings for the Borough of Manhattan, whose offices are in the Municipal Building, a copy of Bulletin No. 10 which relates to "Working Stresses and Loads," and which were adopted by the Board of Aldermen on April 20 and approved by the Mayor on May 1 of the current year.

Cleaning Promenade Tile

From G. N. O., Philadelphia, Pa.—I have a porch floor covered with red promenade tile and the joints grouted with Portland cement. In laying the floor some of the tile were marked with the cement and I would like to know how to remove the cement without injuring the tile.

What Readers Say of The Building Age

From J. M. B., Monroeton, Pa.—I noticed in a recent issue of the paper a number of letters from interested readers telling what they thought of it and how long they had been subscribers to it. I want to say that I began taking the paper in January, 1882, when it was known as "Carpentry and Building," and I have all the volumes complete. I have them all bound except the last four years and these I shall have similarly treated very soon. They are a complete builders' library, and I know of nothing that would be of more help to a young mechanic than those, as they tell how to do all kinds of work in a workmanlike manner.

From J. D., Richmond, Mo.—I have bound volumes of the paper from 1887 and consider it the best journal ever published for the building mechanic. While I have felt at times that I knew it all, I have frequently had my eyes opened to the contrary. Only last week I found in one of the back numbers of the paper $10 worth of information.

Floor Plans for a Small Carpenter Shop

From Builder, Redford, N. Y.—If "D. E. McD.," Calgary, Alta., will turn to page 45 of the issue of THE BUILDING AGE for May, 1914, he will find the floor plan of a small woodworking shop which he may be able to modify to suit his needs. A bench may be placed where the lathe is located and the engine room may be enlarged to hold a dry kiln for gluing if he so desires.

Proportions of Barn Ventilators

From C. B. C., Saginaw, Mich.—At the present day so much attention is given to the architectural details of the modern farm barn that I wish some of the readers to tell me the proper proportions for the cupolas or ventilators on the ridge of the building. There seems to be a diversity of opinion in the matter and I wish to be set right.

A Builder at the Panama Exposition

Some of the Things Which a Practical Woodworker Observed While Visiting the Great Fair

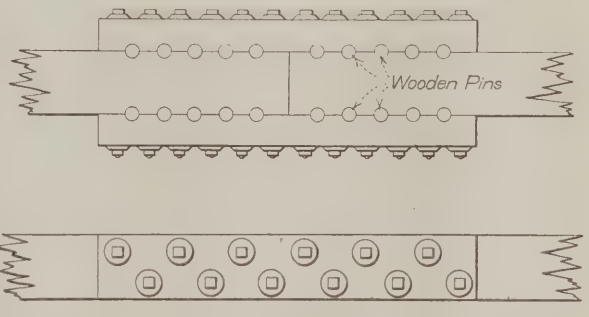
By Edward H. Crussell

ALMOST every periodical one may pick up at the present time has something to say concerning the Great Fair now being held in San Francisco, and the thought has occurred to me that perhaps observations taken from the viewpoint of a practical woodworker might have interest for my brother chips among the readers of THE BUILDING AGE. It is on that basis that the following comments were prepared. The writer visited San Francisco in the summer of 1914 and spent a portion of that visit at the Fair grounds looking over the buildings. All of the exterior portion of the main structures were finished at that time, in consequence of which his impressions on a recent visit were not as startling as they might otherwise have been, and it is certain that some of his conclusions were influenced by what he had seen on his former visit.

The impression, or rather mixture of impressions, one receives when first seeing the flags and the great crowds, hears the music and the "barkers" is very much the same as that of the small boy when for the first time attending the circus. He wants to hurry for fear he will miss some of it. This impression, however, only lasts for an instant, and the next and most compelling thought is, What a pity all this is to last for only a few short months and must then be torn down! This thought constantly occurs to the visitor the first few days and then comes another—What a pity all this is here to see and so many hundreds of thousands of those who would like to see it will never have the opportunity! Those of my readers who are thus situated may believe me when I say that when this thought first occurred to me I felt every bit as sorry for them as they could possibly feel for themselves.

Let us suppose that, like the writer, you are a fairly good walker, and you decided to *do* the fair systematically—take one building at a time, go down one aisle and back the next until you have seen everything in that building and then pass on to the next. In such a case the Palace of Machinery will probably be the best building with which to start. I have heard or read somewhere that this is the largest wooden building ever erected, covering as it does an area of more than seven acres.

Being a woodworker, it is more than probable that the first thing to draw the attention on entering the building will be the timber framing of the roof and supporting columns, all of which is exposed and without covering of any kind. It is not feasible for me to attempt to describe at this time the system of framing used in the main buildings of the Panama-Pacific International Exposition, but it may be stated that the chief characteristics are simplicity of joints and the vast numbers of bolts used for holding the various members together. The uninitiated pass it by without seeing it, but you, who like the writer, have done some of this class of work may well pause for a while and grant it some consideration, speculating on how you would frame and erect such a job if it ever fell to your lot, and finally wondering if every one of the thousands of nuts on all those bolts were screwed up as tightly as they ought to be. You wonder how many of the bolts have more than one washer under the nut so as to make the thread long enough and how many of them had to have their heads held with a wrench so as to make the tightening of the nut possible. You wonder about the fellow who is "Boss"; about the fellows who tightened the nuts and those who arranged the slings and tackle, about the blisters on



Detail of Joint Used in Tie Member in the Framing of the Buildings—Scale ½ in. to the Foot

their hands and the slivers in their fingers; about what sort of boarding places they had, and above all you ask, Where are they now and how many of them are mingled with the crowds in the buildings they did their share toward erecting? So many of us put our brains and muscle in the building of halls, theaters, churches and fine houses and yet are never able to enter them again, once they have been turned over to the owners.

I wondered about a great many things in connection with the construction of these buildings and it seemed rather astonishing to me considering all the world's fairs we have heard of in the past, that nowhere have I been able to find any data written by the men on the job describing those smaller problems of constructive detail regarding which you and I feel so deep an interest.

There is one joint used in the framing of these buildings that I would like to bring to the notice of the readers. It is pictured in the accompanying sketches and was used wherever it was necessary to splice a tie member in any of the framing. The only thing uncommon about this joint is, of course, the idea of putting round pins between the mem-

bers of the splice as shown in the sketches. I was told that at the beginning of the work this joint was tested and found to be practically as strong as the same splice with square pins instead of round; that "of course" the splice with round pins was much easier to make and consequently that was the reason it was decided upon.

Joint with Round vs. Square Pins

The writer has much doubt whether the joint with the round pins is so very much easier to make than the same joint with square pins, especially if it is required, as it should be, that the holes are truly bored so that the pins rest equally in each piece. Having said that much he may as well go further and say that in his humble opinion the strength of this style of joint depends entirely upon the holding power of the bolts used in it and that once the wood starts to shrink the joint will hold just about as well without the pins—either round or square—as it will with them. If it were that pins or wedges were an absolute necessity the writer would use fewer of them and have them made of cast iron.

It is not the intention of the writer to say much regarding the various exhibits at the fair as he has neither the space at his disposal nor the ability to do them justice. Most of them has a tendency to make a fellow feel how small and insignificant he is and what a little he really knows.

Woodworking exhibits, apart from some furniture and samples of various woods, appeared to the writer to be rather meager, although there are two exhibition bungalows in the grounds that well repay a visit. There is an idea in connection with the screen doors in one of these bungalows that the writer intends to make use of in the near future. The frame work of the door is filled with a number of cross bars dividing it into small panels or spaces about 10 in. square and giving the door when viewed from a distance the appearance of a French window. The cross bars are doubled so that the screen wire comes between them. It is possible that this scheme has been described before, but if so the writer has missed it. I am of the opinion that there are many front porches, the screening of which might be improved by its use.

The Tower of Jewels

I was disappointed with the Tower of Jewels, but so far as I know I am the only person that was. This is one of the things that was an influence of my former visit. At that time there was no covering on the steel work and it had a strong and majestic appearance. Now that it is covered with plaster the feeling of strength and majesty is lost and the tower is dwarfed by the size of the buildings around it. It is certainly beautiful, especially at night, but beautiful in the same way a wedding cake is beautiful and it has much the same style of architecture and ornamentation. The jewels appear to be hardly large enough for jewels but just about the right size to represent frosting.

I was, and am yet, much impressed with everything I saw at the Exposition, but I think I was surprised to find how little I knew. I was also inspired to greater things because of what I did see. "What man has done, man may do again."

I thought with wonder of the men who made all this possible and of those who still have it in charge and who are keeping it running smoothly and efficiently. A modern circus is often used as an illustration of what efficient organization means and the same illustration may be used to give those who have never visited the World's Fair some idea of the magnitude of such an undertaking. Automobile races and flying exhibits are still used as drawing cards in every city large enough to assure the necessary attendance. The automobile race at the Panama-Pacific Exposition is only an incident, and a flying exhibit hardly that. Art. Smith afloat in a biplane may loop-the-loop, fly upside down, or perform any other of his hair-raising feats, and though he always has a large crowd of spectators, there are thousands of people on the grounds who would no more think of standing and looking up at him than they would of looking up at the moon or any other natural phenomena—they are too busy looking at other things. I venture to assert that the biggest circus that ever advertised forty funny clowns could parade through the exhibit grounds with all its clowns, bands of music, animals, calliope, etc., and not more than 50 per cent of the visitors would know who was there. The main tent of this circus could be set up in a corner of any of the main buildings and not half of that 50 per cent would go near the show and not a dozen of that number would sit through the entire performance.

Registration of Architects in Michigan

The architect's registration law recently passed in Michigan and which went into effect on Aug. 24, prescribes for the licensing of all persons engaged in the drawing of plans and specifications for buildings for others, which are to be constructed by a person other than the architect. Any builder may draw plans for himself or for any building that is being erected under his own supervision.

A board of five examiners has been appointed to examine and register all who desire to use the title of architect or to practise architecture in the State of Michigan. The members of the board are: Prof. Emil Lorch of the University of Michigan; George D. Mason, Detroit; D. Fred Charlton, Marquette; A. R. Munger, Bay City, and S. Eugene Osgood, Grand Rapids.

Those who have practised architecture prior to Feb. 5, 1915, and can show satisfactory evidence of character, competency and qualifications, can obtain a license by applying to the State Board of Examiners. Architects licensed in another State will be granted Michigan certificate on application.

Upon becoming registered, the applicant is required to pay a fee of $20 and receives a certificate of registration. Any violation of the provisions of this act is a misdemeanor punishable by heavy fine or imprisonment or both.

One of the latest improvements on upper Riverside Drive, New York City, is a six-story apartment house for which plans have just been filed to cost $500,000. The architects are Young & Wagner, 347 Fifth Avenue, New York City.

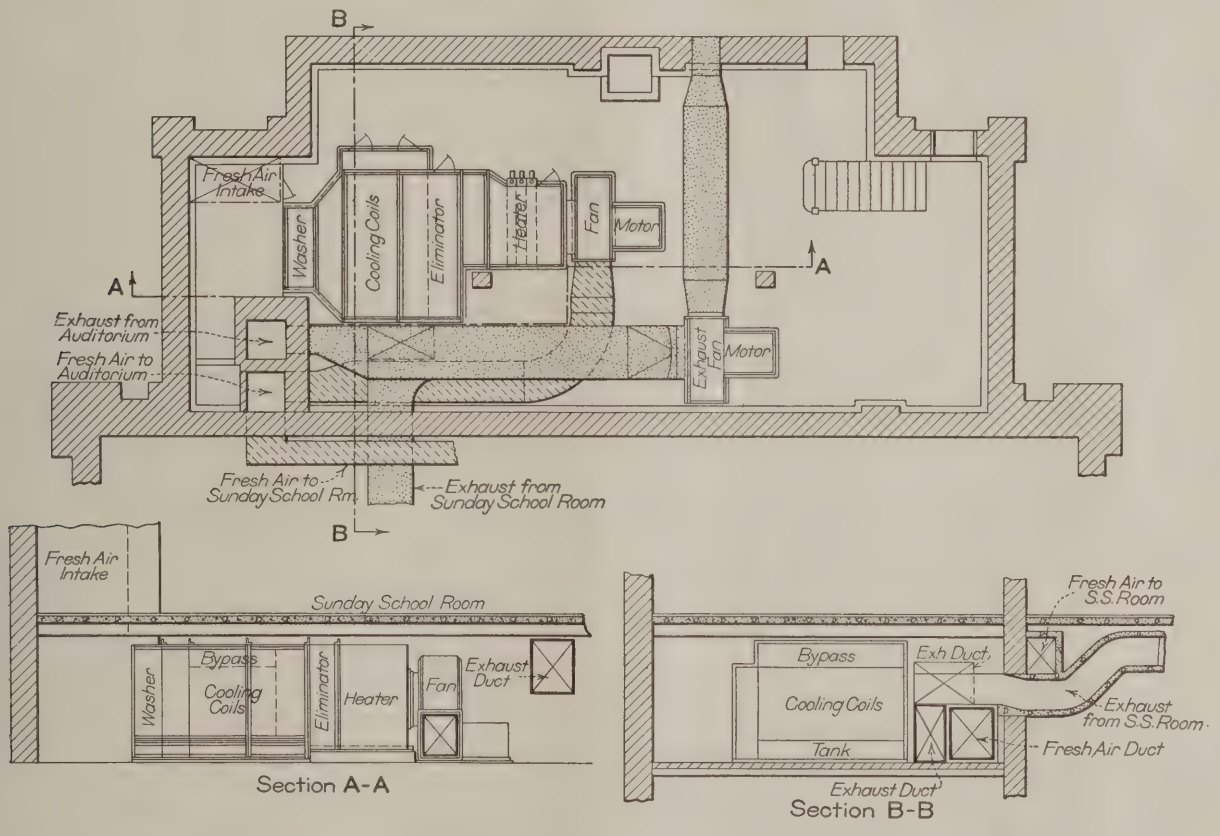
Ventilating and Cooling a Church

Ice-Making Plant in an Adjoining Building Connected with Cooling Coils in the Ventilating Equipment

IT is a well-known fact that there are many instances where buildings are artificially cooled in summer just the same as they are warmed in winter, and it is not far from the truth to say that arrangements have been perfected in some where a portion of the same piping system is used for both purposes. It is, however, rare to find cases where church buildings have been equipped with apparatus for artificial cooling during the summer months, but in the accompanying illustrations we present details of a church edifice in Orange, Tex., showing a cooling arrangement of this nature which has been installed.

The structure is of stone and well equipped to serve the purpose for which it was designed. The climate in Texas is such that cooling apparatus is very desirable and a system has been planned and installed under a guarantee to maintain the temperature of the building at 75 deg., with a humidity of approximately 50 per cent when the outside temperature is 110 deg. The equipment ventilates and cools the auditorium and Sunday school room. The air, whether cooled in the summer season or warmed in the winter season, is forced into the church through ventilators under each seat at a rate that will change the air in the church in less than 10 min. Experience has demonstrated that, in extremely hot weather, it is best to keep the air in the building about 20 deg. cooler than the air outside, and not to bring it down to the low temperature mentioned in the guarantee.

The equipment will be better understood from the accompanying plans and elevations. It includes an air washer, cooling coils, heater, a fresh-air fan and an exhaust fan, which is connected with ducts for removing the air from the auditorium and the Sunday school room. The plan shows the part of the basement in which the heating, ventilating and cooling equipment is installed, and, in one corner, the fresh air intake is shown, which comes down from the top of the building. It is connected directly with an air washer made by the B. F. Sturtevant Co. This air washer has a capacity of 14,000 cu. ft. and was specially designed for this building.



Ventilating and Cooling A Church—Plan and Various Sections Showing Details of the Work

The cooling coils are placed between the spray for washing the air and the eliminators formed by a series of plates, the purpose of which is to remove the excess of moisture from the air. The air then passes to the heaters, which are used in winter, or to the fans, which distribute the cooled air through the church in the summer. The fresh air

supply fan is a Sturtevant, motor-driven, multivane fan, delivering 14,000 cu. ft. of air per minute.

Route of the Air

The longitudinal section gives an elevation, on the line A-A, of the basement plan, and shows the fresh air intake coming down into the chamber, where the air can readily pass into the washer. It then passes to the cooling coils, then to the eliminator, the heater and to the fresh air fan, from which it enters the main distributing duct. This duct connects with the main vertical air stack or riser, from which, at both the Sunday school floor and the auditorium floor, connections are made with distributing ducts, so that either or both rooms may be warmed or cooled. For convenience, the horizontal air duct runs along the basement floor, while the exhaust duct runs above it.

There is a main exhaust shaft, which, as shown in the plans, leads down to the basement, and a duct leads from it above the fresh air duct which receives a branch from the Sunday school room. This exhaust duct continues to a Sturtevant multivane motor-driven exhaust fan, from which a duct leads to the outside of the building where the exhausted air is discharged. The branches taken from the vertical shaft run across to convenient points under the floor of the Sunday school room and connect with the outlets provided for the entrance of fresh air, whether warmed or cooled, to the Sunday school room. At other convenient points there are outlets which connect with the exhaust duct and lead back to the basement and connect with the exhaust fan.

The branch for warming or cooling the auditorium is taken off just below the floor, and connects with a distributing duct, from which branches supply the little ventilators placed under each seat, the capacity being arranged to change the air six times per hour without causing any annoyance from drafts. The exhaust from the auditorium is arranged to be taken from near the floor or near the ceiling at will, and is carried down the exhaust shaft to the horizontal duct in the basement which runs over and connects with the main exhaust fan.

Location of Cooling Apparatus

The cooling apparatus is located in a separate building and consists of an ice-making machine similar to those used in cold storage plants. The installation of the cooling apparatus in connection with the heating equipment in this church is a matter of considerable interest to church congregations, and its operation has been watched with much interest. It is the kind of equipment that is being provided in many of the churches and public buildings in a section of the country where the warm season is long.

The Revised Electrical Code

Amendments to the Ordinance relating to electrical control and recently passed by the Board of Aldermen of New York City are of special interest to the building fraternity. This electrical code is separate from the Building Code, the revision of which is now rapidly nearing completion and reference to which appeared in our issue for August.

According to the amendments in question no person will be permitted hereafter to install or repair electric wiring or appliances for heat, light or power in any building except a person holding a license, a special license or a permit, or a person employed by or working under the general supervision of the holder of a license or permit. A man may, however, without having a license of his own work under the direction of one having a license or a special license or a special permit, but he must be a competent man.

The provisions of the chapter do not apply to electrical equipment used in connection with railroads.

The license board to be appointed by the Commissioner will consist of an officer or employee of the department; a master or employing electrician; a journeyman electrician; an underwriters' electrical inspector; an electrician in the employ of a public service corporation of the city; an architect or builder of at least five years' practical experience and a real estate owner or broker.

When the Code Becomes Effective

The ordinance goes into effect when approved by the mayor, except as to the license requirement, which takes effect Nov. 1.

All applications for licenses or special licenses are to be referred by the Commissioner to the board, which shall promptly investigate and report to the Commissioner as to the fitness for license of the respective applicants. A fee of $10 will be charged for each license issued and thereafter an annual fee of $5 shall be charged for each renewal of such license and a fee of $1 for each special license or special permit so issued.

If, after inspection, the electrical wiring or appliances for light, heat or power in a building shall be found by the Commissioner to have been installed, altered or repaired in conformity with the requirements he is to issue a temporary or final certificate of inspection therefor.

On the contrary, if in the judgment of the Commissioner, after due inspection, the electric wiring or appliances in any building shall be unsafe or dangerous to persons or property, the Commissioner shall have power to cause such wires or appliances to be disconnected from the supplying wires or apparatus and to seal the wiring and appliances so disconnected.

Wages in New South Wales

According to the Government Statistical Bulletin bricklayers in New South Wales are paid from 39 cents to 42 cents per hour; masons and stonecutters 40 cents per hour; laborers 24 cents to 36 cents per hour and slaters and tilers 36 cents to 39 cents per hour. It is stated that the general cost of living in New South Wales in relation to wages is so low that it is the exception rather than the rule for a workman not to own the house in which he lives.

An unusual amount of building work has been planned in Ansonia, Conn., since the first of the year, the greater portion representing building operations of the American Brass Company and the Farrel Foundry & Machine Company. The former concern is erecting three buildings to cost $100,000 each, and the latter concern is putting up a structure involving an estimated outlay of $100,000.

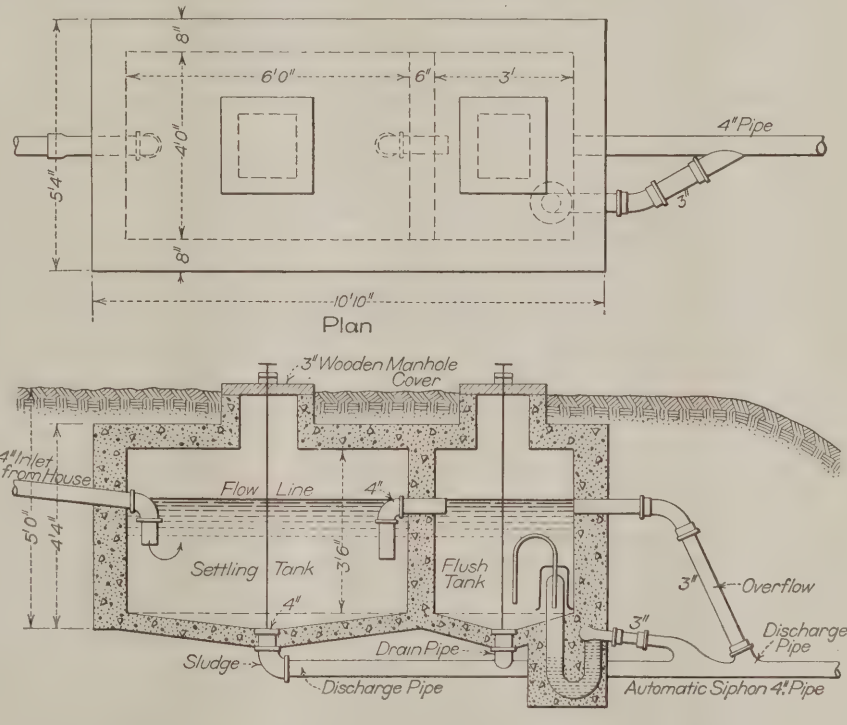
Sewage Disposal for Country Homes

Design and Construction of Septic Tanks—Their Dimensions—The Automatic Siphon and Its Dimensions

THE matter of sewage disposal for isolated dwellings, such as country homes and those found in suburban districts where there is no sewer with which to make connection, is a problem which invites serious consideration. This is especially true in the case of farm houses where the ordinary cesspool perhaps is not desirable but where it is imperative that the sewage be carried away in such a manner as to render its disposal entirely unobjectionable. The solution of the problem is found in the use of the tank. The purification and disposal of farm sewage by small private systems differs somewhat radically from that of city sewage disposal, owing in large measure to the extreme fluctuations in flow; the small size of the system, fresh character, and variation in the quality.

The process of sewage disposal is partly mechanical and partly bacterial, consisting of first, the preliminary or tank treatment and second, of the final treatment, which is application to a natural soil by surface or subsurface distribution or to a specially prepared filter.

It is well known that the exact nature of the action which takes place in a septic tank is a subject of a difference of opinion among sanitary experts. Several theories have been advanced but no definite conclusion appears to have been reached. Some authorities advocate the use of open ventilated tanks, while others are in favor of the use of air-tight tanks as giving the best results.



Sewage Disposal for Country Homes—Fig. 1—Plan and Longitudinal Section of Double Chamber Septic Tank having a Capacity for Six People—Scale ¼ in. to the Foot

Experience has shown that, in a small sewage disposal system, a dark, air-tight tank of sufficient capacity and so constructed that sewage may remain in it entirely at rest for a period ranging from 18 to 24 hours, gives the best results and the least annoyance. The solid matter setles out in such a tank, and, according to the theory at present accepted, it is partially liquefied, deodorized and destroyed by countless numbers of bacteria which thrive in filth and live without air. Some authorities assert that these bacteria also slightly affect the dissolved organic matter in raw liquid sewage. In such a tank a thick scum forms on the surface of the sewage, which protects the bacteria from the incoming air and is evidence of good bacterial action. The breaking up or disturbance of this scum will destroy the bacterial action for the time being and is likely to cause considerable annoyance by odoriferous emanations.

It has been found that the septic tank effects only about 40 per cent purification. The liquefying action in the tank, however, makes it possible to subject the sewage to a final treatment by filtration or distribution in a natural soil. This final purification is effected by means of bacteria which work in the air. Therefore, it is necessary that the sewage be applied to the final disposal system in intermittent doses so that the system may have a chance to air out. If the sewage is applied continuously and in such quantities that the system is kept saturated, the filter or disposal area becomes water-logged and "sewage sick" and ceases to be effective. It is, therefore, necessary that the final treatment system be of sufficient capacity to dispose of each dose of sewage quickly.

The septic tank for a small sewage-disposal system should ordinarily consist of two chambers. In this type of tank the sewage is received, settled, and partially purified in one chamber and collected and discharged from a second chamber. This type of tank if properly designed should give satisfactory operation, since the sewage in the settling chamber

suffers little disturbance, and the discharge to the final disposal system may be made intermittent by means of an automatic siphon placed in the discharge chamber.

Practice indicates that the settling chamber of a small septic tank should have a capacity of from 5 to 15 cu. ft. or from 40 to 80 gal. per person in the family. Some allow an average of 10 or 11 cu. ft. per person. The best results are obtained when the capacity approaches the larger limit, so that 18 to 36 hr. sewage from the house may be held at one time, thus causing the sewage to remain in the tank and undergo sedimentation and bacterial action for this length of time. But care should be taken not to make the tank so large that liquefied sewage will remain in it more than 36 hrs., for in that event putrefaction is likely to set in. For this reason one should make an accurate estimate of the daily sewage flow, which will be practically equal to the daily water consumption. Although a depth of 3 ft. may be sufficient for some classes of sewage, it is better to have the depth from 4 to 8 ft., according to the number of people, in order to give the sludge a good chance to settle and liquefy. The width of the chamber may ordinarily be about one-third or one-half the length, although this may vary for economy and convenience. The width should not be less than 3 ft., however.

The inlet from the house should be provided with an elbow, so that the discharge will be at least a foot below the contained sewage, thus preventing disturbance of the surface scum. The outlet from the settling chamber should be equipped in the same way. Where the entrance and discharge velocities are very strong, baffle walls of wood or concrete should be placed before these openings to break the current. These precautions are especially beneficial in the smaller-sized tanks.

The discharge chamber should be of such capacity and depth as to discharge about every ten to twelve hours. It may be desirable to discharge at more or less frequent intervals, according to the nature of the soil in the disposal area, and this may be controlled by the arrangement of discharge chamber and siphon. Where little outlet fall is available it is possible to so construct the discharge chamber that its floor will be considerably above that of the settling chamber.

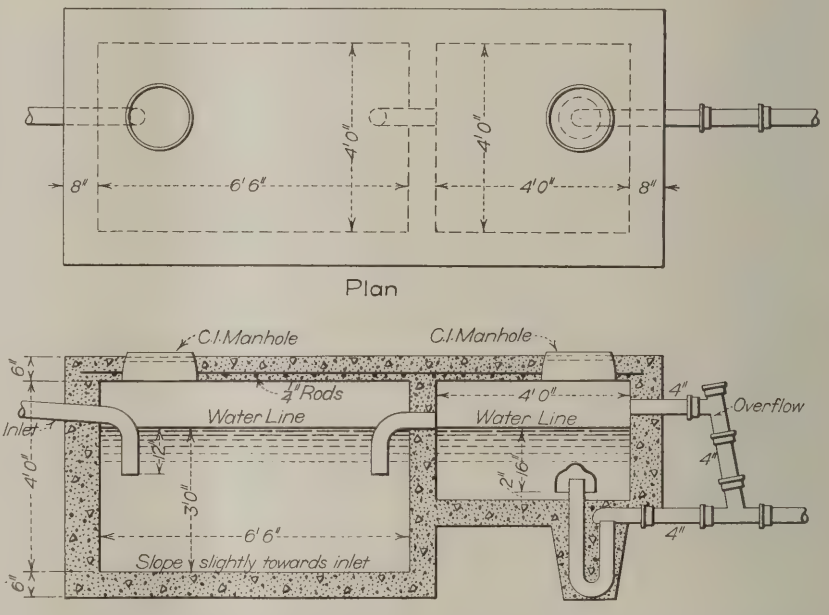
The capacity and depth of discharge chamber and the size of siphon will depend on the number of persons served and the means of disposal. If a sand filter is used or a distribution system in heavy loam, the discharge chamber must be larger and deeper, in order that the discharge interval may be lengthened and the distribution system be given ample time to aerate. If the distribution is in sandy or very porous soil the discharge may be more frequent.

The following table of dimensions of septic tanks suggest sizes of settling and discharge chambers and the corresponding siphon sizes to apply to various average conditions. The depths of siphon chamber given are the minimum allowable.

Dimensions of Septic Tanks

Number Persons	Settling Chamber			Siphon Chamber						Siphon Diameter
				Sand, Filter or Heavy Loam Distribution			Sandy or Porous Soil Distribution			
	Width Inside	Length Inside	Depth	Width Inside	Length Inside	Minimum Depth	Width Inside	Length Inside	Minimum Depth	
	Feet	Feet	Feet	Feet	Feet	Ft. In.	Feet	Feet	Ft. In.	Inches
6	4	6	3½	4	3	2 4	3	2	2 4	3
8	4	6½	4	4	4	2 4	3	2½	2 4	3
12	4	7	5	4	5	2 5	3	4	2 5	4
15	4	8	5	4	6	2 5	3	4	2 5	4
25	4	10	5	4	6½	3 2	3½	4	3 2	5
35	4½	12	5	4	6½	3 2	3⅝	4½	3 2	5

The accompanying table is computed on the basis that the inlet and outlet of the setling chamber should be placed with their inverts 12 in. below the roof of the tank, thus making the depth of sewage in both settling and discharge chamber 12 in. less than the mean inside depth.



Sewage Disposal for Country Homes—Fig. 2—Plan and Longitudinal Section of Double Chamber Septic Tank for Eight People—Scale ¼ in. to the Foot

The tank dimensions given in the above table, it should be remembered, are for average cases only and are not standard for all such cases. They are subject to such variations to suit local conditions as the farmer's judgment indicates; yet care should be taken not to vary any of the essential dimensions and not to go below the given minimum depth of siphon chamber.

In Fig. 1 we show a plan and vertical longitudinal section of a double-chamber septic tank having a capacity for six people and suited to conditions where there is plenty of fall at the outlet. This was designed by W. C. Davidson of the University of Missouri Engineering Experiment Station, and in Fig. 2 we show the top or plan view as well as a vertical longitudinal section of another type of septic tank having a capacity for a family of eight

people. In Fig. 3 we show horizontal and vertical longitudinal sections as well as a cross-section of a double-chamber septic tank for a family of six persons. This was designed by C. A. Ocock of the Wisconsin Agricultural Experiment Station and the tank is suited to flat ground where the outlet fall is difficult to obtain as will be noted by the difference in sectional elevation between the floors of the two chambers. For satisfactory operation a small septic tank should not be built of less capacity than for six people.

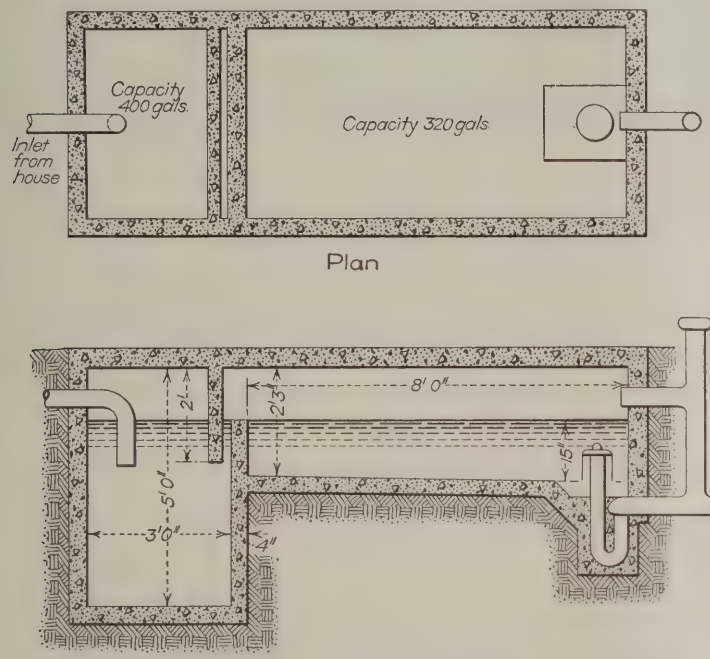


Fig. 3—Plan with Longitudinal and Cross Sections of Double Chamber Septic Tank for a Family of Six People, Suitable to Conditions Where Outlet Fall Is Difficult to Obtain—Scale ¼ In. to the Foot

The septic tank, although air-tight and supposedly water-tight, should be located as far from the house and the well or spring as convenience and local surroundings will permit, thus reducing the danger of pollution or nuisance in case of leakage or improper operation of the system.

The sewer from the house should be of vitrified sewer pipe, usually 4 in. in diameter with tightly cemented joints and should be laid to a grade not less than 9 in. per 100 ft. Where the fall from the house to the tank is excessive it is a good idea to lay the last 100 ft. of tile to the minimum grade so as to break up the entrance velocity.

It is assumed that the farmer has a working knowledge of small concrete structures and that therefore he is aware that the septic tank should be constructed as nearly water-tight as possible and preferably of concrete. The walls should be 6 or 8 in. thick, the floor 4 to 6 in. thick and the roof about 6 in. thick and reinforced. There should also be provided at the bottom some means to facilitate the cleaning out of settled sludge. Either the floor may be sloped toward the inlet end for this purpose or a pipe with a valve may be installed below the tank as shown in Figs. 1 and 2. The discharge chamber should be fitted with an outlet set above the siphon which will allow the sewage to escape in case the siphon becomes clogged.

A concrete mixture of one part cement to two and a half parts sand to four or five parts of broken stone or gravel should be used in the construction of the tank and it is a good idea to use the oil-mixed method to help to waterproof the concrete.

The automatic siphon may be installed to operate as frequently as may seem desirable. A 3-in. or 4-in. automatic siphon as it appears when installed is represented in sectional view in Fig. 4 of the engravings. The siphon operates as follows: As the liquid enters the discharge chamber its weight increases with increasing depth, and the air between the water surface in the bell and the water inside the "siphon leg" is compressed. As the water outside increases in depth the compression inside becomes greater until the water outside reaches the drawing or discharge depth for the siphon. The inside pressure then is sufficient to force the water in the siphon leg around the bent, instantly relieving the compression. The water from the tank then rushes in to fill up the space which was occupied by the air and starts the siphon, which continues until the outside and inside pressures are again equalized.

The table gives working data and dimensions as shown in Fig. 4, to be used in installing 3-in., 4-in. and 5-in. siphons.

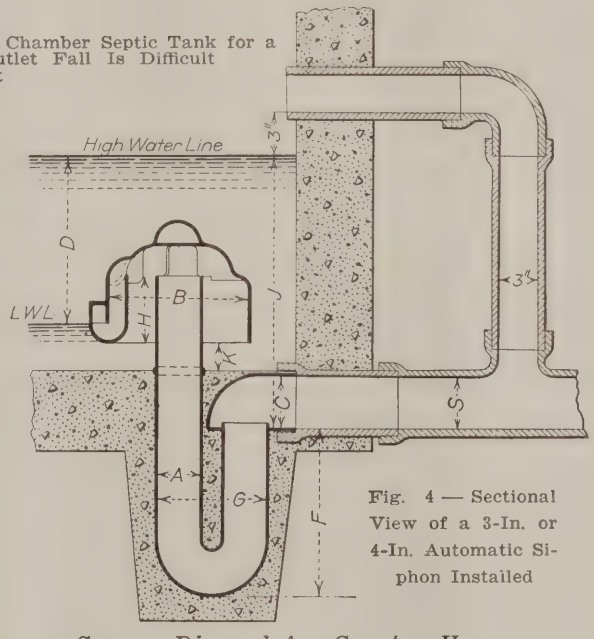


Fig. 4 — Sectional View of a 3-In. or 4-In. Automatic Siphon Installed

Sewage Disposal for Country Homes

Dimensions for Automatic Siphons

Dimension	Reference Letter	Inches	Inches	Inches
Diameter of siphon	A	3	4	5
Diameter of bell	B	10	12	15
Diameter of discharge head	C	4	4	6
Drawing depth	D	13	14	23
Depth of trap	F	12	13	22
Width of trap	G	10	12	14
Height above floor	H	7¼	8¾	9½
Clearance under bell	K	2	2	3
Diameter of carrier	S	4	4–6	6–8
Invert to discharge line	J	20½	22¾	33½
Average discharge per second, cu. ft.	.....	0.16	0.35	0.73

Sizes of siphons 5 in. and over are made a little differently from the 3-in. and 4-in. sizes, although the working principles are the same.

(To be continued)

New Publications

Arithmetic for Carpenters and Builders. By R. Burdette Dale. 228 pages. Size 5 by 7 in. Illustrated with 109 figures. Bound in cloth. Published by John Wiley & Sons. Price $1.25.

This is a little work which cannot fail to be appreciated by a wide circle of readers as it has been written for the purpose of presenting in simple form the subject of arithmetic as used in the daily work of the carpenter and builder. It is in effect a practical book for the trade and for use in manual training and night schools, trade schools, vocational and industrial schools, etc. It is also well adapted for use in correspondence instruction. The material has been used by the author in the Vocational Courses in Engineering at the Iowa State College, and also in the extension classes of the Department of Engineering Extension in various cities in the State of Iowa. Geometry is touched upon merely to serve as a foundation for the work in mensuration, and practical applications of geometrical truths are emphasized, while rigid proofs and developments are omitted. A very interesting portion of the book is found in the two chapters on the use of the steel square—that most important adjunct of the carpenter's kit of tools.

The matter is embraced in sixteen chapters in some of which special attention is given to cement and concrete mixtures, weights of building materials, footings, bearing power of soils, lumber terms and dimensions, allowance for dressing, width of lumber, standard lengths, sizes of common boards and of dimension lumber, sizes of dressed finishing lumber, flooring, shingles, etc. The matter has been arranged for the practical man as well as for the beginner and the student.

Bungalows, Camps and Mountain Houses. Compiled by W. P. Comstock. 126 pages. Size 7½ by 10¼ in.; 200 illustrations, embracing 80 designs. Bound in cloth. Published by the William T. Comstock Company. Price $2.00.

This is a new revised and enlarged edition presenting the thoughts and ideas of thirty-two diffent architects in various sections of the country. The designs are varied to such an extent that many of them are suitable only for summer use, while others are adapted for occupancy the entire year. There are camps, hunting lodges and log cabins suggesting designs for vacation dwellings in the woods and mountains.

The subject matter is treated in three parts, the first of which deals with what is regarded as the "true bungalow"; the second has to do with the bungalow with a second story, and the third considers lodges and log cabins suitable for the mountains, the lake side and the seashore. The descriptive text accompanying the illustrations tells the kinds of materials to be used together with some figures of cost. Many of the illustrations are halftone engravings of buildings already erected, as well as of interiors, these being accompanied by floor plans clearly indicating the general interior layout.

A feature of the new edition is an article by C. E. Schermerhorn, an associate member of the American Institute of Architects, and consists of a condensed account of the requirements for planning a bungalow. It embraces a plate showing twenty-two different schemes for laying out floor plans, and in addition there are a number of little detail sketches clearly indicating how to plan conveniences in the house, such as built-in furniture, kitchen equipment, cupboards, etc.

Principles and Practice of Linear Perspective. By H. T. C. Kraus. Size 14½ by 9½ in.; 54 pages with 15 full page plates of practical examples. Bound in cloth. Published by the Norman W. Henley Publishing Company. Price $2.50.

This is a revised edition of a well-known work dealing with the theory and practice of linear perspective as used in architectural, engineering and mechanical drawings. It includes a self-explanatory linear perspective chart in simplified form, and the matter is arranged with great care and attention to details. In the mechanical make-up of the matter the full-page plates are at the left hand and facing the descriptive text so as to greatly facilitate reference. The drawings are on a sufficiently large scale to clearly show the work and are plainly figured.

Engineering for Architects. By De Witt Clinton Pond. 104 pages. Size 6¼ by 9 in. Illustrated with 77 figures. Bound in cloth. Published by Columbia University Press. Price $2.00 post paid.

The author is instructor of architectural engineering at Columbia University and the work which he has brought out is intended to furnish the architect with information regarding many of the engineering problems with which he is often confronted in the practice of his profession. The author states that it is not his intention to introduce any new methods of calculation nor to give the only ones that may be used, but is simply placing at the disposal of architects such information as will make possible the design of floor beams, girders, column sections, grillage beams and simple roof trusses. There are, as he says, shorter methods that experienced engineers employ, and there are entirely different ways in which structural members may be designed, but in case nothing whatever is known of design the author hopes the work under review will give such information as will make the solving of simple engineering problems possible.

Licensing Architects in Florida

The movement looking to the licensing of architects in various States seems to be making rapid progress judging from the laws to this effect which have been enacted the present year. In addition to New York and Michigan in the list must be placed Florida, where the license fee is $25, the law applying to buildings costing $5,000 and above. The act, which is similar to the Illinois law providing for the licensing of architects, was passed this spring by both houses of the Florida Legislature and was signed May 27 by the Governor.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in July, 1915, and July, 1914

AS the building season progresses it is gratifying to note that conditions indicate an appreciable improvement in July as compared with June, in that the decrease in operations of 7½ per cent as contrasted with July last year is not as great as was the case in June when the falling off was something like 21 per cent as compared with June, 1914. The showing, however, of the 108 cities reporting is very irregular, as decreased operations in some sections contrast with increased activity in adjacent territory. For the first time in many months the Southern zone shows a gain over the corresponding period a year ago.

In considering the Eastern section of the country it is found that of forty-two cities reporting thirty show decreases and twelve increases, with a resultant loss of 5.9 per cent. The greater activity in many of the New England cities, especially in Connecticut, is due to expansions of plants to provide additional manufacturing facilities by concerns turning out munitions of war. In Greater New York the Boroughs of Manhattan, The Bronx and Richmond show a falling off as contrasted with July last year, while Brooklyn and the Borough of Queens show increased activities.

CITIES OF EASTERN STATES

	July, 1915	July, 1914
Albany	$416,760	$692,005
Allentown	79,075	157,635
Altoona	85,031	142,967
Binghamton	53,086	146,599
Boston	984,522	528,000
Brockton	84,517	94,670
Buffalo	1,494,000	985,000
East Orange	144,848	169,522
Elizabeth	118,382	179,190
Erie	283,700	474,206
Harrisburg	144,325	223,375
Hartford	441,767	311,985
Hoboken	48,078	173,133
Holyoke	156,915	71,885
Jersey City	345,913	545,172
Lawrence	55,375	103,280
Manchester	309,050	334,495
Montclair, N. J.	104,770	145,730
Newark, N. J.	581,133	1,172,043
New Bedford	320,720	142,545
New Haven	788,454	427,215
New York:		
Manhattan	4,845,303	5,325,084
Bronx	1,963,993	2,263,983
Brooklyn	4,196,609	3,679,946
Queens	2,546,266	2,336,365
Richmond	204,355	322,365
Passaic	74,750	131,575
Paterson	146,775	229,546
Philadelphia	3,659,940	4,661,850
Pittsburgh	1,186,632	1,510,212
Portland	200,000	104,000
Reading	82,700	103,600
Rochester	762,123	1,067,101
Schenectady	239,148	278,210
Scranton	316,370	167,155
Springfield	436,755	794,835
Syracuse	752,957	854,363
Trenton	385,521	298,024
Troy	125,161	51,827
Utica	112,205	138,375
Wilkes-Barre	45,133	108,413
Worcester	703,329	571,749

Taking the leading cities of what may be designated as the Central zone of the country we have reports from thirty-two cities, of which eighteen show a decrease in building operations in July, while fourteen indicate an increase as contrasted with the same month in 1914. The result is a loss of 14 per cent for this section. In view of the strike in the building trades in Chicago, but which was settled during the month, it is not surprising that the city should show a heavy falling off as compared with last year. Detroit, St. Louis, Cleveland and St. Paul also indicate a shrinkage, while Akron, Cincinnati, Kansas City and Minneapolis show increased activities in various lines.

CITIES IN MIDDLE STATES

	July, 1915	July, 1914
Akron	$1,148,570	$405,960
Canton	247,450	245,900
Cedar Rapids	167,000	166,000
Chicago	6,455,630	9,148,760
Cincinnati	1,275,100	1,055,330
Cleveland	2,319,280	2,532,500
Columbus	504,085	503,355
Dayton	225,000	680,700
Des Moines	181,405	140,690
Detroit	2,663,080	3,121,750
Duluth	201,422	266,259
East St. Louis	142,976	103,695
Evansville	347,080	111,555
Fort Wayne	201,580	333,500
Indianapolis	598,078	1,140,969
Kansas City, Kan.	77,177	188,005
Kansas City, Mo.	1,418,060	1,012,055
Lincoln	272,335	58,750
Milwaukee	916,625	943,724
Minneapolis	1,474,265	1,326,095
Omaha	556,780	402,605
Peoria	121,190	193,100
Richmond	328,667	464,949
Saginaw	54,897	80,895
Sioux City	218,200	320,050
Springfield	63,500	74,800
St. Joseph	143,135	80,967
St. Louis	615,148	1,287,859
St. Paul	770,018	1,053,220
Toledo	534,012	569,579
Topeka	168,991	64,490
Youngstown	147,650	493,240

The striking feature of the reports from the Southern cities is a gain of 9 per cent over the month of July last year, this being due, however, to the fact that operations in Washington, D. C., increased practically 100 per cent. There is a considerable gain in Baltimore, Atlanta, Louisville and New Orleans, with an appreciable shrinkage in Chattanooga, Nashville, Birmingham and Dallas.

CITIES IN SOUTHERN STATES

	July, 1915	July, 1914
Atlanta	$613,046	$495,902
Baltimore	1,749,991	837,458
Birmingham	223,987	468,385
Chattanooga	32,373	116,370
Dallas, Tex.	656,124	941,580
Huntington	132,040	104,650
Louisville	548,740	483,740
Memphis	245,285	333,006
Nashville	220,665	454,039
New Orleans	513,510	505,392
Norfolk, Va.	163,575	210,950
Oklahoma City	81,530	20,880
Richmond	328,667	461,949
Savannah	154,840	163,191
Shreveport	46,884	149,212
Tampa	82,011	110,345
Waco, Tex.	39,769	142,750
Washington, D. C.	1,424,207	709,160
Wilmington	163,675	184,521

Coming to the extreme Western section of the country the figures for July from fifteen cities show thirteen to have experienced decreased activity and two increased planning, with a resultant loss of 7 per cent. The striking features are the figures from Los Angeles, San Francisco, Seattle, Portland and Spokane.

CITIES IN WESTERN STATES

	July, 1915	July, 1914
Colorado Springs	$22,690	$14,228
Denver	177,090	222,220
Los Angeles	936,873	2,081,396
Oakland	410,322	430,665
Pasadena	190,789	409,032
Portland	373,375	870,745
Sacramento	280,247	115,065
San Diego	71,325	579,558
Salt Lake City	174,550	238,750
San Francisco	1,500,206	2,068,537
San Jose	29,971	52,110
Seattle	315,010	2,520,590
Spokane	66,263	229,635
Stockton	46,103	88,849
Tacoma	31,161	96,551

For the seven months of the year the shrinkage in building operations as compared with the same period last year is a trifle more than 10 per cent.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

Exhibit of Stanley Goods at Panama Exposition

An exhibit of shelf and builders' hardware which is of unusual interest to architects, builders, carpenters and prospective house owners visiting the Panama-Pacific Exposition at San Francisco, is that of the Stanley Works, New Britain, Conn., which occupies a conspicuous place in the Palace of Manufactures, Block 26, Fifth Street and Avenue D. The display occupies a floor space of 400 sq. ft. with 260 sq. ft. of wall space on which the products of the company are shown. The architecture of the booth follows the "Mission" style and is in harmony with surrounding exhibits. The interior is finished in quartered oak. A front view of the booth and the display is presented in Fig. 1 of the illustrations. The exhibit proper is displayed on 14 panels in cases with sliding glass doors and lighted by concealed electric lights. Some of the most popular lines of hinges, plated butts, door bolts and shelf brackets are shown in practically all sizes and finishes. At the rear of the booth there is a pair of full sized garage doors equipped with Stanley's latest garage hardware. There are also seven models showing ball bearing butts, half surface butts, blind trimmings, screen hardware, storm sash equipment, garage hardware and casement hardware, in actual size.

Fig. 1—Front View of Booth Showing Stanley Hardware at the Panama-Pacific Exposition

Among the many features of the display is a large butt or hinge of unique design. It is 24 in. square and weighs 90 lb. It is said to be the largest door butt ever made and is finished in "Stanley Sherardized" and plated finish, which is so popular just now where moisture is apt to affect the finish. By the sherardizing process the surface of the metal becomes impregnated with zinc forming an alloy that prevents rust and corrosion, and will, it is said, withstand more rigid tests than required by the United States Government for hot galvanizing. The process is of particular value in the manufacture of Stanley butts, hinges, etc., in that a sherardized surface will receive and retain an electro plate finish, making available an ornamental as well as rust-proof finish over steel.

Other features of the company's exhibit are found in box strapping in various designs and widths, box fasteners, corrugated fasteners, and cold rolled strip steel in coils drawn out in cone shape.

Convention of Salesmen of Sargent & Co.

The annual convention of the selling force of Sargent & Co., was held at the end of June in the convention hall of the works at New Haven, Conn. The meeting was divided into seven sessions, each being conducted under scheduled headings by the department head under whose immediate charge the goods or matter under discussion came. This convention marked the twelfth affair of its kind at the factory and also represented a continuance of a long established practice of calling together the selling force of the company—formerly at its New York office—for the purpose of learning from their experiences the exact requirements of the buying public, thus enabling the company to manufacture its numerous lines in conformity with those requirements. Although the convention had been called for strictly business purposes, this fact did not prevent the usual thoughtful consideration for the comfort and pleasure of the visiting salesmen for both had been amply provided for in the selection of the Shore-

ham Hotel, Morris Cove, as headquarters. Here a banquet was given to the factory department heads and the salesmen which created a lasting impression in the minds of all, not only on account of the congenial atmosphere which always prevails at a "love feast," but also in the wholesome suggestion of co-operation in the mingling of the producer and the distributor.

Philadelphia Branch for Buffalo Wire Works Co.

The rapidly growing demand for "Buffalo" wire products in Philadelphia, Pa., and adjoining territory has necessitated the establishing of a branch office and warehouse at 11 South Seventh Street in that city by the Buffalo Wire Works Company, whose main office and factory are at 316 Terrace, Buffalo, N. Y. A complete stock of all grades of "Buffalo" wire cloth will be constantly carried on hand at the Philadelphia warehouse in order to promptly meet the requirements of the company. The location of the new branch is in the heart of the business section of the city, which places the company in a most excellent position to handle rush orders in that territory.

Rex Strip Shingles

Some interesting particulars relative to the above mentioned product are contained in an attractive folder which has just been sent out by the Flintkote Mfg. Company, Inc., 98 Pearl Street, Boston, Mass., and with New York office at 66 Beaver Street. The product is a slate surfaced asphalt shingle in strip form that can be laid much faster than single shingles. The strips are 40 in. long, 10 in. wide and the "slots" or "cut-outs" are 1½ in. wide and 4 in. deep. There are five shingles to a strip and six nails are all that are necessary to fasten it in place. The exposed portion of each shingle is 7½ in. wide and the company states that only 90 strips of five shingles each are required to cover one square of surface. Rex strip shingles are furnished in two colors—dark red and grayish green. They are made of heavyweight felt thoroughly saturated with high grade refined asphalts. An extra heavy asphalt coating is then applied to the upper side of the felt and while this coating is hot there is rolled and compressed into it an even layer of natural chipped red or green slate especially selected for its permanent colors. The appearance of the shingle when laid on a roof is shown in Fig. 2. The product is packed in strong cartons containing thirty strips each or 1/3 of a square. The shingles are guaranteed for ten years without paint or renewal.

Fig. 2—Section of a Roof Area Showing the Appearance of the Rex Strip Shingles When Laid in Courses

Lighting Fixtures For the Modern Home or Office

Next door to the Johns-Manville Building at Madison Avenue and Forty-second Street, New York City, stands an old brown stone mansion which has just been acquired by the H. W. Johns-Manville Company with the idea of showing in proper surroundings, all the various lighting fixtures for the modern home or office. The old rooms have been restored, handsomely furnished and each one filled with lighting fittings appropriate to its character. The drawing, dining and bed rooms as well as the hall, stairs and office all have their correct setting and here the architect or his client may quietly study the exact effect of each form of light and each kind of fixture. Hitherto the trouble in displaying lighting equipment has been the difficulty of obtaining a correct idea of the complete fixture in advance. The metal parts come from one house, the glassware from another, and if any special design or scheme were called for it was only obtainable after considerable trouble. Since the Johns-Manville Company has taken over the sales arrangements for the well-known Mitchell Vance lighting fixtures and combined with them those for the Gill Parian glassware, it is now possible to carry out the scheme outlined, and under the new arrangement the various departments of lighting design will be co-ordinated and in co-operation with the architect it will be possible to arrange a lighting system which shall form an architectural unit with the building as a whole.

In the new lighting showrooms at 294 Madison Avenue, the visitor may note the efficiency and economy of the J-M Linolite system, which is making rapid strides in public favor for the lighting of buildings of all kinds and the Frink system of concealed lighting.

T. L. Smith Company Controls the Albrecht Excavator and Loader

The trade will be interested in learning that the exclusive manufacturing and selling rights of the Albrecht excavator and loader have recently been purchased by the T. L. Smith Company, 1106-A Thirty-second street, Milwaukee, Wis., which means that one of the largest and oldest concrete mixer concerns has entered the dirt-moving field. For more than five years the inventor, John L. Albrecht, endeavored to market this machine and a number were sold and are now being successfully used in different parts of the country. Lack of capital, however, prevented the successful development of the business, and realizing the immense field in which this machine could be used to advantage, the T. L. Smith Company purchased the entire business.

It may be stated that the Albrecht excavator and loader is a sort of compromise between a hand shovel and a steam shovel and will do the work of both. It does away with the necessity of employing a large number of shovelers as two men, it is stated, can operate the equipment—one man in the pit to handle the scraper, and one man to run the machine. A 12 hp. horizontal gas engine of the heavy duty type provides ample power to dig and load 20 cu. yd. per hour. The claim is made that the machine will dig at a distance of 100 ft. from the machine and at any desired depth for ordinary excavations at the rate of one round trip per minute. It will dig at any point above or below its level and over an area covering a half circle back of the machine. The claim is made that the excavator and loader can be used to great advantage for excavating for large foundations, basement and drainage ditches, for back filling, for loading sand, gravel, etc., and that it is an economical investment for the contractor who handles street and highway paving.

(*Continued on page* 74)

Taylor's Steel Bar Clamps

What are known as the Taylor Steel Bar Clamps Nos. 11, 12 and 13, have just been placed upon the market by the James L. Taylor Mfg. Co., Poughkeepsie, N. Y., and a general view of which is afforded by Fig. 3. The No. 11 is a strong, light clamp with deep engagement, well adapted to core-box and pattern work, light furniture repairing, etc. The steel bar of this clamp measures ¾ by ¼ in. and the steel screw 3 by 7/16 in. All castings are made of the best refined, malleable iron. This model is tested to a safe clamping strain of 750 lb.

In the No. 12 and No. 13 clamps the eccentric lever is combined with the company's self-locking, positive grip, making the clamps exceptionally quick and handy for use in many classes of work. The sliding jaw of each of these clamps is provided with a quick-acting self-locking gripping device so that their grip is positive. Both of these clamps have high grade steel bars measuring 1 by 5/16 in. They have pivoted buttons. All castings are of the best refined, malleable iron. The clamps are tested to safe clamping strains as follows: No. 12, 3800 lb.; No. 13, 1800 lb.

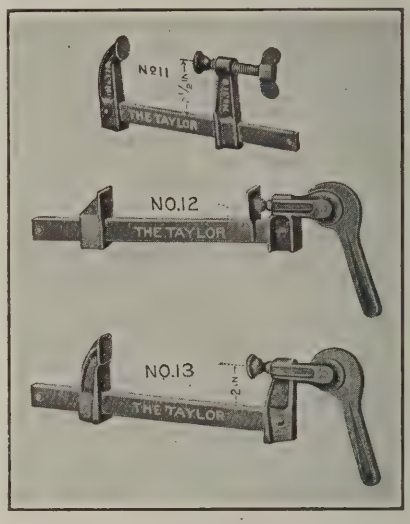


Fig. 3—Views of Three Styles of Taylor's Steel Bar Clamps

Booklet on Graphite Brushes

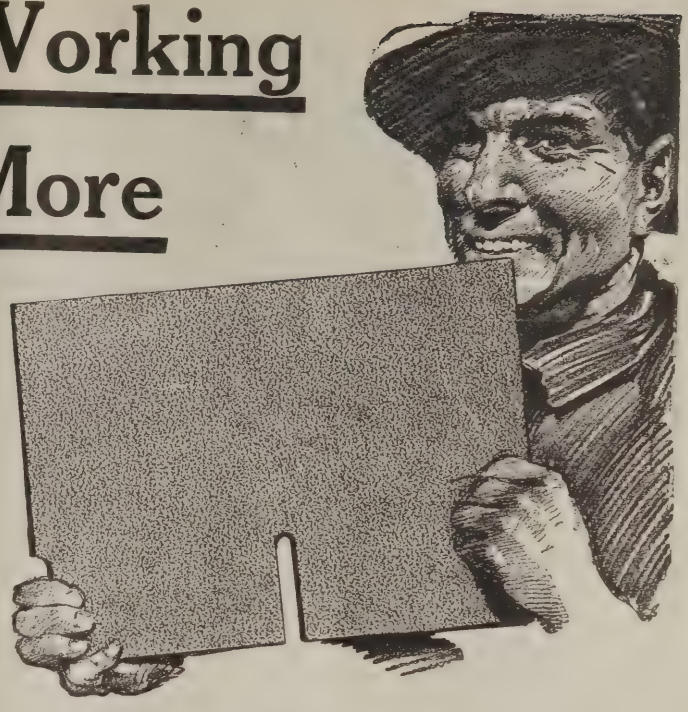
Operators of electric power machinery are interested in the subject of commutation and are fully aware of its importance in the electrical field. A large percentage of breakdowns in the present day motor or generator must be charged against improper operation of commutator and brushes. Graphite brushes are designed and marketed with the express purpose of reducing commutator troubles to a minimum. A booklet, "Dixon's Graphite Brushes," explains how the characteristic lubricating qualities of graphite are utilized to this end. The advantages of graphite over carbon as a brush material are also clearly set forth. An electrical service department for the solution of brush problems invites detailed statements and will advise whether Dixon's brushes are adapted to the stated operating conditions. Frequently trial orders have made enthusiastic supporters of graphite brushes. A copy of the booklet may be obtained free from the Joseph Dixon Crucible Co., Jersey City, N. J.

The "Ankyra" Expansion Bolt

A neat and attractive catalog relating to the "Ankyra" bolt or sleeve which is of a nature to meet many requirements, has just been sent out by the Ankyra Mfg. Company, 149 West Berkley Street, Wayne Junction, Philadelphia, Pa. This anchor bolt is said to combine the principles of the toggle and expansion bolts, but differing from them in that the nut is an integral part of the sleeve itself. The "Ankyra" consists of a

(*Continued on page* 76)

15 Salesmen Working For Me and More Coming



These salesmen are my customers — property owners — whose residences I have covered with NEPONSET Shingles. They are the biggest boosters of the shingle I know. They're turning business my way every week.

There is no roof so attractive as that covered with

NEPONSET Shingles

PATENTED

Each shingle is specially built up—the butt end being three times thicker than the top end! When laid they form seven layers. That will give you some idea of their durability. Why not get a sample and investigate for *yourself?*

The same materials are used in **Neponset** Shingles as in the well-known **PAROID** Roofing, also used in **Neponset** Proslate, the highest grade colored ready roofing ever made. **Neponset** Wall Board, **Neponset** Waterproof Building Paper and **Neponset** Floor Covering are other well-known **Neponset** products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me a sample of the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

longitudinal perforated metal sleeve, which upon being inserted in a hollow wall and collapsed by a specially devised tool, forms a triangular shaped winged nut. The point is made that the growing use of sheet metal has been hindered to some extent by the necessity of predetermining the location of fixtures and hardware in order that a suitable means of fastening may be provided, and the company states that the "Ankyra" anchor bolt eliminates this difficulty since it permits fixtures to be applied at any place without previous reinforcement. The catalog in question illustrates and describes some of the multifarious applications of this bolt and also shows how the "Ankyra" collapsing tools are used.

Jennings Auger Bit Sets in Pockets

C. E. Jennings & Co., 71-73 Murray Street, New York City, are putting up their high grade No. 1½ auger bits in sets of four, handy for the mechanic to carry readily in his hip pocket or kit when away from the shop, or suitable for use at home, where the average family does not require a full set of twelve bits and often not more than four of the most commonly

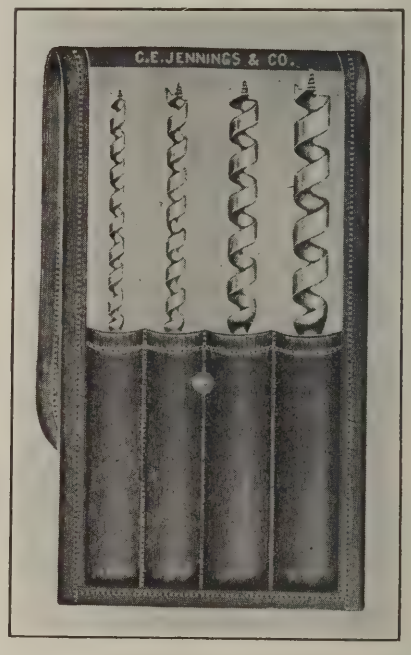


Fig 4—Jennings Auger Bit Sets in Pockets

used sizes. This set, known as No. 701½, arranged in a flexible container of black enameled cloth, with a flap and a snap fastener, as shown in Fig. 4 of the cuts, includes one each 4, 6, 8, 10 and 16 in. bits; otherwise ¼, ⅜, ½ and ⅝ in. in diameter. The pocket measures when open, exclusive of the flap, 9¼ by 4¾ in., weighing complete 12 oz. Rolled up, it measures 9¼ in. long by 1¼ in. in diameter. The bit is "buzzed" or milled out of the highest grade solid steel stock, suitable for this purpose, and every set is guaranteed.

Hollow Tile Construction

Under the above title there is being distributed an illustrated folder calling attention to this form of construction for residences, garages and other buildings. A few of the advantages of hollow tile construction are set forth and special emphasis is laid upon the fact that it renders a building fireproof while with its low cost it is as practicable for a person of moderate means to construct a modest bungalow of this material as it is for the man who builds a mansion. In sending out the folder, the Swanson Brick & Tile Company, 107 Kasota Building, Minneapolis, Minn., calls attention to the fact that this porous hollow tile is made of a mixture of clay and a small percentage of sawdust, and is burned in kilns for several days, being subjected to a very high temperature, and therefore the finished product is fire-

(*Continued on page 78*)

proof. During the process of burning, the sawdust which is mixed with the clay burns out leaving small holes throughout the tile, thus rendering it porous. The illustrations show details of various tiles, giving sizes and showing their position in a wall. Other sketches represent combinations of hollow tile for 10-in. and 12-in. walls. The folder is of more than usual interest to the architect and builder and we understand that a copy of it can be obtained on application to the address given.

Sargent's Screen Door Check

A new liquid screen door check and spring which closes the door quickly so that mosquitoes, flies and other insects are kept out, and closes it without slamming so that the occupants of the house are not disturbed by the "slam-bang" which has heretofore been an accompaniment of the screen door, has just been placed on the market by Sargent & Co., 53 Water

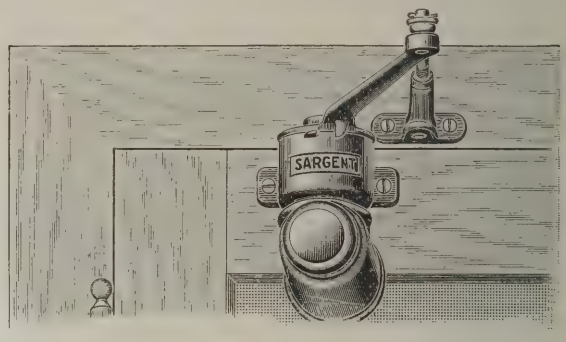


Fig. 5—Sargent's Screen Door Check

Street, New Haven, Conn. This article, which is designated as "No. 20," has been very carefully built after much thought and planning and is designed especially for screen doors, but can be used also on light partition doors. It is well adapted for the purpose for which it is made, therefore no adjustment of spring or checking power is necessary. The construction is substantial and all working parts are inclosed in the case so that dust and dirt cannot get in and interfere with its operation. It may be applied to either right or left hand doors without changing any of the parts, a blue print template being packed with each check to show the exact position on the door. The check applied to a door is shown in Fig. 5.

Safety Key-Set Store Front Construction

The Zouri Drawn Metals Co., 215-233 West Schiller Street, Chicago, has purchased a factory at Chicago Heights, Ill., and is making additions which in all will cover a floor space of approximately 80,000 sq. ft. The company is the manufacturer of safety key-set store front construction, comprising such safety devices as key-set sash, corner and division bars, union sill, side and head jamb coverings, and a self-adjusting setting block. In connection with its new plant the company has purchased the most modern and efficient machinery in order to facilitate production. The location was selected on account of its ideal site for manufacturing purposes. Chicago Heights is 26 miles from Chicago, making connection with 36 railroads. The company is therefore able to offer the best shipping facilities to all parts of the country. The company's 1915 catalogue is of special interest to building contractors, and a copy can be obtained by writing to the address given above.

Telsmith Portable Crushing Rig

A new equipment which is said to be particularly well suited to the requirements of the small isolated concrete job is the Telsmith portable crushing rig made by the Smith Engineering Works, Thirty-second and Locust Streets, Milwaukee, Wis. The rig is mounted on an all-steel truck with 8-in channel sills strongly

(*Continued on page* 80)

braced. The apparatus consists of a No. 7 Telsmith jaw breaker, a 12-hp. double-opposed-cylinder engine, elevator, screen and bin. The double-opposed-cylinder engine is said to be particularly adapted to this work because of its reduced weight and continuous flow of power. The machine has a capacity of from 2 to 2½ tons per hour of ½-in. size or 3 to 4 tons per hour of 1½-in. size. A reciprocating feeder conveys the stone from the crusher to the elevator, the feeder being operated by the swinging jaw of the crusher.

The Adbro Continuous Rotary Screw Driver

The latest candidate for popular favor in the way of a screw driver is the tool illustrated in Fig. 6 and which is built on an entirely new screw driver idea, combining in one simple handy tool the advantages of a brace and screw driver. It is known as the "Adbro" and is provided with a pivotal handle which gives a continuous rotary motion, thus making it a one-hand tool, leaving the other free for holding the work if necessary. It is made by the Adbro Mfg. Company, with offices in the Phipps-Power Building, Pittsburgh, Pa., and the claim is put forth that the tool will not blister the hand and that by a simple rapid turning of the wrist the desired speed is attained. The T-head gripping part indicated by the arrow in the engraving is said to give great leverage for driving home or loosening the heaviest screws. The tool is made of high grade steel scientifically tempered with a hand-forged point and every one is said to be bench finished. It is simple in construction with no ratchets, springs or parts to wear away or get out of order. It is made in six sizes, No. 1 being 3/16 in. in diameter and No. 6 is ¼ in. in diameter. The length of shank in the clear ranges from 3 in. in the smallest size to 7 in. in the largest. The tool is especially adapted for mechanics in all branches of trade having occasion to use a screw driver for any purpose. The company is sending out a circular describing the tool and pointout its manifold advantages.

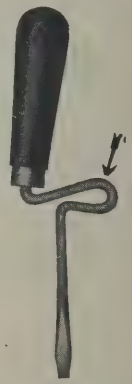


Fig. 6—General View of the Adbro Screw Driver

Pittsburgh Branch For Witte Engine Works

The trade will be interested in learning that on Aug. 1 the Witte Engine Works opened a branch in Pittsburgh, Pa., with offices in the Empire Building, corner of Liberty Avenue and Fifth Street, under the management of E. D. Voorhis, who for a number of years past has been connected with the main office in Kansas City, and is therefore entirely familiar with the various details of the business. The Pittsburgh branch carries a complete stock of engines, and of spare parts and is prepared to make prompt shipment of all orders, large or small. The reason for opening the Pittsburgh branch is to furnish a quicker service to the present Witte customers as well as to take better care of all future customers served in the Pittsburgh territory.

Bossert "Redibilt" Buildings

There has just been issued from the press by Louis Bossert & Sons, Grand street and Newtown Creek, Brooklyn, N. Y., an exceedingly neat and attractive catalogue illustrating and describing the "Redibilt" structure made by this concern. These include the latest and most improved bungalows, boathouses, garages, churches, schoolhouses, hospitals, real estate offices, railway stations, emergency buildings, bathhouses, etc. The company points out that while the building of portable houses is nothing new in their line, as they have been manufacturing them for the past twenty-five years for other selling agents, it now offers a new improved portable house designed and manufactured under its own patents. The lumber used is transported to the company's dock direct from the saw mills, and every

(*Continued on page 82*)

part of "Redibilt" houses is made from carefully selected lumber which has been proven by experience suitable for the part for which it is used. Some of this comes from the South, some from the North and some through the Panama Canal from the far West. An entire building is made of sections just large enough to conveniently handle and erect, and all sections are interchangeable, as simplicity is the keynote of the system. Skilled labor of any kind is not required and an entire house may be erected by anyone of average intelligence, possessing a small wrench. The buildings are of such a nature that they may be taken down and re-erected any number of times without injury to the structure or destroying a single feature. If, at any time, an owner should wish to enlarge his building new sections may be secured from the company which will accurately fit the other structure. The matter presented within the covers of the little work under review is illustrated with details of construction and there are specifications which tell how the various parts are made and finished. We understand that a copy of the book will be sent to any reader on application.

The Hess Welded Steel Cottage Furnace

For the purpose of meeting a well-defined demand the Hess Warming and Ventilating Company, 1201 Tacoma Building, Chicago, Ill., has just placed upon the market a new welded steel cottage furnace, which, while of the same type as the steel furnace long manufactured by the company, differs from it in certain par-

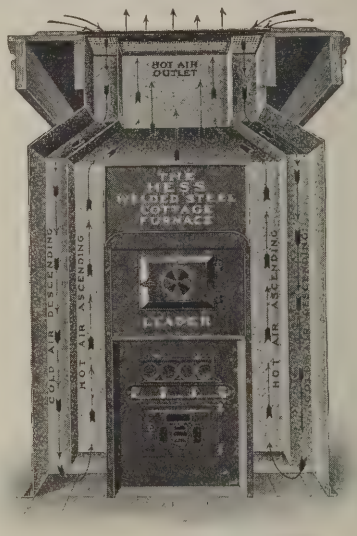


Fig. 7—Sectional View of the Hess Welded Steel Cottage Furnace Showing Course of Air Currents

ticulars. Instead of the usual pipes and registers for each room and the ordinary air supply duct the new construction involves the use of no horizontal pipes. As a substitute one large register grating is placed directly over the furnace in the main room of the house to be heated. This register is divided into three sections, consisting of a large center opening for warm air and a smaller opening at each end through which the cold air at the floor returns to the furnace. This cold air travels down outside next to the galvanized casing, thus preventing any loss of heat in the cellar, and it returns upward through inner chambers of the furnace next to the welded steel radiator. The company calls attention to the fact that the whole outfit costs no more than a base burning stove of equal capacity; that it can be installed by any handy man; that it will heat any ordinary cottage, bungalow, church or store more uniformly than stoves; that it saves the room occupied by the latter, and finally all the fuel and ashes are handled in the cellar. A sectional view of the furnace showing the course of the hot and cold air currents is presented in Fig. 7 of the cuts. We understand that this new heater in no way supersedes the regular Hess furnace, which is sold more extensively than ever, but is brought out to meet the demand for smaller and less expensive equipments.

(*Continued on page* 84)

The "Globe" Sheet Metal Products

A vast amount of very interesting information relating to the line of sheet metal building materials turned out by the Globe Iron Roofing & Corrugating Co., Cincinnati, Ohio, has just been issued from the press and is now being distributed among the trade. It is known as "Catalog H," consists of 166 pages, is profusely illustrated and the matter arranged in a way to prove of interest and value not only to the sheet metal contractor, but also to architects and builders generally. The point is made that the company controls its product from the raw material to the sheet, operating its own steel plant, rolling mills, galvanizing works and roofing factories, thus insuring economy in the cost of production, which is shared by customers in the prices offered by the company. In connection with the various goods illustrated is to be found brief descriptive letter press covering the salient features, as well as numbers, sizes, etc. Not the least interesting feature are instructions for laying corrugated roofing and siding, with directions for ordering corrugated arches. Reference is made to corrugated and V-crimp roofing, beaded ceiling and siding, weather boarding, corners and pilasters, and shingles of various design which are furnished painted and galvanized; wall ties, portable garages and houses, barn ventilators, conductor pipe, eaves trough, etc., etc. There are also numerous tables which will be found valuable in this connection. Suggestions are given for ordering roofing, and there are rules of measurement used in selling sheet metal building materials on which quotations are based.

Stanley's Carpenter's Plumb and Level

There has recently been placed upon the market by the Stanley Rule & Level Company, New Britain, Conn., an aluminum level, which, while designed especially for the use of carpenters is of a nature to appeal to any other mechanic having occasion to use a tool of this description, a general view of which is shown in Fig. 8.

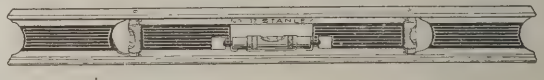


Fig. 8—Stanley's Carpenter's Plumb and Level

The levels have tops and bottoms that are milled and are ground to insure two perfectly parallel surfaces, and the level glasses are located between these two surfaces. The company points out that this is a distinct advantage, as the tool can be used to level by placing the bottom on the work in the ordinary way, or the top under the work as required in leveling ceiling beams, girders, etc. The glasses are what are known as "proved," and are set in metal cases, which rest at each end on a support cast in the frame of the level. The cases are held on the supports by means of eccentric cone centers at each end, having screw adjustment. Both the plumb and level glasses are completely protected, this protection consisting of a metal shell or cover, which is termed by the makers "Eclipse Case," which can be turned so as to entirely cover the glass when the level is not in use. The tool is made in three lengths, the shortest being 12 in. and the longest 24 in.

Lumina Solid Steel Windows

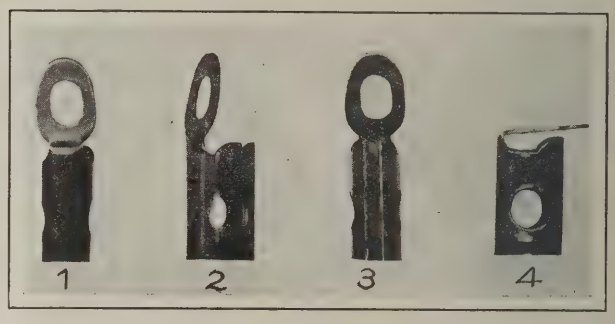
An attractive publication of forty-eight pages, profusely illustrated with line engravings and handsome half tones, and relating to the subject indicated by the above title, is being distributed among architects and builders by the Detroit Steel Products Company, Detroit, Mich. The merits of Lumina are set forth in convincing style, special reference being made to the maximum amount of natural light furnished by windows of the character indicated, also to their protection against fire and to the excellent ventilation afforded by their use. Ventilators are designed so that they can be operated at any point in the sash to meet the special requirements of a building, use being made of a chain and spring catch, or a notched stay and cam latch. Every bar of the Lumina windows

(*Continued on page 86*)

shows in cross-section that it is solid throughout and not "built up," "assembled" or "wired" together under pressure. The windows are made from bars which run continuously from jamb to jamb, and from head to sill. These bars are interlocked by the patent Lumina joint, which adds strength at the point of intersection. The recesses for fitting the glass are unusually deep, thus giving the sash a good weathering body of putty.

The Furr-Easy Post

One of the most perplexing problems since the advent of the use of stucco on the exterior walls of buildings has been the cracking of the surface, and both the architect and the builder have endeavored in many



The Furr-Easy Post—Fig. 9.—Various Views of the Device

ways to overcome this difficulty. Various expedients have been adopted from time to time dealing both with the mixtures of stucco and with the method of application. Metal lath has been a popular form of base to which to attach the exterior coating of stucco, and various forms of this material have been brought out having this special object in view. It is a well known fact that where metal lath is thoroughly embedded in cement or lime mortar that the life of the lath is equal to that of the building in connection with which it is used. In order to overcome the difficulties which have been encountered, there has recently been placed upon the market what is known as Furr-Easy posts,

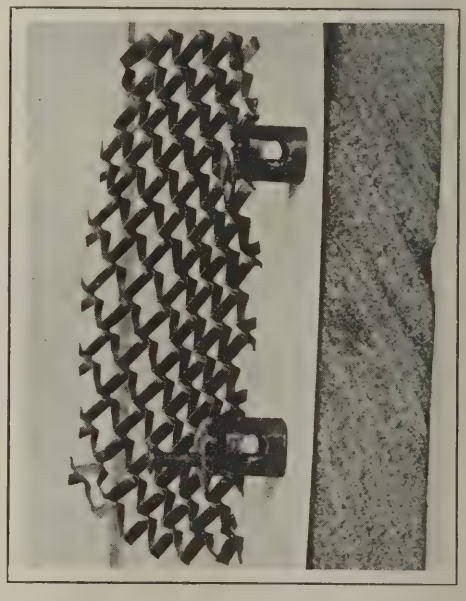


Fig. 10—Showing the Manner in Which the Posts Are Used in Connection with Metal Lath

made from metal formed of various lengths to suit the requirements of the user, their general appearance being indicated in Fig. 9 of the illustrations. In its application the post is inserted through the openings of the metal or wire lath, the lip is turned down over the strand and the nail of whatever length desired is driven through the hole in the flap, thereby producing a positive fastening and holding the lath rigidly in

(*Continued on page* 88)

place; at the same time it produces a smooth and even surface. The post is open at the back and sides, thus allowing plaster to enter and fill the interior for protection. In the halftone engraving No. 1 is a front view; No. 2 a side view; No. 3 the back of the device with the lip or flap turned up, in which shape they are marketed, while No. 4 represents the flap down as it will appear when in place. By the use of the Furr-Easy post the lath is rigidly fastened and back plastered, being thoroughly covered and embedded with equal thicknesses in an unbroken surface throughout, therefore, acting in unison during expansion and contraction. This post has been brought out by the Wagner-Behm Co., 20 East Jackson Boulevard, Chicago, Ill., who makes the statement that a 26-gage lath can be thoroughly fastened, stiff and rigid, for application of mortar with twelve Furr-Easy posts per square yard. In Fig. 10 is a perspective view of a piece of metal lath fastened with Furr-Easy posts to a stud or beam. The lower post shows the nail partially driven home, while the upper post shows the nail fully driven into place. The point is made that this post is an excellent device for semi-fireproof construction where it is desired to furr the lath on wooden beams or joists, and on the inside and exterior walls for the purpose of providing an unobstructed air circulation. The point is also made that the Furr-Easy post is an ideal device for use in connection with the "over-coating" of old wooden, stone and brick buildings when the stucco is applied to expanded metal or wire lath. The device is also serviceable as a fastening and spacer in the construction of concrete floor slabs, etc., where mesh reinforcement or light rods are used.

Success of Interior Decorations

The color scheme of the rooms in which we live and work has an important bearing upon our health, happiness and efficiency. While discerning owners and builders have long recognized this, still they have had more or less difficulty in determining just what colors or combinations of colors would give most pleasing and artistic results. Then, too, dealers have not always been in position to offer advice, although fully realizing the advantages this knowledge would give them. To enable every dealer in Berger's "Classik" Steel Ceilings and Sidewalls to give real helpful suggestions to his customers regarding their decorative problems, the Berger Mfg. Co. of Canton, Ohio, has prepared a brief monograph entitled "Decorative Suggestions," in which the essentials of successful indoor decoration are set forth in clear, non-technical language which anyone can readily understand and apply to his particular problems. Any reader of *The Building Age* who is interested in this subject may secure a copy of "Decorative Suggestions" by writing The Berger Mfg. Co. at Canton, Ohio, and mentioning this publication.

TRADE NOTES

The United States Government Bureau of Standards has recently completed a series of exhaustive tests of heat insulators in which Cabot's quilt showed results meriting the serious attention of all interested in the subject. As regards the specific conductivity of the various materials tested, it was shown that Cabot's quilt proved the most effective, indicating as it did a smaller leakage of British thermal units than any of the other materials. The table of results shows samples of insulating material tested to include corkboard; Cabot's car quilt; car lining, Balsa wood plaster No. 100 and Sil-o-cell.

Allmetal Weatherstrip Company, 224 West Madison Street, Chicago, Ill., in calling attention to the fact that the season will soon be at hand when windows and doors will have to be fitted for protection against the blasts of winter, points out that its Allmetal weather-strips are easy to install, that there is nothing complicated about them, and that they are noiseless, easy-running, and permit window sash to be instantly removed for repairs,

(*Continued on page* 90)

when necessary. These weatherstrips are of especial interest to the wide-awake and enterprising carpenter-contractor and builder, as they constitute a business in themselves, and the pattern used is such as to instantly command the favor of the house owner.

The Heppes Company, 1011 South Kilbourne Avenue, Chicago, Ill., has recently been furnishing free to contractors, carpenters and builders complete displays of its Flex-A-Tile "Giant" asphalt shingles, its "Standard" Flex-A-Tiles, its Dreadnought and Flex-A-Tile roll roofing, as well as its Utility board in grained wood finishes, together with its other guaranteed asphalt products. A Wisconsin contractor recently stated that the display of asphalt shingles in his office, coupled with the fact that he had laid several roofs with Flex-A-Tile "Giant" asphalt shingles to which he could point as visible evidences of his workmanship, opened the way for four new jobs.

N. G. Hanery, Crooksville, Ohio, who was recently engaged in the general contracting business, is desirous of securing catalogs from manufacturers of fire proofing materials. He is also interested in information regarding terra-cotta work. Mr. Hanery was recently awarded the contract for $40,000 public school building to be erected at Radnor, Ohio.

The last issue of *DooR-Ways*, the house organ of the Richards-Wilcox Mfg. Company, Aurora, Ill., has as its leading feature an article entitled, "Safeguarding the Elevator Passengers," which it is pointed out is accomplished through the use of the R-W ideal elevator door closer and check. This device closes the door rapidly when released and checks it when beyond the danger point, bringing to full close noiselessly and without slamming. There are comments on the economical advantages of slide versus swinging doors and reference is also made to the line of garage door equipment which the company is prepared to furnish.

(*Continued on page* 92)

The Roberd's Mfg. Co., 101 Railroad Avenue, Marion, Ind., is directing special attention to its wallboard having a new oak finish. The statement is made that this finish is not pasted on, nor is it in any way a mechanical or imitation design of oak, but rather an exact reproduction of the genuine wood so perfect that the skilled observer cannot detect it. This oak wall-board is produced by an exclusive process, controlled by the company, and is furnished in 42-in. and 48-in. widths.

J. Hardin Company, 4543 Cottagegrove Avenue, Chicago, Ill., is offering to send to the readers of THE BUILDING AGE a free copy of a book referring to complete heating plants as well as heating goods of every description, bathroom outfits, sinks, water pressure systems and lighting plants, which cannot fail to prove interesting. The work is known as Catalog No. 43-A, and the statement is made that any man handy with tools can install the goods by means of the plans furnished by the company.

Asphalt Publicity Bureau, 854 Market Building, Chicago, Ill., is sending out an interesting little work entitled "The Roof Distinctive," which contains a great deal of information relative to the advantages of asphalt shingles, their long life, beauty and fire resisting qualities. A coupon in another part of this issue properly filled out with name and address, and sent to the Bureau, will bring a copy of the book in question free of charge.

SALESMEN WANTED—I want a representative in every village and city of 1500 population and over, for the sale and installation of my "OutofSite" Beds. Concealed as perfectly as desired in new or old construction. Takes 20 inches floor space, use any standard spring and mattress and guaranteed a life time. Carpenters, builders or those connected with the building trades preferred. Apply to Morgan Rundel, Mfgr., Detroit, Mich.

TABLE OF CONTENTS FOR OCTOBER, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, OCTOBER, 1915

A Tile Cottage with Shingle Roof

A Unique Arrangement of Rooms — Stucco Exterior — Work Done Under Separate Contracts—Cost About $5,000

By Charles E. Anderson

AN interesting example of the use of hollow tile in cottage construction is found in the dwelling which constitutes the basis of the present article. The foundations are built of 12-in. hollow tile and the first story walls of 8-in. tile. A little above the floor line the exterior surface is broken by what might properly be termed a belt course of brick set on end and extending entirely around the house and porch. The same kind of brick are used in the porch piers.

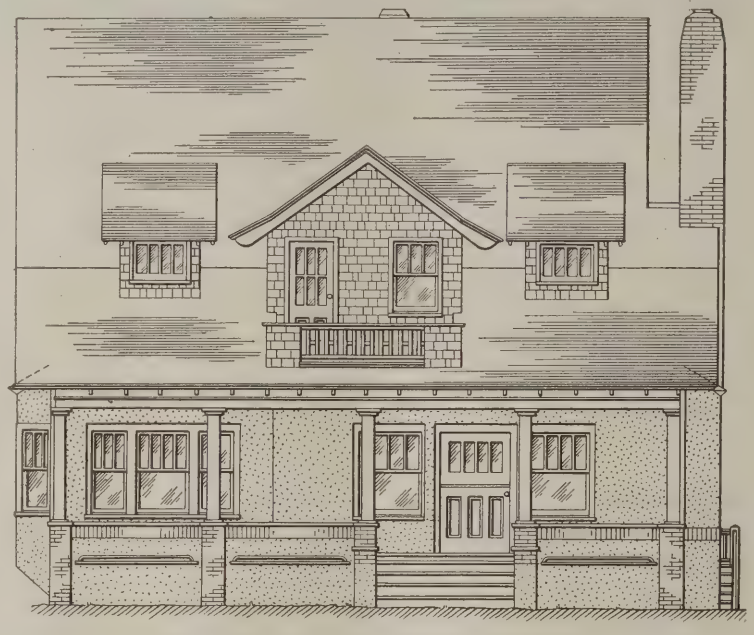
The gable ends forming the second story, as well as the front and sides of the attractive dormer which pierces the roof, are covered with red cedar shingles. The roofs are covered with asbestos shingles. The exterior trim is cream colored, which harmonizes with the tint of the "rough cast" stucco

Hollow Tile Cottage of A. H. Magee at Atlantic Highlands—Architect L. Jerome Aimar, Navesink, N. J.

and with the asbestos shingles covering the roof.

The porch is 5 ft. in width across the front of the house and 12½ ft. wide, and 15 ft. deep at the corner.

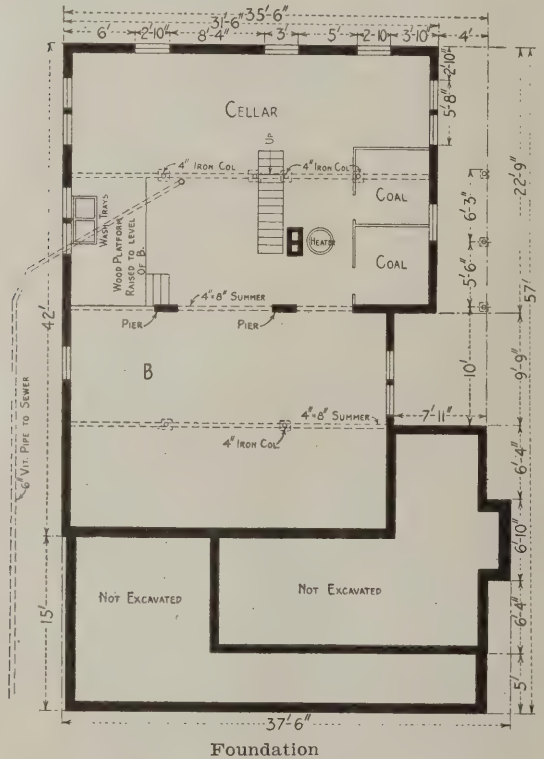
An inspection of the floor plan shows that the entrance to the living-room is directly from the porch—no vestibule being provided. The striking feature of this apartment is the massive open fireplace at the extreme right hand end, this being 8 ft. in width and extending to the ceiling, as shown in one of the pictures accompanying this article. The work is done in rough brick laid with wide joints in dark mortar. Sections of the brickwork are corbelled out to carry the shelf, which is stained dark. Above the shelf the front row of brickwork slopes in from each side toward the ceiling, while the second row is run up square, as an inspection of the picture will show. The hearth is also of brick and is raised several inches from the floor. The fireplace is lined with firebrick and provided with an ash damper connecting with a clean-out in the cellar, through which the hearth may be cleaned.



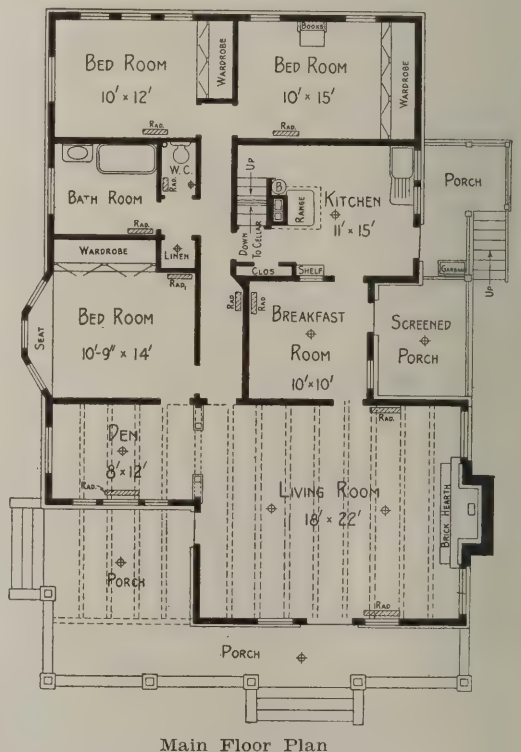
Front Elevation—Scale, 3/32 In. to the Foot

Each side of the fireplace a window, 4 ft. wide by 2 ft. 8 in. high, is set well up in the wall. The side casings on these windows, as on the others in this room, run from floor to ceiling, the top casing and apron being cut in between in Craftsman style. To the left of the fireplace a window, not shown on the plan, looks out upon a screened porch, and helps to light the room by letting in the afternoon sun. Beneath this window, and across the end of the room to the fireplace, is a built-in seat of cypress to match the other trim and is stained "English Oak" with Bridgeport Penetrating Stains and Wax Finish. In the front wall there is a window on each side of the front door.

The ceiling is finished with beam effect, the ceiling being first covered with tongued, grooved and center-beaded North Carolina Pine ceiling boards, and the beams, 4 in. deep and 7 in. wide, put on over them. At the easterly end of the room a door opens onto the porch. Off this end of the room there is also a den, 12 ft. x 8 ft. 9 in., trimmed to match the living room. A window 4 ft. wide and 3 ft. high looks out upon the lawn and opening on the porch there is a triple window 4 ft. 10 in. high, with a center section 3 ft. wide and two others 2 ft. wide. Between the living-room and den is a columned opening. Between the square columns



Foundation



Main Floor Plan

A Tile Cottage with Asbestos Shingle Roof—Floor Plans—Scale 1/16 In. to the Foot

and the walls on each side of the opening are book shelves about 3 ft. high.

To the rear of the living room on the westerly side of the house is a breakfast room about 10 ft. square, and also used as the dining room. This is finished in white enamel and in one corner has a cabinet with glass doors for holding dishes. There is a door opening from this room upon the screened porch and also one opening into the kitchen. The latter is finished in white enamel, and fitted with porcelain enameled sink with drain board and a Garland gas stove. There is also a gas water heater. In one corner of the room is a dish closet. The kitchen is well lighted by a double window. There is a door opening upon the kitchen porch and also one leading from the kitchen to the hall, the wall next to the door. There is a built-in receptacle for soiled linen. The toilet is entirely separated from the bathroom by a partition and is reached by an independent door.

Stairs lead from the kitchen to the second floor, where the maid's room is located. There is space for another bedroom across the hall from the maid's room, as well as for a large front room with a door opening upon the small balcony in front, if such should be found necessary. This room is lighted on each side by two windows which are part of a row of four. In front there is a window beside the door in the central dormer and light is also received from the two smaller dormers.

The rear portion of the cellar is partitioned off with hollow tile and is used as a laundry, which is

A Tile Cottage with Asbestos Shingle Roof—View in the Living Room Looking into the "Den"—Door to the Porch Is Shown at the Left and the Hall Door at the Right

which communicates with the front and rear of the house.

The main bedroom is at the front of the hall, just back of the den, and lighted by three windows set in a bay. The trim in this room is finished in white enamel. At one side of the room is a wardrobe, with two large doors, one being fitted with a full length mirror. Beneath the wardrobe are two drawers. Between the end of the wardrobe and the wall there is a niche in which a dresser can be placed. The other bedrooms are finished in the same manner, each having a wardrobe and being well lighted by two or more windows.

The bathroom is fitted with porcelain enameled tub and lavatory, and a medicine cabinet is built on

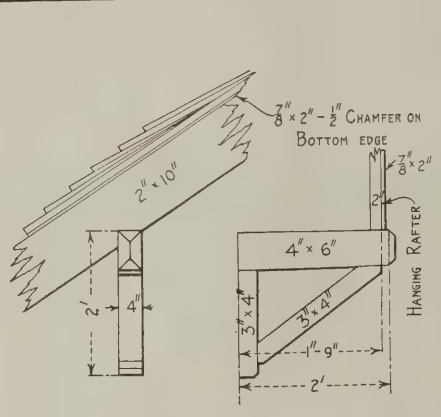
fitted with two sets of two-part washtubs made of cement. In this portion of the cellar is also the heating plant, consisting of a Richardson & Boynton water boiler.

In the general construction of the building the following sized spruce timbers were used: wall plates, 2 in. x 6 in. secured to the walls by bolts; partition and other plates, 2 in. x 4 in. doubled; studding, 2 in. x 4 in. doubled at openings; summer beams or girders, 4 in. x 8 in.; first floor joists, 2 in. x 10 in. doubled under partitions; second floor joists, 2 in. x 8 in. placed 16 in. on centers; collar beams, 2 in. x 6 in. placed 24 in. on centers, and spiked to each rafter; porch beams, 2 in. x 8 in. placed 20 in. on centers; main rafters, 2 in. x 6 in.;

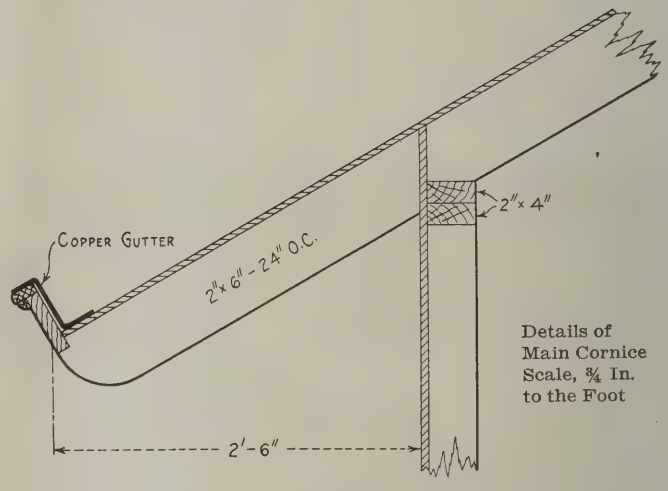
dormer and side porch rafters, 2 in. x 4 in. placed 24 in. on centers; hanging rafters, 2 in. x 10 in. spruce, dressed; porch sills, 2 in. x 8 in. doubled; and outlooks, 2 in. x 6 in.

Each tier of floor beams has a row of bridging cut through the center of each span. The floor beams are framed with their crowning edges up and are sized over plates and other timbers. All partitions running at right angles to beams under them have 2-in. shoes under and 2-in. plates over, the plates being doubled for all principal partitions with 7/8-in. cypress narrow center-beaded matched boards turned face downward.

At the gable projections the roof sheathing is cut on centers of outside pair of rafters and the overhangs ceiled horizontally with center-beaded ceiling laid face downward. A 7/8-in. fillet is cut in with chamfered bottom edges, the motive being to eliminate machine worked moldings where possible. The finish of eaves, where they return on the sides of the building, is a plain 7/8 in. x 2 in. strip, over which the shingles project 1 in. The



Details of Gable Brackets—Scale, 3/8 In. to the Foot



Details of Main Cornice Scale, 3/4 In. to the Foot

Side (Right) Elevation—Scale, 3/32 In. to the Foot

Elevation and Miscellaneous Constructive Details of a Tile Cottage with Asbestos Shingle Roof

carrying weight of floors above. The projecting rafter feet are of white pine, smoothly dressed.

The exterior of the second story including gables and dormers is sheathed with 7/8-in. North Carolina pine shiplap, laid horizontally. The roof is also sheathed with shiplap.

There are three brackets, made of dressed cypress, supporting the hanging rafters. The tops of the projecting rafter feet are ceiled over fascia around porches over columns is 8 in. deep with drip cap over, as shown.

The bay is sheathed and covered with metal lath and finished with stucco to correspond with the rest of the exterior.

The porches are ceiled overhead with 5/8-in. center beaded Southern pine, matched boards, with small moldings cut in the angles under ceilings.

The columns are solid, 8 in. square. The soffits

over them are of such widths as to finish flush with inside and outside faces of the columns, with ⅜-in. beads on each edge of same. They are secured to the cemented caps below with ⅞-in. bolts, set in the masonry.

All sliding window frames are made in the usual manner, provided with noiseless axle pulleys, pockets, parting strips, blind stops, etc. In the first story, which is of hollow tile, box frames are used. Outside door frames have hard wood sills and the jambs for the front door are of 2-in. stuff in order to provide a more stable support for it, as it is 4 ft. by 7, and of the type known as a "Dutch Door"—that is, divided in the center so that the top half may be opened without opening the lower half.

Each half of the front door is hung with two breakfast room is screened with lattice having 2-in. mesh. This is framed with ⅞ in. x 4 in. pine, with bottom rails 5¾ in. wide.

All roofs are covered with J-M Transite Asbestos Fire-Proof Shingles made by the H. W. Johns-Manville Co.. These are laid in the standard American method over slating felt, exposing 7 in. to the weather, starting with double courses and fastening each shingle with two galvanized iron roofing nails. The ridges are finished with ridge roll of asbestos shapes made for that purpose. Copper flashings are woven in up the sides of dormers and wherever necessary to make a tight job. The chimneys are flashed with copper, return copper flashings being provided at bottom corners of dormers and copper strips across the bottoms of same, the return flashings being set over these strips.

View in Living Room of Tile Cottage with Shingle Roof Looking Toward the Open Fireplace

3½ in. x 3½ in. loose pin ball tipped butts and has a good lock with brass face and striking plates, ball knobs, night latch attachment, and brass knocker to match. All other doors are hung with two 3½ in. x 3½ in. loose pin butts, and have mortise locks with elongated escutcheons, metal knobs and bright metal keys.

The front porch steps are of concrete, others being of wood. The porch floors are of Oregon fir.

A hole is provided in the side porch, with an inclosure built up around it about 2 ft. 6 in. high and finished with a cap. This is used as a garbage drop, and is provided with a hook in the ceiling for attaching a pulley and draw rope to raise and lower a garbage receptacle. The porch next the

The balcony is formed with shingled buttresses and railing between, made of 3 in. x 3 in. square stuff with cap intersecting that of the buttresses and finished in the same manner. Inside, the buttresses are ceiled vertically with ⅞-in. center beaded boards. The floor is white pine covered with 12-oz. duck. The door leading out to the balcony is placed above the interior floor and steps are provided inside up to it.

All sash except those of cellar are 1½ in. thick and glazed with first quality American sheet glass. The cellar sash are 1¼ in. thick, hung on top with steel butts. Bottom sash in the living-room, den and front bedroom are furnished with flush sash lifts in the bottom sash. All sash is of clear pine.

Sash in tops of gables are made to slide in the walls on the side and are stopped in a watertight manner. The single sash in the group on second floor is made to slide in the same manner. The single sash in living-room and rear bedroom have follow heads so that sash may be hung with cords and weights to slide up. All double hung sash are provided with Ive's sash fasteners.

The front door is of selected cypress to correspond with the interior doors, which are also of cypress, having five and six cross panels. The door to the bathroom has "Florentine" glass in the upper half.

The floors throughout the first story are of 7/8-in. shiplap laid diagonally, and covered with a finish floor of comb-grain Southern pine, 7/8 in. x 2 in. face, blind nailed. A border is formed of two strips of flooring around the living-room following the contour of the rooms and around the hearth. Inside this, a space 10 in. wide is laid diagonally and then three strips all around. Inside of this border the floor is laid in the usual manner. Floor molding is cut in around all finished rooms. The second floor is laid with No. 2 North Carolina pine matched boards, 7/8 in. x 3½ in.

The stairs are built with North Carolina pine, clear, 1⅛ in. thick. The risers are of selected cypress 7/8 in. thick and the stringers are also 7/8 in. cypress. Both treads and risers are housed into the strings, wedged and glued. Treads and risers are tongued and grooved together. The cellar stairs have 5/4-in. treads and 7/8-in. risers, all of spruce, and are supported on strong carriages with board rails down the side, supported by a post to the beams above.

The trim of all openings throughout the first story is of selected cypress, the casings being 5/8 in. x 4½ in. with plain faces and square edges. These casings run up from the top of the base to the skirt boards round the ceilings in the living-room and den, and head casings and aprons are cut in between the upright trim.

Over the columns in the opening between the living-room and den a wide head casing is used 7/8 in. thick to form entablature extending ½ in. above lower edges of cased beams so that the picture molding covers the joint between the casing and skirt board. The windows have plain square edged stools with the sharp edges slightly beveled off.

The cased beams have perfectly plain soffits and sides. Skirt boards 7/8 in. thick and the exact depth of the beams are run around the sides of these rooms up against the ceilings and cut in against the sides of the beams. Strips of proper widths are nailed to the ceiling for fastening the beams to. A 5/8-in. molding is run at the intersection of the beams and skirt board with the ceiling. The shelf or buttress under the columns is 1⅜ in. thick and 8 in. wide. The columns are 6 in. square, solid, with square blocks under and over, with small plain faced moldings broken around tops and bottoms. The base around room is 6¾ in. high, perfectly plain, 7/8 in. thick and beveled to a 45 deg. slope on top. The trim in other rooms is similar except that the upright casings are not carried to ceiling, but start from apron and miter around heads of openings.

The linen closet has three drawers full width below and five shelves above, the shelves being the full width and depth of the closet.

The floor of the bathroom is tiled, a rough floor being cut in 2 in. below the tops of the beams supported by 1 in. x 2 in. strips nailed to them and covered with concrete on which the tile is laid.

This cottage is located in the Borough of Atlantic Highlands, N. J., and was built for Alfred H. Magee in accordance with plans drawn by Architect L. Jerome Aimar of Navesink, N. J. The different classes of work were done under separate contracts and cost about $5,000.

Six Months Tenement Building in New Jersey

According to statistics which have just been compiled the number of homes erected in New Jersey during the first six months of the current year varies little in number and value from that of the corresponding period of last year. All dwellings and apartments housing three or more families are designated as "tenement houses" in New Jersey and are built under a law controlling their erection in every portion of the State. During the first six months of the current year 419 tenement houses, having accommodations for 3217 families and 16,085 persons, and costing $5,291,000, were erected under the direction of the State Board of Tenement House Supervision, which is a body charged with the enforcement of the State law. The accompanying table, furnished by Miles W. Beemer, Tenement House Commissioner, shows the number and cost of new buildings erected from Jan. 1 to July 1 of the current year.

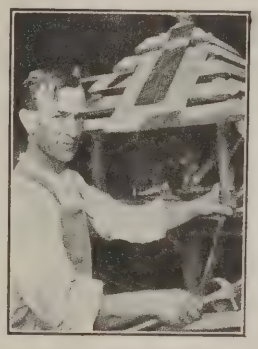
Location	Buildings	Cost
Arlington	2	$22,000
Atlantic City	6	106,000
Bayonne	8	110,000
Belleville	1	10,000
Bloomfield	2	10,000
Bound Brook	1	8,000
Cliffside Park	1	9,000
Clifton	4	23,000
East Orange	18	309,000
East Rutherford	1	12,000
Edgewater	1	30,000
Elizabeth	4	22,000
Englewood	1	13,000
Garfield	4	25,000
Guttenberg	2	18,000
Grantwood	1	10,000
Harrison	4	24,000
Irvington	10	58,000
Jersey City	118	1,530,000
Kearny	6	52,000
Lodi	3	16,000
Montclair	9	177,000
Newark	111	1,211,000
North Bergen	8	147,000
Nutley	3	28,000
Ocean City	1	17,000
Orange	4	48,000
Passaic	5	106,000
Paterson	13	130,000
Perth Amboy	1	7,000
Phillipsburg	1	22,000
Plainfield	1	45,000
Pleasantville	1	18,000
Roselle Borough	2	18,000
Shady Side	1	6,000
South Orange	1	50,000
Summit	3	11,000
Town of Union	8	158,000
Wellington	1	5,000
West Hoboken	10	106,000
West New York	30	487,000
West Orange	6	68,000
Woodcliff	1	9,000
Total	419	$5,291,000

Another phase of the activities of the Tenement House Board is its supervision over the sanitary condition of tenements and the correction of abuses of this nature insuring healthful surroundings for tenants. The extent of this work is indicated by the fact that the violations in old buildings which were removed aggregated 31,598.

A Garage of Unique Conception

How a Steep Embankment Was Utilized for the Housing of a Suburbanite's Motor Cars

A STRUCTURE which well illustrates the pleasing effects that may be produced by a combination of wood and cement and which at the same time made use of a steep embankment as the site for its location, is the woodcraft garage shown in the picture upon this page. The steep embankment was excavated back into the hill for a distance of 32 ft. with a width of 30 ft., after which reinforced concrete walls 12 in. thick were erected and a cement flooring was laid. The double doors are of hewn oak plank, with hammered bronze hinges which give an ancient effect that tapers to 4 ft. at the far end, where the drive meets the highways. There is no retaining wall on the lower side of the garage or its approach.



MR. KUERTZ AT WORK

The point is made that this structure cost but very little more to build in such a location than would be the case with one entirely of frame. On the other hand, it is probable that one entirely of wood could not have been built upon the embankment in question, while the combination of the cement and wood structure solves the problem in a most unique and rustic manner. It clearly demonstrates how a useless

A Garage of Unique Conception—Built by Louis Kuertz of Hazelwood, Ohio

combines admirably with the woodcraft idea. The flat roof of the garage is covered with tile and is on a level with the surface of the lot upon which the owner's residence stands. A substantial fence of cedar in woodcraft design completes with its rustic furniture an attractive little roof garden where family gatherings may be held.

The concrete retaining wall on the upper side of the garage is 15 ft. high at the building and space upon many a suburban lot might be made to serve a useful purpose.

The builder of this woodcraft garage was Louis Kuertz of Hazelwood, a little village not far from Cincinnati. The small picture at the beginning of this article represents Mr. Kuertz at work upon one of the many forms of woodcraft in which he specializes. He was reared close to nature and when a boy of fourteen years was making little

homes for squirrels and birds with true craftsman skill from material he gathered in the woods. His love for the wild has developed much cleverness along the lines indicated and the results of it can be found in the homes of wealthy Cincinnatians who have engaged him from time to time to construct woodcraft mantels, log cabins, etc., some examples of the latter of which appeared in these columns not long since.

Bonds in Brick Work

Much attention is now being given by architects to brickwork and this is noticeable in nearly every new house of architectural merit. Bricks with good texture and fine color tones, and bonds that make a pattern in the wall are employed. Less and less is being seen in new work of the old-style "running bond," or the representatives of it that house painters used to block out with red and white paint. In *House and Garden* of recent date, Harold Donaldson Eberlien describes several of the bonds that are now employed. He says the most common bonds, in fact almost the only one employed during a great part of the nineteenth century, is the running bond, in which all the courses are composed of "stretchers," that is to say, brick laid lengthwise, the only "headers" or endwise brick visible being at the window jambs, at the starting of piers and pilasters and in straight header courses at more or less frequent intervals where their use is made obligatory by the local building laws to tie the face-wall to the backing. Each course breaks joints vertically with the courses immediately above and below. Running bond is perhaps the simplest and certainly the least interesting and artistic way of laying brick and has little to commend it except considerations of economy.

The Flemish Bond

The Flemish bond, in which every course consists of alternate headers and stretchers is, after the running bond, the one we most commonly meet with, having been generally used in our brick buildings of Colonial date, in which the black header and red stretcher effect is so often noticeable. Flemish bond is constructionally honest, artistic, and satisfying, and its almost universal employment in modern building of Colonial style cannot be too strongly commended.

The double-stretcher Flemish bond which, as its name denotes, consists of two stretchers together, followed by a single header in all courses, the headers being laid above the joints between the two stretchers in the course next below. It is coming more and more into vogue in America and has been used in some of our largest buildings with signal success.

Use of Colored Mortar

For the vertical joints between the contiguous stretchers, mortar colored to exactly match the brick is often used, thus making a blind joint and giving the effect of one double-length stretcher. The use of double-stretcher Flemish bond sets a big-broad scale and can be employed to advantage in large wall surfaces, particularly where it is desired to take off somewhat from the appearance of height, as the strongly marked horizontal lines have that effect. This feature can be further emphasized by slightly increasing the thickness of the horizontal mortar joints.

The English Bond

English bond and Dutch cross bond, like both the single-stretcher and double-stretcher Flemish bond are replete with artistic feeling and deserve to be far more widely known and used than they now are in America. Not only are they essentially artistic but they are strong and honest in structure. Both English bond and Dutch cross bond have alternate courses, the one wholly of stretchers and the next wholly of headers, but in the English bond the stretchers of all the courses come directly above each other while in the Dutch cross bond the stretchers of the first and fifth courses break joints with the stretchers of the third and seventh courses respectively and thus throughout, giving a diagonally diapered appearance if the mortar joints and the hue of the brick be judiciously contrasted.

The bonds mentioned are the most usual kinds, but one also meets with special adaptations of recognized types; it is, however, quite sufficient for general purposes to remember the five enumerated. In fact, many people, who are supposed to have some knowledge of such matters, have difficulty in keeping the differences clearly in mind and generally fall down in trying to describe them.

Construction of Terrazzo Floors

Terrazzo is made by spreading upon the base concrete a mixture of neat cement and marble chips and grinding the surface to a depth sufficient to cut into stones and expose them on their largest diameters. Marble, sometimes white and sometimes colored, is used, and since no sand is employed the particles may be of fairly uniform size. The joints between the particles being of neat cement are hard, and even more durable than the pieces of the marble themselves.

Large pieces of marble, from ¾ in. to 1 in. in diameter, give a more distinctive floor, but cost more than a floor of the smaller stones, from ⅛ in. to ½ in. in diameter, because the large stones require much more grinding to get down to the large diameters of the particles, says Sanford E. Thompson. There is more tendency to crack than in a good granolithic properly bonded to the base, but if laid with the best workmanship, this cracking is reduced to a minimum. Terrazzo is largely used, especially in the newer office buildings and in institutions, for corridors and halls. It also is satisfactory for lavatories, although more expensive than granolithic.

It appears from our investigation that for both of these uses concrete with a ground surface can be substituted at less cost and with satisfactory results. In certain cases objection—which applies also to any hard material like granolithic or tile—is raised to terrazzo because of the noise, and often corridors are covered with linoleum or similar material to soften the footsteps.

Brick Schoolhouse at Pickens, Miss.

A Four-Room Structure with a Seating Capacity for 160 Pupils—Some Interesting Details of Construction

SCHOOLHOUSE construction and arrangement are always attractive topics for discussion by many of our readers more especially where the subject involves structures well adapted for erection in the smaller cities and towns as well as in the rural districts of the country. In the example of schoolhouse architecture here presented, there is illustrated and described a four-room building designed to meet the requirements of a southern city. It is of brick, two stories in height, and with a seating capacity of forty pupils to each room. The floor plans clearly indicate the general arrangement of the interior of the building together with the location of cloak room, closets, platforms, cold air registers, etc., while the halftone engravings show the appearance, front and rear of the finished structure. The interior carries an excellent idea of the arrangement of desks and the ample illumination, while the numerous details afford an idea of the method of construction.

Brick Schoolhouse at Pickens, Miss.—Architect, Emmett J. Hull, Jackson, Miss.

The main walls as stated are of brick 13 in. thick resting on concrete footings 12 in. by 2 ft. 6 in., the concrete consisting of one part cement, three parts sand and five parts clean, wash gravel. The brick is dark red in color, laid up in ½ in. gray mortar joints. The north wall or front elevation has a course of headers every sixth course, tieing the face brick to the courses behind. In the side and rear walls of the building metal wall ties are substituted, thus making all stretcher courses in these walls.

The roof is covered with cypress shingles 5 in. wide and laid 4½ in. to the weather. Before laying the shingles were dipped two-thirds their length in Cabot's creosote shingle stain. The roof is well ventilated by means of louvers in the gable and dormers as shown. The window sills are of brick laid in cement mortar.

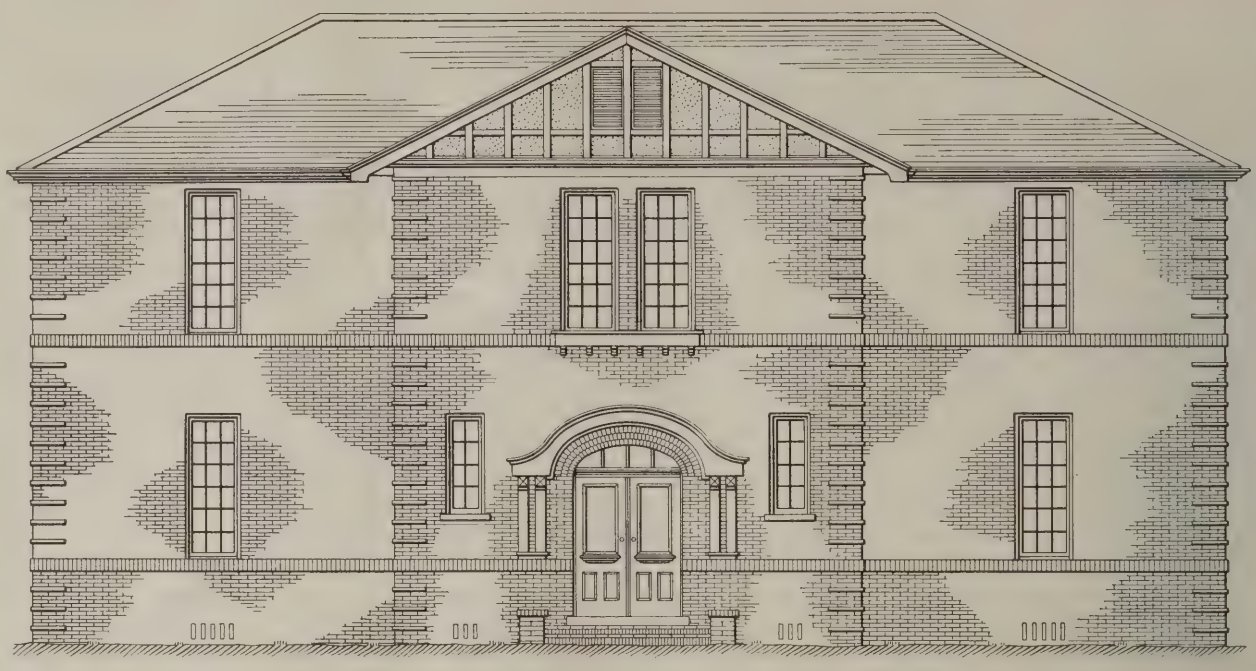
The large chimney clearly shown in the rear elevation has four smoke and four ventilating flues, each of which is 8 by 8 in.

All brick walls just above grade are provided with a damp course consisting of tarred felt, laid in hot pitch.

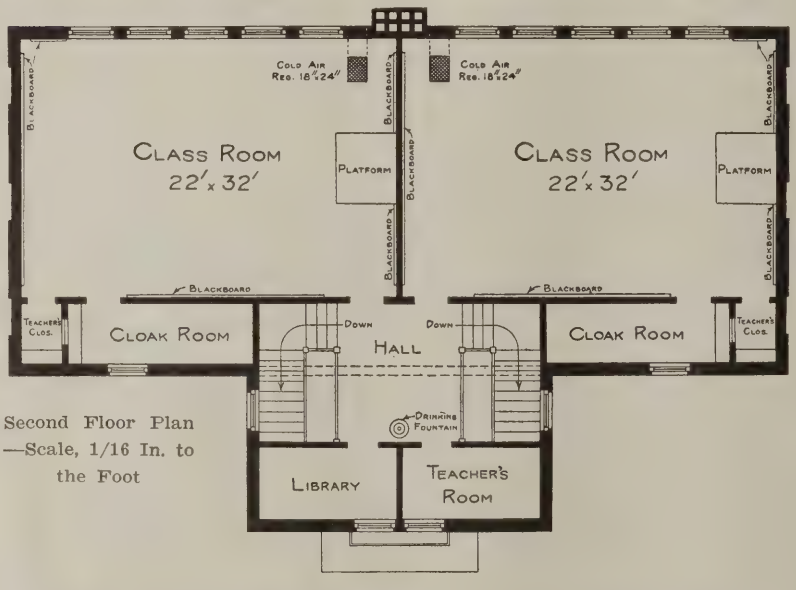
It may not be without interest to state that the mortar used in the construction of all brick work was composed of one part fresh burnt Alabama lime and four parts clean sharp sand to which was added 2½ sacks of Portland cement to 1000 bricks.

All walls and ceilings are plastered with patent hard wall plaster—three coats—finished white as the light is from the north in all classrooms.

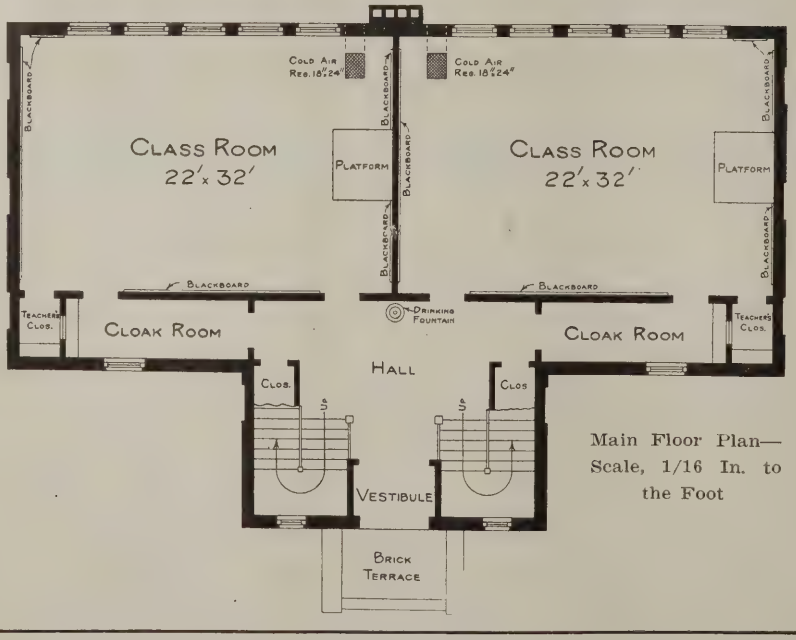
The joists of the second floor are anchored to the



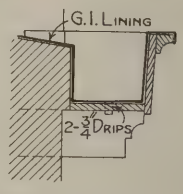
Front Eevation of the School Building—Scale 3/32 In. to the Foot



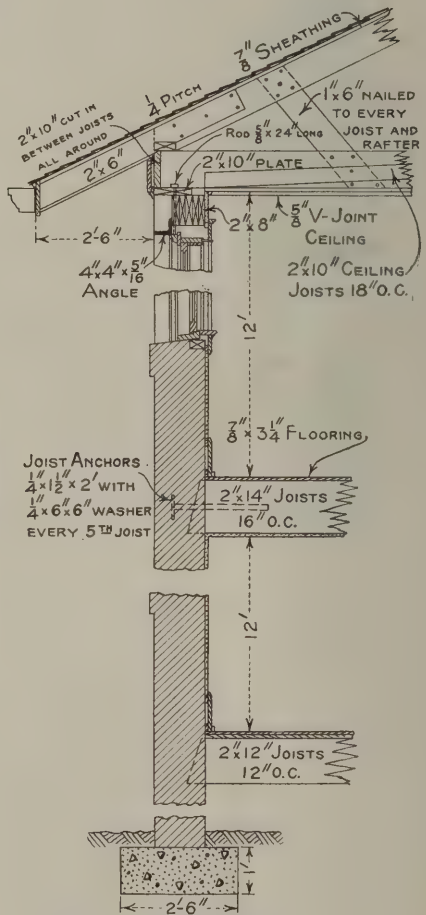
Second Floor Plan —Scale, 1/16 In. to the Foot



Main Floor Plan— Scale, 1/16 In. to the Foot



Detail of Window Box—Scale, ½ In. to the Foot



Section Through Main Wall and Cornice—Scale, ¼ In. to the Foot

Plans, Elevation and Miscellaneous Constructive Details of Brick Schoolhouse at Pickens, Miss.

exterior walls with ¼ x 1½ in. wrought iron anchors 2 ft. in length securely attached to every fifth joist. The anchors extend 8 in. into the walls and are made secure with ¼ x 6 x 6 in. washers.

All framing lumber used throughout the building is No. 1 common yellow pine. The joists for the first floor are 2 x 12 in. placed 12 in. on centers. The floor joists for the second story classrooms are 2 x 14 in. placed 16 in. on centers and for the stair hall they are 2 x 12 in. also placed 16 in. on centers. The second story ceiling joists are 2 x 10 in. placed 18 in. on centers and the rafters are 2 x 8 in. placed 18 in. on centers. Between all joists of 10 ft. span or more 1 x 3 in. cross bridging is used. For spans of 18 ft. or more 2 rows of bridging are used, and for spans of 24 ft. or more 3 rows are used.

The girder in the ceiling of the second story is 10 x 14 in. All framing partitions are built of 2 x 4 in. studs placed 16 in. on centers except the partitions of the classrooms which carry 2 x 14 in. joists on the second floor which are on 2 x 6 in. studs. The studs in the gable are 2 x 4 in. placed 16 in. on centers and the valley rafters are 2 x 12 in.

Every other rafter of the main portion of the building is braced to the ceiling just underneath with two 1 x 6 in. diagonal braces running to the center of the joist and nearly perpendicular to the rafter and one 2 x 4 in. tie at the center, thus forming a truss. The foot of every rafter is tied to the ceiling just below with a 1 x 6 in. brace as indicated in the detail of the cornice.

The subfloor of the classrooms in the first story is of ⅞ x 6 in. No. 2 common yellow pine boards laid diagonally. The finish floor of the first story as well as the second story floor, is of ⅞ x 3¼ in. "B" grade matched yellow pine flooring. The blackboards on the walls of the classrooms are 3 ft. 6 in. wide, 2 ft. 6 in. from the floor and are of composition material.

The doors throughout are of "A" grade yellow pine and all other millwork is of selected yellow pine. All inside door frames are double rabbeted and all windows are double hung. All sash throughout is 1¾ in. thick and hung on Silver Lake sash cord with iron weights. All windows throughout the building are glazed with American double strength "A" grade glass. The interior windows between cloakrooms and closets have 20 x 24 in. clear glass.

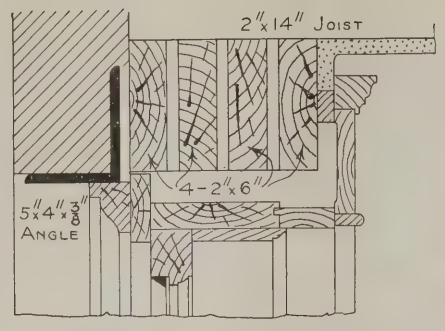
The two flights of stairs leading from the first to the second floors have three carriages of 2 in. lumber, treads 1¼ in. thick and risers ⅞ in. housed into the wall strings.

All exterior woodwork is primed with white lead and oil paint and finished with two coats of selected colors. All interior woodwork throughout except the floors is stained with Johnson's wood dye followed with one coat of wax.

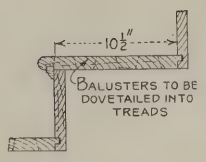
The gutters are of galvanized iron connected with four 5 in. conductor pipes which empty into 5 in. cast iron pipes 4 ft. long with the bottom end turned out and resting on the ground. The tin roof over the entrance and the flashing and the counterflashing around chimney is "Scott's extra coated" made by Follansbee Brothers Company.

The heating is by means of jacketed stoves placed over the cold air registers, the location of each being clearly shown on the floor plans, while the appearance of one of the heaters is shown in the interior view. The cold air is admitted by means of four galvanized iron ducts, the openings in the

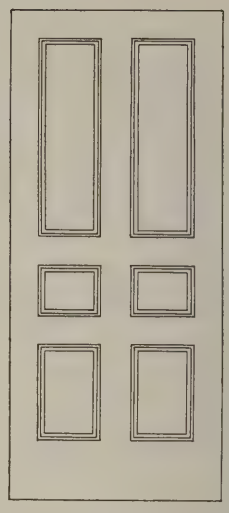
Interior View of Brick Schoolhouse at Pickens, Miss.—Architect, Emmett J. Hull, Jackson, Miss.



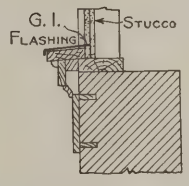
Detail of Window Head—Scale, 1½ In. to the Foot



Vertical Section Through Treads and Risers of Stairs—Scale ¾ In. to the Foot

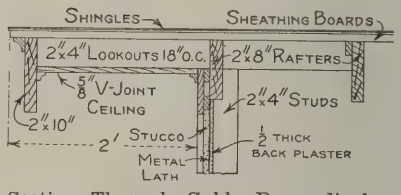


Detail of Interior Doors—Scale ⅜ In. to the Foot

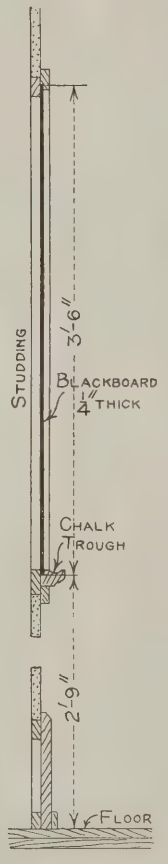


Detail of Wooden Course Under Gable—Scale, ½ In. to the Foot

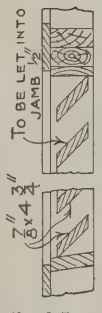
Half Profile of Hand Rail—Scale, 3 In. to the Foot



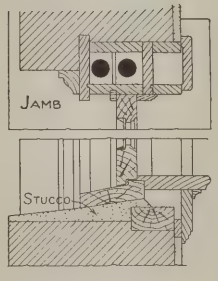
Section Through Gable Perpendicular to Pitch—Scale, ½ In. to the Foot



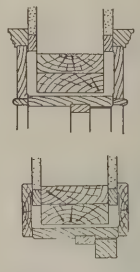
Detail of Blackboards—Scale, ½ In. to the Foot



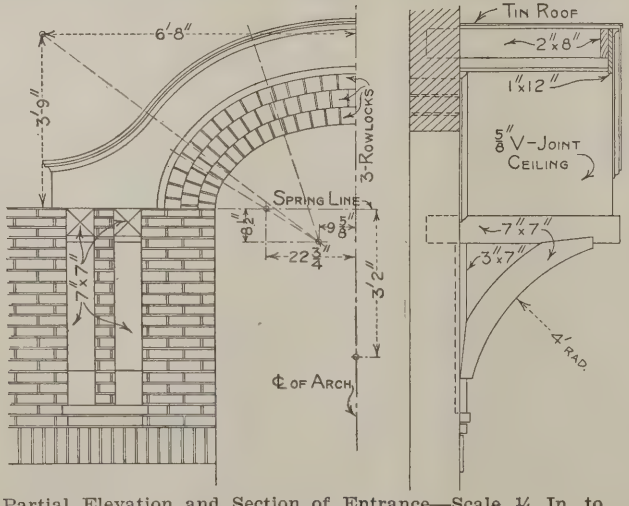
Detail of Louvre in Gable—Scale, ½ In. to the Foot



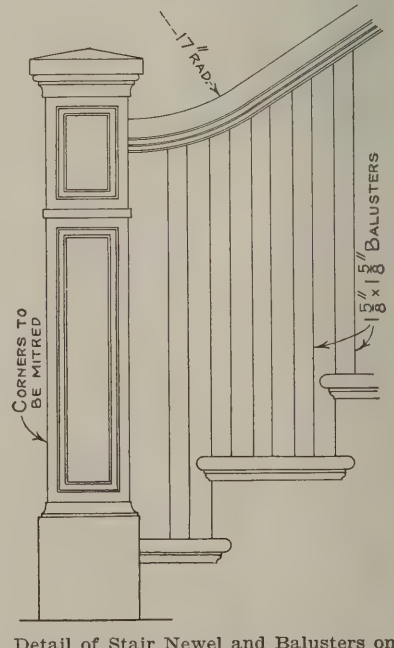
Details of Windows —Scale, ½ In. to the Foot



Detail of Doors—Scale, ¾ In. to the Foot



Partial Elevation and Section of Entrance—Scale ¼ In. to the Foot



Detail of Stair Newel and Balusters on First Floor—Scale, ¾ In to the Foot

Miscellaneous Constructive Details of Brick Schoolhouse at Pickens, Miss.

brick wall being 18 x 24 in. under the first floor and 18 x 18 in. under the second floor. The ducts are of the same sizes as the brick openings respectively and run under and connect with the floor registers shown on the plans. The floor registers are the regulation hot air type made of cast iron with dampers so as to control the cold air supply. The cold air enters through the intake and passes up between the stove and the metal jacket surrounding it, where it becomes heated and is discharged at a comfortable temperature through the room. The space between the stove and the metal jacket is about 6 in. and after the warm air rises to the ceiling it settles uniformly over the room furnishing a comfortable degree of warmth for the pupils in the farthest corner of the room as well as those in closer proximity to the stove. At the floor line there is a small register in the wall which serves as an outlet for the foul air that has become cool. This passes up alongside the smoke flue which being hot more or less heats the flue adjoining it, thus causing a gentle movement of air upward ventilating the rooms. The jacket around the stove protects the pupil close to it from too much heat while causing the distribution of heat to the distant parts of the room.

It may be of interest to state that the partition between the two classrooms on the second floor of the building may be of a "removable" type if so desired, thus throwing the two rooms into one and using the space as an auditorium or assembly hall as occasion may require.

The schoolhouse here described is located at Pickens, Miss., and was designed by architect Emmett J. Hull, Daniel Building, Jackson, Miss.

The contract was executed by W. G. Googin of Durant, Miss.

Rear View of Brick Schoolhouse at Pickens, Miss., Showing Window Exposure

Architects' Year Book

The New York Society of Architects has just issued from the press its official year book of 1915 containing a vast fund of information of special interest to architects, contractors and builders not only in and about Greater New York, but throughout the entire country. The idea has been to make the publication an authoritative handbook containing information which is required in the daily routine of an architect's office. It has therefore been arranged in such a manner as to constitute an excellent reference book of architecture and related subjects and in the present issue the endeavor of the committee has been to assemble all the laws relating to building and construction in the various boroughs of the greater city.

Much that is of value to the builder as well as to the architect are the provisions such as the state laws relating to plumbing; the state labor law in regard to factories; the state excise law relating to the construction of hotels; the sanitary code of the health department affecting the construction of buildings; the regulations of the fire department in relation to standpipes in fireproof buildings; the municipal explosives commission in regard to blasting; garage regulations; ordinances regulating courtyards; the rules and regulations of the bureau of buildings of the tenement house department, as well as the laws concerning factories and bakeries.

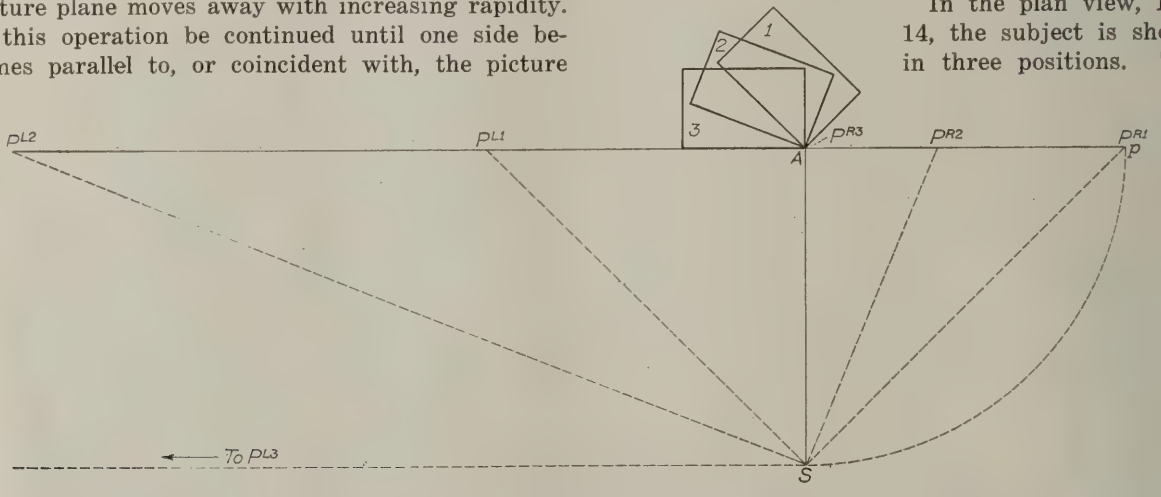
Elementary Perspective Drawing—VII

Principles Involved in What Is Known as "Parallel" or "One Point" Perspective—An Example

By George W. Kittredge*

IN introducing the subject of interior, or what is sometimes termed "parallel perspective," the student should understand that its methods involve no principles not already explained or which cannot be readily deduced from what has been told in connection with exterior representation. In proof of this let the reader turn back to Fig. 6, in which it was shown that as the building or subject to be represented is turned from a position in which its two sides make equal angles with the picture plane, the vanishing point of the side which is steadily approaching the picture plane moves away with increasing rapidity. If this operation be continued until one side becomes parallel to, or coincident with, the picture plane, then will there be but one vanishing point (if the subject be rectangular in plan) for the following reason: If, in accordance with the method of finding the vanishing points, explained in connection with Figs. 2 and 4, the observer, standing at the station point, turns so as to look in a direction parallel to the side of the object which has just been turned into coincidence with the picture plane, his line of vision can never penetrate the picture plane, because it will be parallel thereto; while, on the other hand, if he turns so as to look in the direction parallel to the other or receding side of the subject, he will be looking at right angles to the picture plane, and a line drawn from the point of sight on the plan in this direction becomes one and the same with the axial ray of vision. When the intersection of this line with the picture plane has been dropped or projected into the horizon line of the picture it will thus be centrally located in the field of view, and all horizontal receding lines of the subject will then vanish to this point, which can properly be designated by the letter V. Since the first named side, or what now may be termed the front of the subject, has become coincident with the picture plane, the heights of all horizontal lines within the same, as measured from the ground up, will be the same at all points from one extreme to the other, or in other words, such lines will be and appear horizontal instead of appearing to vanish as when the side is oblique to the picture plane.

In the plan view, Fig. 14, the subject is shown in three positions. The



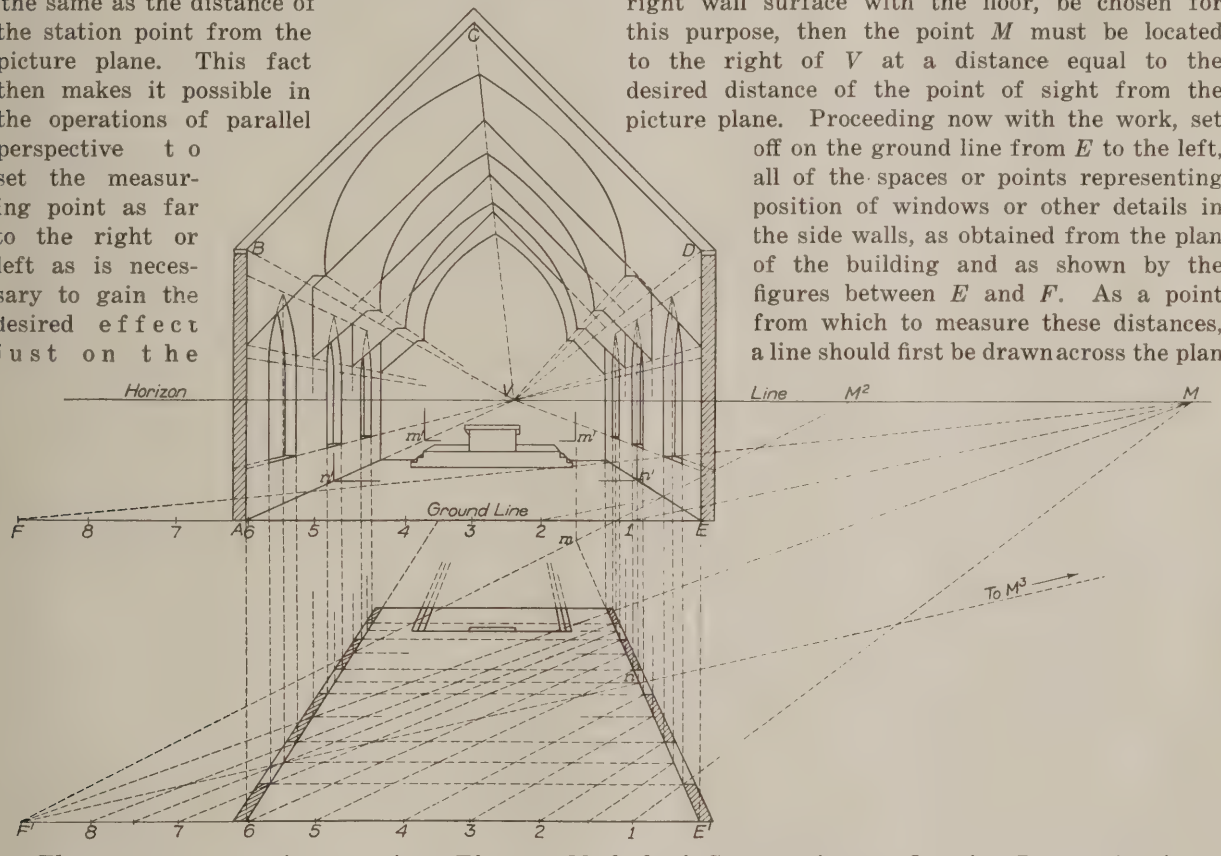
Elementary Perspective Drawing—Fig. 14—*Diagram Showing Change in the Distance of the Vanishing Points with Relation to the Angle of the Subject*

distance away of the two vanishing points for each position, as determined by the intersection of the visual rays with the picture plane, is indicated for the three positions, respectively, by the addition of the index figures, 1, 2 and 3 to the usual reference letters. In the first position the subject is so placed that its sides make equal angles with the picture plane; in the second position it has been turned to the left far enough to exactly divide the angle between the picture plane and the side in the first position, showing that the distance from A to P^{R2} is now less than half the distance to P^{R1}, while the distance from A to P^{L2} is more than twice the distance to P^{L1}. In position three the point P^{R} has reached and become one with the point A, while the point P^{L3} has reached infinity.

Having thus shown that the method of locating the vanishing point in parallel (or what for this

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers. —Editor The Building Age.]

reason is sometimes termed one point) perspective is exactly in accordance with that employed in angular (or what is termed two point) perspective, we come now to the location of the measuring point, for since one vanishing point has been eliminated there can, of course, be but one measuring point, except in the case of an oblique wall surface, for which it would be necessary to first find a special vanishing point. It was explained in connection with Fig. 5 that the positions of the measuring points were most easily found by drawing arcs through the station point 8, using the points P^R and P^L as centers, extending them to cut the picture plane. Applying this rule to the present case, we describe an arc from A—that is, P^{R3} as center, with $A\ S$ as radius—cutting the picture plane either to the right or left of A, as is most convenient, as shown by the arc $S\ p$ in Fig. 14. From this operation we discover that the distance of the measuring point from A is exactly the same as the distance of the station point from the picture plane. This fact then makes it possible in the operations of parallel perspective to set the measuring point as far to the right or left as is necessary to gain the desired effect just on the principle that one would approach or recede from the real object for the same purpose in making a sketch.



Elementary Perspective Drawing—Fig. 15—Method of Constructing an Interior Perspective in What Is Known as "Parallel" or "One Point" Perspective

While discussing "interior" perspective, we have thus far considered only the exterior aspect of the object. If we suppose the view to include two buildings with a space between, as when placed upon opposite sides of a street, and the point of sight chosen opposite the space—that is, so as to permit a view down the street—we shall have the essential features of an interior. Under these conditions, then the side walls of a room will be at right angles to the picture plane, while its farther wall will, under ordinary circumstances, be parallel thereto, and the picture plane will be the plane of an orthographic section across the room at the immediate foreground. As a subject for the illustration of the methods of parallel perspective we have chosen what may be considered as an interior view of a church, similar to that shown in Figs. 4 and 5.

The work may be begun, therefore, by first constructing the outlines of a sectional view, as though a sectional elevation were intended, as shown by $A\ B\ C\ D\ E$ of Fig. 15. The height of the horizon may be established at will and the vanishing point located, either centrally or somewhat nearer to one side, as desired. The horizontal line $A\ E$, representing the level of the floor, becomes the ground line, corresponding with G^{C2} of Fig. 5, upon which spaces representing receding distances are to be set off. The measuring point may be located upon the horizon line, either to the right or the left, according to whether $E\ V$ or $A\ V$ is chosen at the receding line to which the spaces on the ground line are to be transferred. Should the line $E\ V$, representing the intersection of the right wall surface with the floor, be chosen for this purpose, then the point M must be located to the right of V at a distance equal to the desired distance of the point of sight from the picture plane. Proceeding now with the work, set off on the ground line from E to the left, all of the spaces or points representing position of windows or other details in the side walls, as obtained from the plan of the building and as shown by the figures between E and F. As a point from which to measure these distances, a line should first be drawn across the plan representing thereon the position of the picture plane—that is, to show how much of the interior is to be represented in the view. Having made the several distances from E equal to those of the plan from the line just drawn, lines may now be drawn from each point between E and F toward M, cutting the line $E\ V$. From these several points of intersection on $E\ V$, lines can be erected into the view, and the heights set off on $E\ D$ and carried toward V to cut the proper lines, in a manner exactly similar to that shown upon the side wall of the building in Figs. 4 and 5.

Should the left wall of the interior contain the same details as the right, it will be necessary to simply carry all points on $E\ V$ horizontally across $A\ V$ and repeat the operation of obtaining heights

by first transferring the heights obtained on *E D* to *A B*. Should the left wall, however, differ in details from the right, the space for the same can be set off on the ground line from *A* to the right, and lines carried from the points thus obtained to another measuring point placed exactly as far to the left of *V* as *M* is to the right.

The operation of interior perspective admits of the use of the plan in perspective, as shown in teh lower part of Fig. 15, where said operations are so clearly indicated as to require no explanation beyond what has been said concerning this method in connection with exterior perspective and demonstrated in Fig. 5. The results in Fig. 15 have been obtained from the plan, using E^1 F^1 as the ground line, only a few projections having been made from points on *E F* just to show that the results are the same in both cases. The use of the plan in perspective is to be recommended because the intersections can be made with greater accuracy, especially in case of a low horizon, and because that part of the paper devoted to the view can be kept more free of lines. In fact, a separate sheet of paper can, if desired, be temporarily tacked over the lower part of the drawing, upon which the plan in perspective can be drawn and which can be removed when the work is finished, leaving the paper clean.

An interior can also be constructed by the viewing process, by first placing as much of the plan as is to be shown in the view against the picture plane in a plan view, and then locating the point of sight and proceeding all as explained in connection with Fig. 4.

In assuming the point of view for an interior, it is apparent that the farther away it is fixed the more obliquely or edgewise the side walls will appear, while a fuller view of them is obtained as the point of view is brought nearer; it is therefore advisable to choose a point of view as near as possible without making the angle of the view too wide. To this end an angle which will include somewhat more than that considered proper for an angular or exterior view is often permissible. In Fig. 15 the distance of the farther wall from the point of sight is twice that of the foreground (that portion in the plane of the view), and the view includes an angle of about 38 deg. The amount of space occupied in the view by the side walls, as compared with that of the rear wall for a nearer or a more distant point of view, can be quite easily determined. If, for instance, the distance away of the station point were decreased by half, the measuring point would then be placed midway between *M* and *V*, as shown at M^2, and the point F^1 of the ground line would then fall at *m* on the line E^v V, with the result that the width of the rear wall would be that shown by *m′ m″* in the view. If, on the contrary, the distance of the view point were doubled, the distance of *M* from *V* would be doubled, the point so located being marked M^3, and the point F^1 would then fall at *n*, and the comparative width of the rear wall would be that shown at *n′ n″* in the view. Of course the details of the side wall would then be correspondingly extended or contracted.

Interior views are not always such as can be designated as being in one point perspective. The view may be such as to include only two walls of a room, both of course, being oblique to the plane of the view. Such a subject can be treated exactly the same as an exterior view, there being of course, two vanishing points and two measuring points. In such a case all horizontal measurements are set off on the ground line in one direction from a point representing the intersection of one of the walls with the picture plane, at which point a line of heights is also erected. Should the said intersecting wall be that at the left, then the horizontal measurements will be set off to the right from the point referred to. Those measurements intended for use along the left wall will be carrid toward M^L to cut the base line of that wall, while those intended for use on the right wall will be first brought forward from M^R to cut a line drawn from V^L, through the point from which the measurements were set off, thence toward V^R to cut the base of the right hand wall. This is illustrated in Fig. 5, in which the front of the building corresponds with what has been termed the left wall of an interior, while the side of the tower and steps corresponds with the right wall. Referring to the plan, G^1 represents the intersection of the left wall with the picture plane, from which point all measurements are set off to the right. Those points intended for the left wall, indicated by *a, b, d* and *f*, are carried toward M^1 to cut the line G^1 *f′*, while those indicated for use on the right wall, 1, 2, 3 and 4, are first brought forward to cut V^L G^1, extended as shown at 1′, 2′, 3′ and 4′, and are thence carried toward V^R to cut the right wall, beginning with b′.

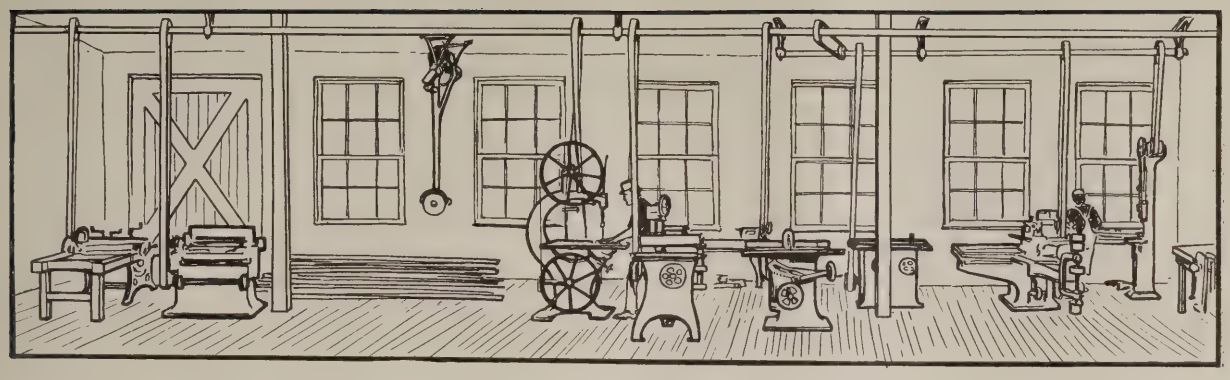
(To be continued.)

Color Schemes in a City Home

The prevailing color of a living-room on Riverside Drive is mulberry. Mulberry velvet is used for the window and door hangings, and a moire material matching these hangings in color is used for the wall panels. The general color scheme, even, is carried out in the lampshade sconces, says the *Decorative Furnisher*. The furniture is of mahogany, and the upholstery material and window cushions are in mulberry color, matching the prevailing scheme. The trim of the room is ivory white, and the entire effect is one of soft color harmony and charm. The window panels are combination Filet and Venetian lace, and the Oriental rug, of particular charm, was especially imported by the decorator on account of its size and the harmony of the color it contained.

Adjoining the living-room is the foyer hall. The color of the draperies and the curtains is old blue, forming a beautiful contrast with the mulberry tones used in the living-room. The trim here is also ivory white. The lace panels used on the windows match those in the living-room. The floors are covered with Persian rugs of excellent design.

In the lounging or smoking-room the color scheme is golden brown, which, against the ivory white of the woodwork and mahogany doors, is soft and restful. The rugs are Oriental, and the curtains of two-tone silk are in accord with the general brown color scheme. Arab panels are used on the windows.



Planning a Small Carpenter Shop

Comments by a Practical Woodworker on the Economical Arrangement of the Various Machines and Equipment

By W. S. Wilkin

THE subject of carpenter shop arrangement is always interesting for discussion and what I shall endeavor to do in this article will be to point out some of the things which are likely to appeal to any carpenter or builder having a shop of his own, or who may be thinking of building one. The floor plan on the next page shows a shop 40 x 60 ft., which is not very large, yet it will, I think, answer the needs of the average builder for making his own frames, stairs, porch work, cases, etc. It is a shop that could be used in the smaller cities and larger towns, for many a builder likes to be so situated that he can do his own work or at least a part of it and can arrange to get it out just when he most needs it. Many times the planing mill will hold him up on a bill of frames in the busy season which is likely to stop the whole job—bricklayers and all.

I think the place where this kind of a shop is needed most is in the small towns—those having a population ranging from 1000 to 2500 or 3000, and are surrounded by good farming land where there would be quite a bit of building through the country as well as in town. While some of these places may have a small planing mill, others have only a lumber yard, and some not even that.

While the lumber man may carry in stock sash, doors and quite a lot of finish, as well as standard lumber for cornice, etc., there is much work that has to be done by hand, or else send to the larger town or city for it where wages are higher. This of course makes it cost more than it would if the builder had a small shop of his own and could do the work himself. Then again, there is the time lost and this is frequently an important factor.

It is often only a small turning that is needed, or it may be an odd size of door which cannot be found in stock. If the carpenter or builder does not have all the machines that are to be found in the planing mill, he could however get out most any kind of work he is likely to need if he only knows how to go at it and makes it his business to give people what they want when they want it.

I am, however, getting away somewhat from my subject. I am not writing on the construction of the shop at this time, but rather on its arrangement. I have shown on the floor plan the posts through the center of the shop because they are often found there and the machines must be set accordingly. The window arrangement could be different than that shown, but it should always be borne in mind that there cannot be too much lighting. Plenty of windows will save a lighting bill for if there be no artificial light it will enable the men to work longer in winter or on dark days.

An inspection of the plan will show a sliding door on each side near one end to be used for getting lumber into the shop. One door is about 6 ft. wide and the other 12 ft., so it will be large enough to let in any large piece of work. There might be a smaller door placed in the large one or a small one can be put in the other end of the shop if desired. It is also a good plan to put sash in the large doors for the more light the better. The arrows on the plan show which way the work will go through the machines, or which way the operator will face the machine.

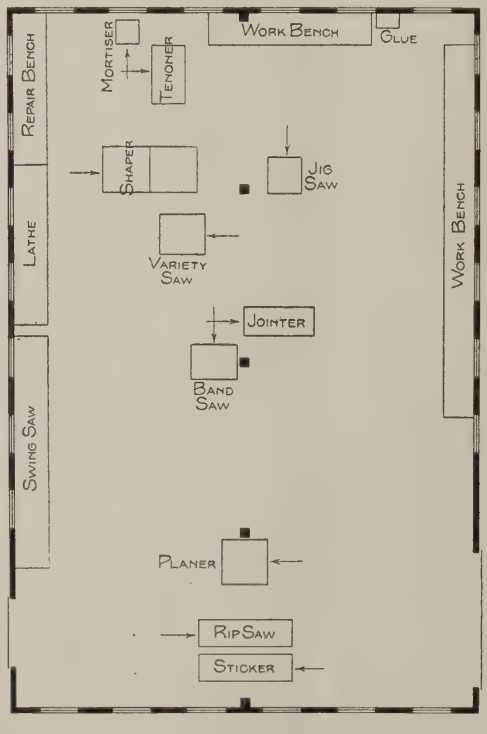
This kind of shop should be arranged so as to save handling the work as much as possible—even more so than in a big shop, for the latter will have boys to wheel it around, while in a small shop two or three carpenters will constitute the full force and have to do all the handling themselves.

If the lumber is to go through the planer first it may be put in at the big door while if it is to be ripped first it can be put in at the small door. If

it is for pulley stiles or molding that will go through the sticker, it can be put right back over the rip saw and then back the other way through the sticker or molder as it may be ripped in the rough and run through the molder. If it is to be cut up for rough work it can go from the planer to the rip saw and down to the bench or over to the swing saw and then to the benches. These three machines would work just about as good one way as the other. For work such as frame linings, etc., or anything that would not go back through the sticker they would be better if placed the other way; then it would go through the planer, then back through the rip saw and would be right at the swing saw to be cut off, then go over the jointer and to the benches. If, however, the owner was running his own frame stock, such as pulley stiles, sills, etc., the lumber would be ripped and go back through the sticker and cut off on the swing saw, then go over to the variety saw and be gained, recut, etc., and then over to the benches.

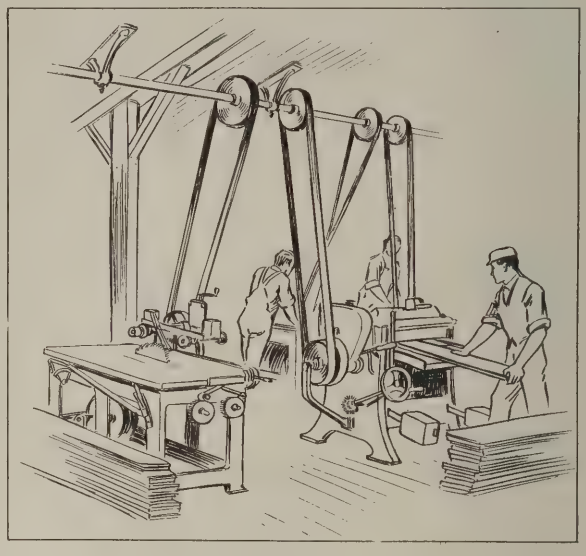
If the work was something like china cases, pedestals or odd sash or doors such as could not be bought in stock, it would go through the planer to the swing saw and be cut off; back over the jointer, then back over the variety saw and be ripped to size and then over to what is marked "repair bench," which would be used for saw filing, repairing, etc., and also for what one might call a "laying-off" bench. Here the work would be laid off, then it would go to the mortiser, tenoner and shaper and then over to the benches.

From this it will be seen that the work would go around with but little extra handling so I consider the sticker, rip saw, and planer are set just about right. It must be remembered that long lumber may go through all three of these machines even in the very small shop that would not have a sticker, or even a planer, but long boards must some times be ripped and room is needed at each end of the saw. If the building is narrow and has no big doors, the builder could put in little doors at each side of the building to be opened when long boards are to be ripped. It will be seen that there is room for long material at the swing saw and there is room for long work on the lathe.



Floor Plan of a Small Carpenter Shop

I have used the same scale on the machines as on the building so as to show the relative space they will occupy. Of course there are different sizes of machines but I think this will give a fair idea of the room each will require.



Some of the Operations in the Shop

I have shown a bench 3 x 14 ft. at the end and one 3 x 32 ft. along the side which would make two 16-ft. benches. This would give room for three men at the benches. I have shown the glue heater between the benches where it will be handy to reach. In the corner of the shop at the end of the long bench is a good place for a tool chest and over at the end of the short bench next to the tenoner is room for another one. The man with the small shop will not as a rule carry much lumber in stock but will buy it as he needs it, or if he wants to he can have a small shed under which he could keep a little. In a shop of this kind if the roof is not too flat, he can keep quite a bit overhead. He will need a little room, however, to put frames, etc., as he makes them until they are taken out. There will be room at the end of the long bench, and over by the planer there is also some floor space.

The band saw should be set where there will be room to handle long material all around. There is only one place where a post should be near a band saw; that is, where it is shown on the plan. It will do no harm here as it will be right by the arm of the saw. The band saw is higher than the jointer or variety saw, so it will be seen there is plenty of room to swing long pieces, such as stair horses, rafters, etc.

There are times when pretty long pieces must go over the jointer and variety saw, so there must be room on each end of them and the carpenter may want to gain some pretty long work on the variety saw so that fact must not be overlooked in setting it. The space back of the shaper is where the counter shaft will set. Owing to the spindles being set vertical in a shaper the counter shaft must be set back far enough to give

the belts room to turn. The counter shaft will be set low and can be boxed over; then it will not be in the way of the variety saw or the tenoner. There is nothing in the way of the tenoner until you get to the variety saw which will let in 12 ft. or more. The variety saw might be moved back closer to the post but the post might be in the way of mitering long pieces. It will just clear when placed as shown, but there is plenty of room out toward the swing saw.

There must be room on each side of the mortiser for any long work that may be done on it. There must also be room on both sides of it so the face side can be worked against the fence all the time.

While it is not often the case, there are times when the workman might wish to saw some long pieces on the jig saw so that fact must not be forgotten.

It will be seen from the plan that all the machines are set so they can be belted from a shaft running lengthwise of the shop. Some machines might be set to better advantage the other way, but it would require a mule stand or something to turn the belt to run a line shaft extending crosswise of the shop.

This shop can be cut in two and the end with the benches put on the second floor simply by changing the machines around a little. My preference, however, is to have all on one floor. An engine could be set in a little building outside and the belt come in at a point say between the swing saw and the lathe, running to the line shaft about in the center. In a shop of this kind where there are likely to be only a few men working and only a part of the machines running at the same time, it will not require as much power as would be the case if all the machines were running under a load. The planer and sticker will take the most power and in a small shop it will hardly be necessary to run both at the same time.

I think it is a good idea in connection with a shop of this kind to have a clutch in the line shaft so the end with the swing saw and the other three machines can be cut off and save pulling that end of the shaft and belts for maybe days at a time. This plan would save the belts as well as oil and power. If there were lots of work being done in the shop, of course, all the machines would be running all the time.

I think the nicest way to obtain the power when one has room for a basement is to run the line shaft under the floor and belt through it to the machines. This will often save a counter shaft on the floor and the belts will not be so much in the way. The belt runs under the table on a variety saw and if belted from above must have a counter shaft on the floor to get to it, while, if belted from below, this floor space would be saved.

If a smaller shop than that here shown was wanted the sticker could be cut out and the bandsaw, jointer, variety saw, single spindle shaper and mortiser could all be bought in one machine, and so arranged that the operators will not be in each other's way. The tenoner could be cut out, as good tenons can be made on a saw. The lathe is something every shop should have.

I think a little talk along this line from some of the other practical readers of the paper would not only prove interesting but develop a most valuable discussion.

The Building Operations in 1914

Official Figures for the Last Year Covering 147 Cities of the Country

THE figures of building operations for 1914 just made public by the United States Geological Survey show that, although there was an apparent general decrease in building operations throughout the country, ten cities which during the year 1913 showed decreases rallied in 1914 and showed increases.

The most noteworthy feature in the building industry in 1914 was the large decrease in New York City, by which it lost its rank as the leading city in cost of building operations, being passed by Chicago. The cost of building operations in Chicago was $83,261,710, against $74,030,241 in New York. New York's decrease, compared with 1913, amounted to $33,074,466. The greatest increase shown in any city was in San Francisco—$7,140,299—the second largest increase being in Brooklyn —$7,109,801.

In forty-eight selected cities the total cost of building operations in 1914 was $619,752,354, compared with $673,220,625 in 1913.

Efforts were made by the Geological Survey to obtain detailed information from the leading 157 cities in population. Replies were received from 147 of these, 113 of them furnishing sufficient details to permit the publication of figures by classes of buildings.

Building operations in the 147 cities cost $785,525,746 in 1914. In 113 of these cities the new buildings of all kinds cost $461,681,108; new wooden buildings, $165,226,250; new fire-resisting buildings $296,454,858, and new brick buildings cost $181,957,682. All other new fire-resisting buildings cost $114,497,176.

The cost of all additions, alterations, and repairs in these 113 cities was $67,230,432, $24,453,877 of which was for wooden buildings and $42,776,555 for fire-resisting buildings.

Features of the Modern Greenhouse

What an English Writer Has to Say About This Attractive Adjunct of the Country Dwelling

By John Y. Dunlop

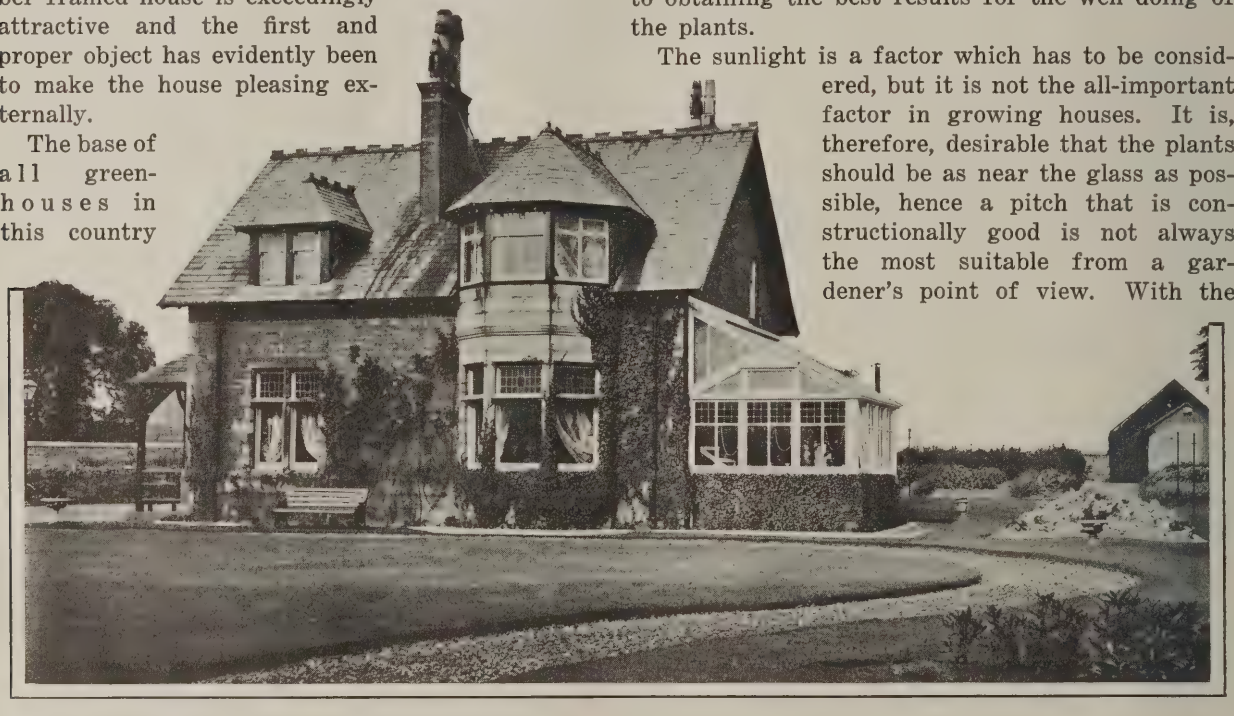
THE greenhouse to-day in England, as is probably the case elsewhere, is a very important part of the home and takes various forms in the different country districts of Great Britain, the lean-to house seemingly to symbolize the humble rural life. It is only when we view the cottage of the wealthy that we encounter a more useful and elaborate form. Beautiful as the cottage greenhouse may be, it is only when we view the span building and the domical glass structure that we really see the work of the decorative builder. The appearance of many of the latter type of timber framed house is exceedingly attractive and the first and proper object has evidently been to make the house pleasing externally.

The base of all greenhouses in this country is of some solid material as it has been found exceedingly unsatisfactory to place a timber building directly on the ground. Walls of patent material stand well for a few summers, but as a rule their life is short. The choice seems to rest between stone and brick, although recently "poured" concrete has been introduced. In districts where stone is specially abundant this material, of course, has many advantages for choice. The question of concrete vs. brick in an economical sense is also largely influenced by the proximity or otherwise of the materials necessary for the production of concrete. There is the other reason of a brick base for a brick cottage, and a stone base for a stone house.

This latter argument need not be taken too seriously for we find that most of the old houses in the country districts add a certain degree of picturesqueness by causing ivy to grow on the solid base of the house; something making the junction with the soil appear like a natural production—a part of the garden.

This practical form which seems to appeal to the gardener is shown in the picture Fig. 1 of the lean-to house, and it would probably need only the sanction of habit to be accepted for it is a sensible method in itself and not incapable of pleasing treatment. Beautiful as these small conservatories can be made they must always be built for utility and therefore are always constructed with a view to obtaining the best results for the well doing of the plants.

The sunlight is a factor which has to be considered, but it is not the all-important factor in growing houses. It is, therefore, desirable that the plants should be as near the glass as possible, hence a pitch that is constructionally good is not always the most suitable from a gardener's point of view. With the low pitch house the heat is more evenly distributed, but greenhouses which have a high pitch accumulate hot air at the top or peak of the house and the tendency in plants is for the sap to flow toward the point where the greatest heat exists and as a consequence the lower portion of such plants suffer.



Features of the Modern Greenhouse—Fig. 1—A Lean-to Greenhouse for a Cottage

Another very important point in the design of these structures is the fresh air inlets. They should be as low down as possible and the outlets should be as near the top as they can be placed. The glass used for the growing house is 21 oz. sheets, with large conservatory plate glass generally used for the front lights.

The lean-to house shown in Fig. 1 is set off with its shortest end to the north; that is, with its length running north and south, and with dimen-

Features of the Modern Greenhouse—Fig. 2—A "Span" Greenhouse with Octagonal Bays in the Center of Each Side of the Structure

sions 10 ft. 6 in. x 14 ft. The entrance is in the south end, and along side is the independent boiler for the heating. In the construction there are only three sides to be formed, as the gable end makes the remaining side.

In many cottages it might be a suitable arrangement to have direct access to the greenhouses through a door in the gable of the cottage. Where this plan is adopted, however, it is always desirable to have a dry corridor between the glass-house and the cottage so as to prevent the heat and moisture of the former from penetrating to the latter. This corridor also serves as an air buffer. The solid part of this small growing house is in 4½ in. brick work, on top of which is embedded the sill for the front and end lights. The greater portion of the vertical lights are made in the form of sashes which means that the frames for these parts are fixed up first. In the ends there are the wall post, the corner post, and the door posts, if the entrance is in that part. These then receive the lintel which is carried along the ends and front.

The sashes for the lower part of the gable ends are divided into four parts. The angular sash which receives the roof is framed in one piece and the short raking member as well as the vertical bars are all constituent parts of this large triangular frame. In this part a pediment is formed in wood. This is done by filling in the triangular space in the middle with a piece of 1-in. deal and the addition of the horizontal and raking moldings.

With the roof the opening ventilating sash extends the whole way along the top. This is done by framing in two trimmers between the gables of the house. The first one is against the wall of the cottage and the second one is a distance down equal to the depth of the sash. This lower trimmer is checked to receive the glass of the roof and it is also jointed to receive all the roof glass bars. The latter are then fitted on to the lintel of the front frame and to the member on which the ventilating sash rests.

The internal arrangement of this house is a wood stand 2 ft. 6 in. high on the glass side of the building and a stand at various heights on the wall side. This arrangement gives two beds on which flowering plants can be placed in pots, the front beds being used to display the various flowering plants in season.

In the case of a large lean-to glass house, such as Fig. 4, the structural work is very much the same as in the examples just described. A larger

Fig. 3—Showing an Octagonal Domical Conservatory with Pediment Ends on the Four Sides

house means heavier bars and in this case the sashes are all 2 in. thick. In the roof a heavier glass bar is placed in line with each post in the front framing with the ordinary pattern in between, supported by rows of 1¼ x 1¼ x ¼ in. T-iron mortised into the heavy rafters and screwed to the sash bars.

Then for easy work the ventilation sash on top of the roof is opened by a continuous rod 1 in. in diameter passing through bushes fitted to the heavy rafters. Each rod is fitted with pinion wheels and the sashes with toothed segments and handwheel brackets for easy opening. Molded cast iron or zinc gutters are also fixed to the eaves of all such houses, and as a rule have their 2-in. conductor pipe taken into a storage tank for the watering of the plants.

These houses are all glazed with 21-oz. sheet glass properly bedded. The glass is firmly tacked with zinc sprigs and no fore putty is used on the roof glass.

Internally the arrangement of the house depends very much on what is being grown. A bed along the front is always looked for and very often a portion of the space in the house is allotted to plants with rock work in which the various subjects are planted, and in which they remain permanently.

The hot water low pressure system is invariably used for the heating of all modern greenhouses in England. The position of the hot water pipes is above the floor and only in large conservatories where the walks are composed of iron gratings are the pipes placed in brick channels underneath the grating. The position of the boiler in the two small houses shown is at the top end of the house and the pipes from the boiler run at a minimum inclination of ½ in. per 9 ft. These pipes are never allowed to dip and where there is a doorway a fresh set of pipes is used for each side of the house. Vent tubes are fixed at the highest end of each pipe so as to prevent accumulation of air in them which of course would stop circulation and thereby the heating of the house.

With the span greenhouse shown in Fig. 2 a side view is presented of one recently erected in which an attempt was made to improve on the ordinary stock pattern. The plan of the main artery of the house is rectangular with semi-octagonal bays at the middle of each side. The house is strongly constructed with wood principals 6 x 2 in., and sash bars 2 x 1 in., all of which are neatly molded, grooved and stopped for the brackets and points. The principals are placed about 5 ft. apart and are fixed to the framing and gutter sill as well as being mitered and bolted together at the top and strengthened with neat cast iron brackets fixed with coach screws and bolts. The side lights of the whole front are built of 4 x 2 in. framing and sashes.

In the center, part of the woodwork extends down to a lower level than on the sides, which gives the design the advantage that the fresh air can be taken in at a lower level than would otherwise be the case.

The eaves of the two roofs are on different levels, which gives a much more pleasing appearance to the building by reason of breaking the long horizontal lines of the elevation. In construction the glass bars of the roof are mortised in the ridge piece at the ends of the house; they then rest on the sections of T-iron which run forward to the flanks and are beveled and fitted to the head of the side frame.

Features of the Modern Greenhouse—Fig. 4—A Lean-to Greenhouse for a Country Residence

Here each eave has the usual gutters which are neatly supported on ornamental brackets fixed to the sides of the house. At the apex the ventilation sashes are built in the form of a lantern which requires special construction at that point. First, the ridge piece is left out and two purlins are substituted. Each of these members is fixed to the principals and in a line with the vertical side of the lantern. They in a manner form the sill piece for the side frame. The side lights open outward and are hung on the top at the corner posts and mullions are rabbeted on the solid. The lintel has the bead planted on as it is not required to stand any shock.

The roof is formed with molded ridge filled in

with sash bars which in turn are fitted to the splayed top of the side frame. Each end of the long lantern is finished with matched boardnig, while those of the side are glazed right round the perimeter of the lantern.

Glazing and heating of this house is done in the same way as described in the last examples only the boiler house is placed at the middle of the building in the rear.

Conservatories usually form adjuncts to large houses, and where as a rule expense is a matter of little or no consideration. In the effort shown in Fig. 3 the center part has a lofty span to accommodate palms, dracenas and other tall subjects.

The house has a light steel frame which consists of a channel-iron section forming the octagonal base for the lantern which is supported by eight H-iron sections bedded in concrete at the foundations and bent to the shape of the groin. A light steel section is carried round the sides of the octagon lower down which forms the base for the domical glass part. The base is built of Ashlar blocks made from local sandstone, while the exposed woodwork is of teak. All the rough timbers are red pine.

In construction the corner posts are 4 x 4 in. with the intermediate posts 4 x 2 in. These are carried up to the underside of the first horizontal steel frame and are framed together with horizontal timbers. At the projecting bays on the front and ends much the same framing was used as for the sides and front, but as this part of the structure is covered with glass the upper part of the side frame was splayed to receive the glass bars. All the furnishings of those parts of the structure and the sashes and doors are in teak. In the construction of the domical roof the curved steel ribs form the principals which are carried upward until they meet the base frame for the lantern. All the other glass bars are in wood.

The sides of the lantern are in solid teak wrought in the form of molded pilasters on the outside and paneled on the inside. This receives the glass roof which is finished with an open ventilator.

Making Square-Paneled Porch Columns

What a Mill Man Has to Say About Making This Type of Porch Column

A PORCH column which of late has gained much favor on account of its pleasing style and appearance, and is much in demand in the construction of the bungalow type of houses, is the square-paneled style column, says a writer in a recent issue of the *Wood Worker*. Columns of this type may be easily constructed in several simple ways, such as setting the panel in a fillet and placing molding around, or rabbeting same to fit panel into corner stile. Recently, however, I came across a column of this kind, which is away ahead of any I have seen, and I believe it worth while to give an illustration of the type of construction used, and which shall be practically self-explanatory.

The edge stiles are run over the shaper (after being planed to proper dimensions), where two dovetail grooves are cut on the inside edges. The panels are also made with a corresponding dovetail edge, as shown in Fig. 1. A small brace shelf is placed in the bottom and top of column to strengthen the dovetail construction, and the column is ready to be put together. It will be observed that in this type of construction practically no nails are used, except the few used in inside brace shelf. Consequently there are none to show, or putty to fall out after the column is on the house, which often gives a column of this type a bad appearance. It can be safely claimed for a column thus constructed that it cannot split, pull apart, warp, check or break, and will practically last as long as there is a roof on the house.

The making of this kind of column will not mean any expense for new machinery where there is a shaper in the equipment; and the price of a dovetail bit is only nominal. The plant that goes in for this type of construction will not alone get the bulk of trade for its vicinity, but will turn out a product upon which it can stake its reputation to the highest degree. Referring to the sketch, Fig. 1 shows end view, Fig. 2 side view, Fig. 3 the cut of side column, and Fig. 4 the panel cut.

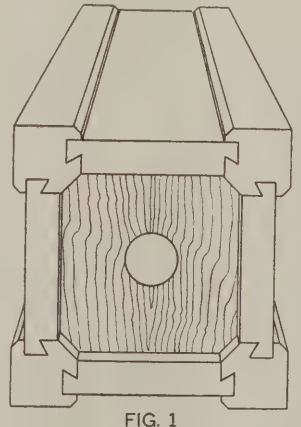


FIG. 1

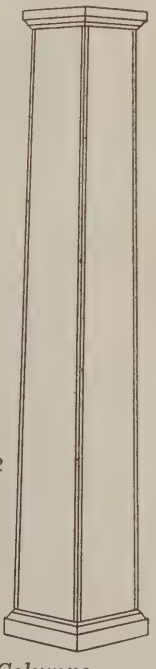


FIG. 2

FIG. 3

FIG. 4

Making Square-Paneled Porch Columns

A Five-Room Stucco Finished Cottage

A Moderate Cost Half-Timber Dwelling with Exterior of Stucco Applied to Metal Lath

WE have taken for the subject of our colored supplemented plate this month a neat and attractive cottage, the exterior of which is finished in English half-timber effect, the panels being filled with stucco applied to metal lath. An outside chimney is the striking feature of one of the end gables, while a quaint dormer breaks the monotony of the plain roof surfaces of the front. The chimney is of brick, resting on a concrete footing, but where exposed to view, the exterior is covered with cement.

The Color Scheme

The cottage has a rough "pebble-dash" finish, tinted a light cream color, while the exposed timbers are to be of white pine and painted a dark brown. The red cedar shingles which cover the roof, and are to be laid 5½ in. to the weather with a heavy joint every third course, will be dipped in dark brown shingle stain.

The cottage is intended for a lot having a frontage of 75 or 100 ft., and so placed as to allow a roadway to the rear in order to reach the garage. The building is therefore placed the long way of the lot, as its depth without porches is 25 ft.

All footings are to be 10 in. thick and 22 in. wide; supporting foundation walls 10 in. thick. All are to be of concrete mixed in the proportions of one part cement, three parts sand and five parts broken stone.

All framing timbers are to be of sound spruce, the corner posts to be 4 x 6 in.; girders 6 x 8 in.; the first floor beams 2 x 10 in.; the second floor beams 2 x 8 in.; all placed 16 in. on centers and strengthened with 2 x 4-in. cross bridging, spaced 6 ft. apart; plate 4 x 6 in., laid flat; the studs 2 x 4 in., placed 16 in. on centers; the main roof rafters 2 x 8 in., and the dormer roof rafters 2 x 6 in., all placed 20 in. on centers.

The Exterior Treatment

The exterior frame of the building is to be covered with 1 x 9 in. hemlock sheathing laid diagonally, over which is to be placed a good quality of building paper. Upon this in turn is to be nailed 1 x 2-in. furring strips placed 12 in. on centers, to which is to be attached the metal lath which is to carry the exterior stucco finish.

The floors of the room in the first story are to be double, the sub-floor consisting of 1 x 6-in. tongued and grooved pine, while the finish floors in the hall and living room are to be ⅞ x 2½.in. North Carolina comb grain pine. All other rooms are to have floors of ⅞ x 2½-in. North Carolina flat grain pine.

It will be seen from an inspection of the floor plans upon the facing page that the dining room has been combined with the living room, being separated from it simply by a movable screen, the position of which is clearly indicated. This gives in reality one large room measuring 16 x 24 ft. in size. A rear window in the dining room gives out upon a porch 8 x 26 ft. in size, thus affording an excellent place for an outdoor dining room, if such use of it is desired by the occupant.

There is a bedroom in the front left-hand corner of the building, beyond which is the bath room, and beyond this in turn is the kitchen which is of comfortable size and contains a dining nook with table and seats. This feature can be utilized for a variety of purposes by the housewife. Communication between the dining room end of the living room and the kitchen is established by means of a pantry, from which descend the stairs to the cellar situated under a portion of the building and containing the laundry, the furnace room, storage room, etc. The main flight of stairs leading to the second-story rises from the hall connecting the kitchen with the front entrance. On the second floor are two good sized bedrooms and a large storage room.

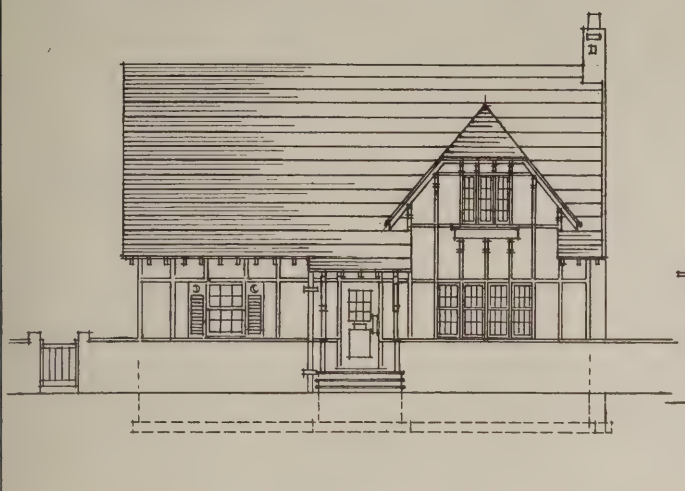
Finish of Living Room

The living room and hall are to be trimmed in fir, and bedrooms and kitchen in white wood enameled, and all doors are to be of birch, stained mahogany. The rooms are to be plastered with two-coat work and have a hard, smooth finish, except the living room and hall, which are to have a sand finish. In the bathroom the walls are to be enameled a soft light green, and the floor covered with tile. The side walls are to be wainscoted to a height of 3 ft. 6 in., with white glazed tile. The tub and wash tray are to be of porcelain enameled and the water closet is to have a china bowl and a low tank. All exposed pipes are to have a nickel-plated finish. A feature of the bathroom will be a built-in medicine closet with mirror in the door.

The plumbing of the house is to be of a good system with simple, inexpensive fixtures, using a galvanized sink and a 40-gal. galvanized iron boiler over the range in the kitchen. All exposed pipes in the kitchen are to have a coating of enamel paint. A two-part wash tray of soapstone is to be set up in the laundry.

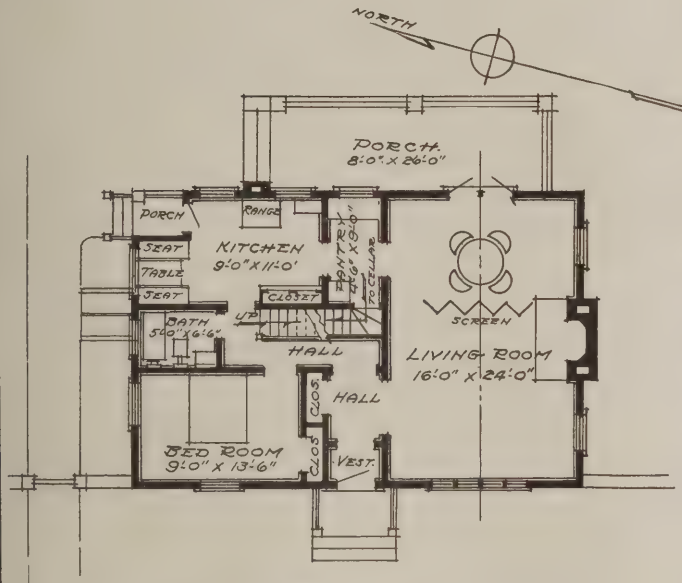
The hardware throughout the house is to be of neat design, and that in the living room to have a bronze plate finish. The hardware for all the doors is to be of a dull bronze finish and the knobs of glass.

The house is to be wired for electricity and piped for gas. The fixtures are to be of a neat, simple design and match the hardware in finish. The living room is to have three drop pendents of three lights each, and a few loose base or wall sockets

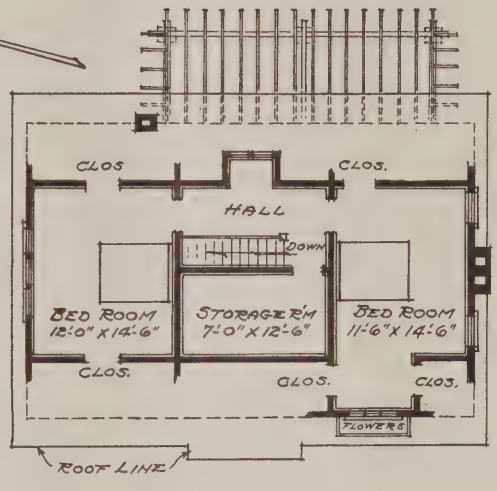


WEST ELEVATION.

NORTH ELEVATION.

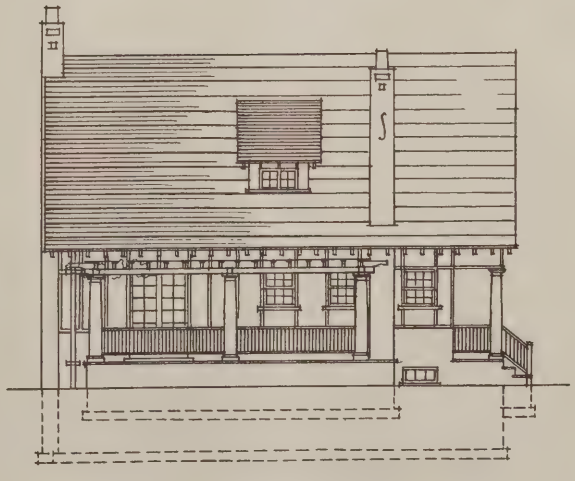


FIRST FLOOR PLAN.



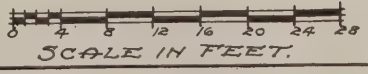
SECOND FLOOR PLAN.

SOUTH ELEVATION.

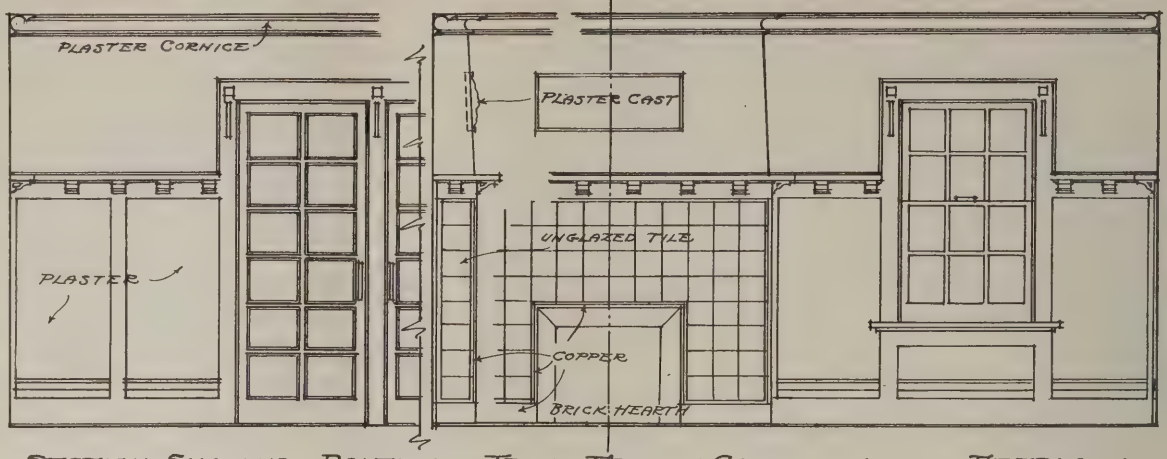


EAST ELEVATION.

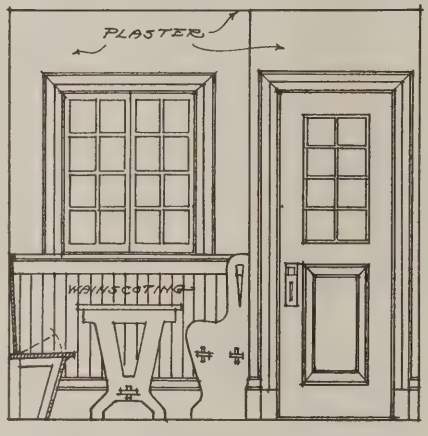
ARTHUR WEINDORF. ARCHT.
LONG ISLAND CITY, N.Y.



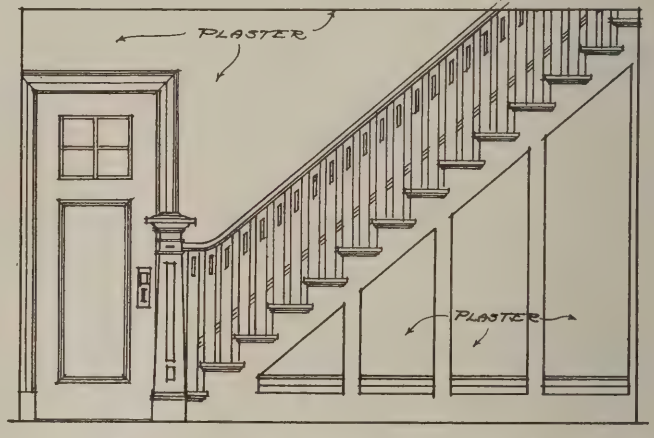
Plans and Elevations of Cottage Forming Basis of Our Colored Supplemental Plate



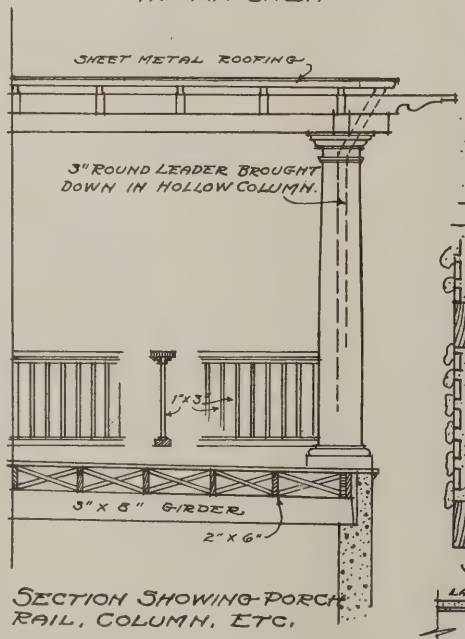
SECTION SHOWING PANELING, TRIM, FRENCH CASEMENTS AND FIREPLACE IN LIVING ROOM.



SECTION SHOWING DINING NOOK IN KITCHEN

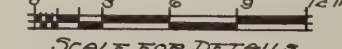


SECTION SHOWING HALL AND STAIR TRIM.

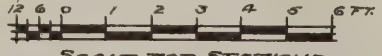


SECTION SHOWING PORCH RAIL, COLUMN, ETC.

WALL CONSTRUCTION

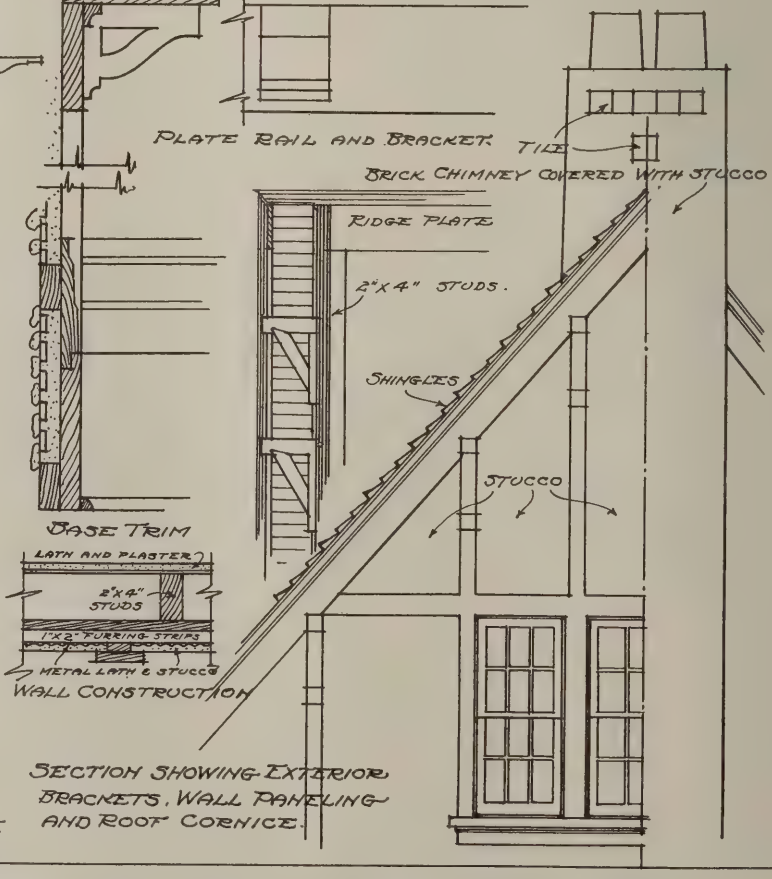


SCALE FOR DETAILS



SCALE FOR SECTIONS.

ARTHUR WEINDORF, ARCH'T.
LONG ISLAND CITY, N.Y.



SECTION SHOWING EXTERIOR BRACKETS, WALL PANELING AND ROOF CORNICE.

Miscellaneous Constructive Details of Stucco Finished Cottage Shown on Supplemental Plate

to be provided as a matter of convenience for connection with table lamp or fixtures.

The architect states that the accommodations are sufficient for a family of five, and that the estimate of cost is based on a cubic contents of 25,000 cu. ft. at a unit price of 19 cents per cu. ft.

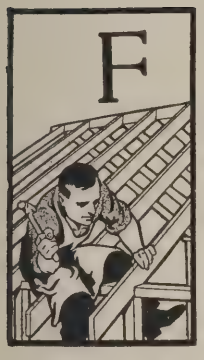
The design here shown was prepared by Architect Arthur Weindorf, care THE BUILDING AGE, 239 West Thirty-ninth Street, New York City.

A complete set of working drawings and specifications of the house can be obtained by any reader interested, for the sum of $10.

Roof Framing with the Steel Square

Some Suggestions by a Practical Builder Which the Younger Element in the Trade Will Appreciate

BY D. P. BARRY



FROM the number of requests for methods of roofing with the use of the steel square it is evident that very little help is obtained from the confusing systems of drawing which are found from time to time in the trade press. The object of this communication is to try to present the matter so that the subject may readily be handled by every carpenter and builder having an elementary knowledge of arithmetic.

All the methods published have one common fault, that is, working to a scale of one inch to the foot. Take for example, a very common case. If the run of a common rafter is 12 ft. and the rise

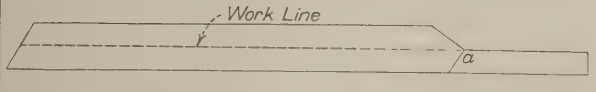


Fig. 1—Striking the Work Line on a Rafter Pattern

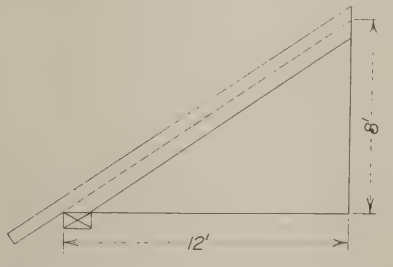


Fig. 2—Showing the Work Line with Rafter in Position

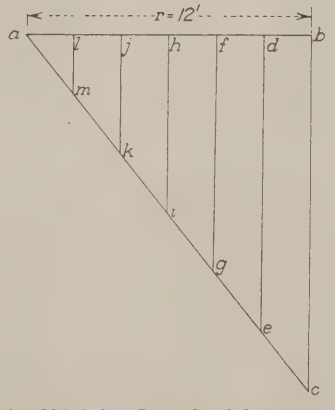


Fig. 3—Obtaining Length of Cripple Rafters

Roof Framing with the Steel Square

8 ft., then taking these figures on the square and measuring across from one to the other, the distance is found to be 14 7-16 in. Now, right here, nearly everyone falls down some time or another, while many always make the mistake. They conclude that the rafter is 14 ft. 7-16 in. long because they fail to multiply the 7-16 by 12 in order to obtain the true length which is 14 ft. 5 in. plus. A work line should be struck on a rafter pattern with a straight edge or chalk line as indicated in Fig. 1 of the accompanying sketches. This work line is the line from the outside edge of the plate to the mathematical ridge as shown in Fig. 2.

This method of obtaining the length of rafters should be discarded as treacherous and crude. A method that is every way applicable and safe is the square-root method. Now referring to Fig. 2, the run, 12, squared, plus the square of the rise 8 equals 208, and the square root of this is 14.4222 ft. Reducing the fraction of a foot to inches gives a trifle more than 5 1-16 in. Hence, the common rafter is 14 ft. 5 1-16 in. plus in length.

This is absolute, and 12 on the blade of the square and 8 on the tongue will cut that rafter. The blade gives the bottom cut and the tongue the top cut. Again 17 on the blade and 8 on the tongue will cut hip or valley rafter.

Let us see how this 17 is obtained. The run of the hip or valley rafter equals the diagonal of a square; the sides of which equal the run of the common rafter for roofs of equal pitch. The length of the hip or valley rafter equals the square root of the sum of the square of the run plus the square of the rise. Thus, 12 squared plus 12 squared equals 288, and the square root of 288 is 16.9706, or 16 ft. 11⅝ in., and is the run of hip or valley rafter.

Now, to obtain the length of the hip or valley rafter, instead of squaring 17 which already contains an error, we will say

$$12^2 + 12^2 + 8^2 = 352$$

Taking the square root of 352, as is done above, the result 18.7617 equals the length of the hip or

valley rafter, 18 ft. 9⅛ in. A builder's guide on the table before me gives this length 18 ft. 9¾ in., but this is more than ½ in. too long.

Now, to obtain the length of the cripples. We have in Fig. 3 a triangle, one side of which is the length of the common rafter 14 ft. 5 in.: the second side is the run of the common rafter 12 ft., and the third is the length of the valley rafter 18 ft. 9⅛ in. Placing the rafters 2 ft. on centers and squaring from *a b* as in Fig. 3 we obtain 12 ft.; 8 ft. 8 in.; 7 ft. 3 in.; 4 ft. 10 in., and 2 ft. 5 in., as the approximately correct lengths. Now by mathematics, from *a* to *b* is 12 ft. and from *a* to *d* is 10 ft. By proportion the side.

ad : de :: ab : bc
10 ft. : (x) :: 12 ft. : 14-5/12 ft.
5 ft. : (x) :: 6 ft. : 14-5/12 ft.

$\frac{173 \times 5}{12} = \frac{865}{72} = 12$ ft. plus as length of first cripple
$\frac{1}{6}$

692 gives 9 ft. 7-5/16 in. for second cripple
72

519 gives 7 ft. 2½ in. for third cripple
72

346 gives 4 ft. 9⅝ in. for fourth cripple
72

172 gives 4 ft. 4-13/16 in. for fifth cripple
72

The different proportions are:

10 ft. : (x) :: 12 ft. : 14-5/12 ft.
8 ft. : (x) :: 12 ft. : 14-5/12 ft.
6 ft. : (x) :: 12 ft. : 14-5/12 ft.
4 ft. : (x) :: 12 ft. : 14-5/12 ft.
2 ft. : (x) :: 12 ft. : 14-5/12 ft.

This method will apply in any roof of any pitch equal or unequal. The calculations are to the mathematical ridge and the center of the hip or valley rafter on the work line. To apply Fig. 3 to a hip needs only to move it round so that the ridge becomes the outside edge of the plate as in Fig. 4.

To obtain the cuts of the cripples we have only to set the square on the stock or rafter to be cut, taking 14-5/12 in.—the length of the common rafter on the blade—and 12 in. the run of the common rafter—one the tongue: mark by the blade. This will give the cut to fit against the hip or valley rafter. Taking the same figures in the same way will give the top cut of hip or valley rafter against the ridge or themselves; cut by the tongue.

Every case of jack raftering can be simply reduced to a triangle and solved in this way. All that is necessary is to accurately obtain the run which in roofs of equal pitch is the run of the common rafter. In roofs of unequal pitch it must be determined with the plumb line.

Ordinary rules to cut cripples would include the statement that the run of the common rafter on the tongue and the length of common rafter on the blade will give the top cut for hip cripples and the bottom cut for valley cripples. Cut by the blade. A roof hips 9 ft. on the right side and 13 ft. on the left and rises 8 ft. What are the lengths and bevels of the rafters? Take 13 on the blade and 8 on the tongue:

$$13^2 + 8^2 = 233$$

The square root of 233 is 15.2643 which equals 15 ft. 3⅛ in.—the length of common rafter on the left side of the hip. Taking the length of common rafter on the left side of the blade and 9 on the tongue the run of the common rafter on the right side—will give the cut for cripples on the left side of the hip.

Now, in general, if the roofs are of unequal pitch the length of the common rafter on the blade and the run of the common rafter on the oposite side of the hip or valley on the tongue will give the cut of the cripples on the side from which the length of the common rafter was taken. Blade gives cut.

Now, as to backing. The top edge of valley rafters should be grooved and the under edge of the projection of hip rafters should be grooved for soffit. No hip rafter less than 2 in. thick needs

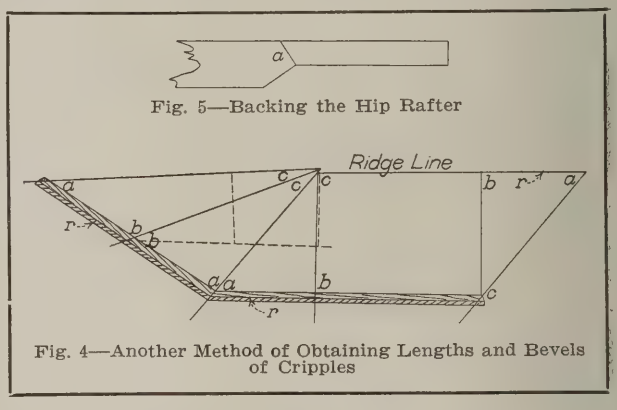


Fig. 5—Backing the Hip Rafter

Fig. 4—Another Method of Obtaining Lengths and Bevels of Cripples

backing if the vertical distance at right angles to the rafter seat be made equal to that of the common rafter. See *a* in Fig. 5. The method used on page 27 of the issue of THE BUILDING AGE for November, 1914, is not applicable except for a pattern if the hip rafter has cornice projection. A very simple way always at hand is to make *a* in Figs. 1 and 5 equal. This is the vertical distance at the outside edge of the plate and is done by squaring from the outside point of the rafter seat. Ordinarily roofs of ¼ pitch—¼ in. to the inch—backed off will do.

One-third pitch requires about 1-3 in. to an inch.

One-half pitch requires about ½ in. to an inch.

Three-quarter pitch requires about ⅝ in. to an inch, all from the center of the rafter.

If rafters are placed 16 in. on centers, the side ad should be taken 10-1/3 ft. or 1-2/3 ft. less than the rnn.

To cut the end of hip or valley rafter the same pitch as the common rafter take 17 on the blade and half the rise per foot run of the common rafter on the tongue: mark by the tongue. Assuming the rafter nailed on, the angle of the square should be down.

Residence Construction in Indiana

How Western Methods Employed in Building a Home Impressed an Old-Time Eastern Contractor

By James F. Hobart

HAVING recently watched the construction of a "double" or two-family house about a mile from the center of Indianapolis, the writer became much interested in the methods of doing the work, the manner of placing material and the kinds used; so much so, that the matters in question are described and illustrated herewith, as

Fig. 1—Appearance of the Finished Building

they appear somewhat novel to an "old-timer" eastern contractor and builder. Probably some of the things described may not be new to *Building Age* readers—at least to all of them—but it is hoped that the text and illustrations will prove interesting, even if not novel.

The house occupies the northwest corner of the street fronting to the east. The sewers are laid in the alleys, but water and gas connections are taken from the street in front. Fig. 1 gives a view of the building as it appeared when completed. It is 51 ft. long and with an 8-ft. piazza makes it 59 ft. The width is 30 ft., thus allowing 15 ft. width for each tenant. The cellar is 8 ft. in the clear, the first story 9 ft. and second story 8 ft. 6 in.

Only half the cellar depth had to be excavated, owing to the lay of the land, which was quite low, as shown in Fig. 2, which reveals four courses of concrete blocks above grade, and there are three more below grade.

Each side of the house contains six rooms, with bath, pantry, back porch and front piazza, both downstairs only. The stairs run crosswise of the building, as may be seen from an inspection of the plans presented in Fig. 3.

The sill construction is indicated in Fig. 2, a 2 x 8-in. North Carolina pine plank being placed on top of the 8-in. concrete block foundation wall. Another 8-in. plank was set up edgewise flush with the flatwise plank, and the ends of the floor joists were spiked through the vertical plank mentioned.

The picture shows that a 2 x 4-in. strip was then broken around the edge of the building, and spiked to the top of the vertical 8-in. plank, also to the ends of the floor joists. This 2 x 4-in. strip was set back, all around, just the thickness of the square-edge board of sheathing which was used to cover the body of the building. This renders the structure nearly ratproof. At the ends of the building, an extra floor joist was used, so placed that the 2 x 4-in. strip came to the middle, leaving nearly 1 in. to receive the ends of the floor-boards.

When the first floor joists were put in place, they were held by a single 4-in. shingle strip, fastened with a single nail to each joist, as shown in Fig. 4, one strip being run along each end of the gang of joists, while the third strip was placed in the middle.

This picture as well as Fig. 5 shows a wall of concrete blocks, very poorly laid in lime mortar. It was run up through the middle of the building, completely separating the two tenements. This wall was continuous from cellar bottom to first floor, with the exception of an opening for the chimney. The floor joists were then placed and after the frame was up, the central concrete wall was run to the second floor level and the joists for that floor put in position.

There was no bridging in either set of floor joists. Fig. 4 shows an opening for the cellar

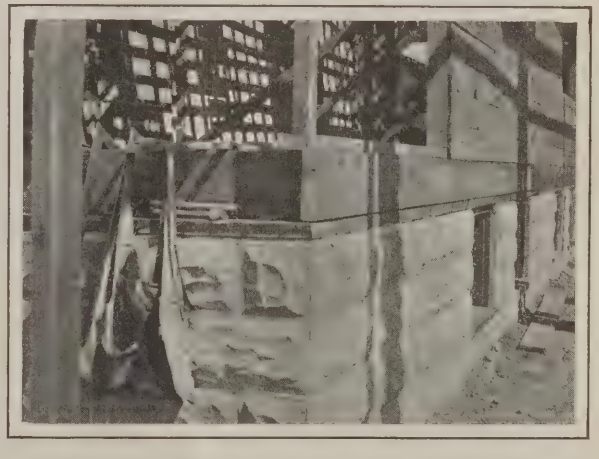


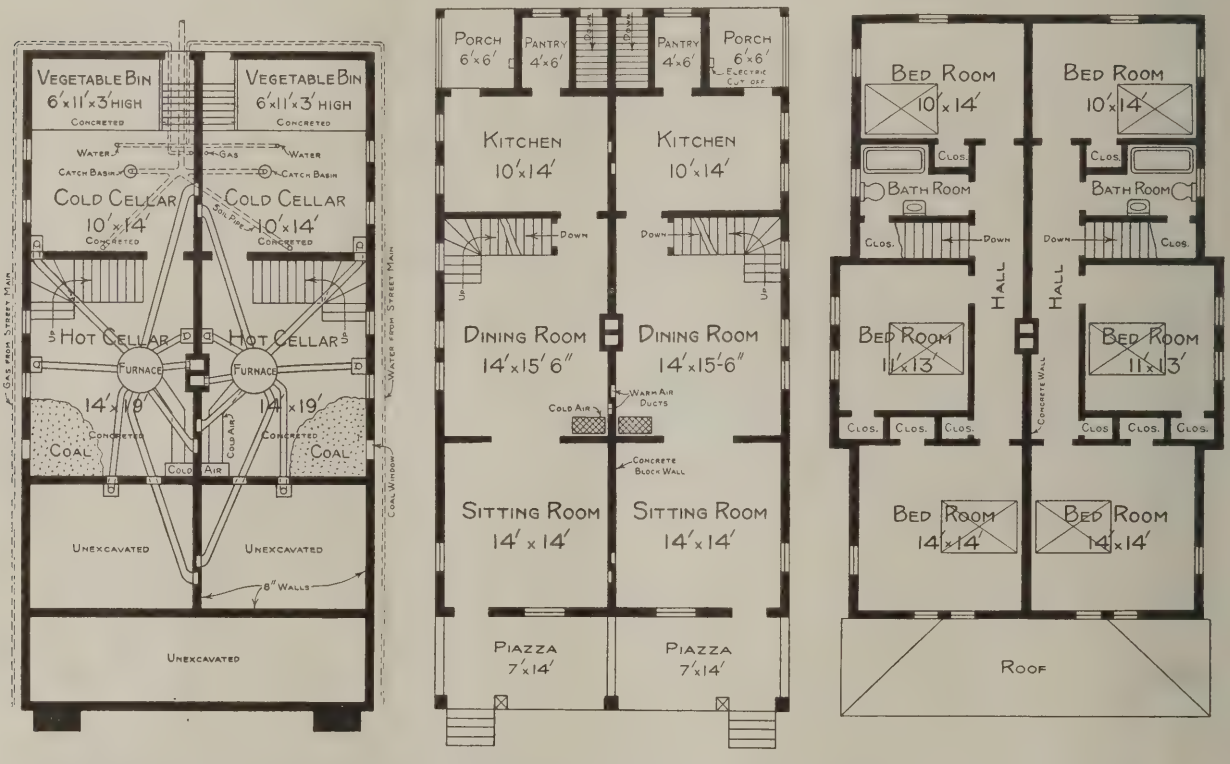
Fig. 2—Showing Sill Construction and the Block Foundation

stairs, and it will be noted that the long floor joists are doubled, but with a distance block between the two. These blocks were merely toe-nailed top and bottom, and were supposed to separate the joists sufficiently to permit the soil and vent pipes of the plumbing to pass between,

but how these calculations failed will be told later.

In keeping with the exceedingly "economical" manner in which this house was planned and built, the utter absence of steel stirrups at the headers will be noted. There is a stair header, holding four or five cut-off long joists, and the header itself is double, but is spiked to a single thickness of the long floor joist thus practically bringing all the load of the cut-off joists upon the four small spikes in each of the stair headers. The "steady" strips on the joists were removed when the floor was laid, but until that event these strips furnished the only path for the workmen whenever they had occasion to walk from one end of the building to the other, inside the structure. A very unhandy, and rather dangerous way.

The utter lack of an extra piece of material, around this building struck the writer very forcibly.



Residence Construction in Indiana—Fig. 3—The Floor Plans—Scale 1/16 in. to the Foot

The roof stuff had to be used for concrete forms and the carpenters had to bring every bit of material used for stagings as there was absolutely nothing in the house material which could be used for that purpose.

The exceedingly flimsy construction of the central concrete wall was a matter of notice as the work progressed. As shown in Figs. 4 and 5, the 8-in. concrete blocks were laid almost dry, and the joints afterwards painted—no, daubed in spots—with a mortar. There were numberless places where a rule could be pushed through cracks in this wall, and several places where a hammer handle could be passed through, were it not for the hammer head.

The 8-in. concrete wall also carried 4 x 12-in. recesses—two on either side of the wall—and "breaking" only a few inches. These recesses were made by cutting out one side and the partitions of the blocks, leaving only the 2½-in. side wall of the blocks to hold the wall together. These vertical recesses were to receive the hot air ducts, as in Fig. 5, and the meager size of these ducts is noticeable all through Middle-West house construction. The very small ducts used make it necessary in very cold weather to run the furnace almost red hot, thereby quickly burning out that useful but much abused heating member. If the furnaces are not kept at a very high temperature, it is impossible to get sufficient heat through the little ducts, and it is a case of go cold or burn out the furnace. An air duct, 4 in. x 12 in. outside, and 20 ft. long to supply heat to a room 15 ft. x 17 ft. x 8 ft. 6 in. may do in summer, especially in southern Indiana, but it does seem mighty skimpy when the mercury is fooling around the zero mark.

Fig. 5 forms about as perfect an object lesson of "how not to do" in building concrete walls, as can be found. Note the almost unbroken joints at the right side; the wide, surface daubed joints; the utter lack of mortar in many of the joints, also consider that the opposite side of the wall is weakened by another duct-recess, not shown, and the remark will be appreciated of a passerby who looked at the wall, and said: "How'd yez ever hold up that wall until you got the floor joists in?" Later, this wall was plastered directly upon the concrete blocks, skim coated and finished same as the lathed walls. There is one thing to be said about party walls or middle walls of this character, viz., it won't be hard work to cut a door through, if that should ever be necessary.

The roof of the building, Fig. 6, represents the limit of minimum lumber and labor. The rafters, 2 x 4 in. from butt to tip, and without purlin or collar beams, were all cut, set and covered with shingle strips and proved so frail that shores had to be placed, like purlins, to temporarily support the roof while the mechanics were upon it. Should this roof ever be called upon to support a foot of wet snow the reader may readily imagine what might

happen. The 2 x 4-in. temporary supports were all removed before the house was completed. The large attic is available for storage only by means of a scuttle through which small articles can be passed up from a ladder in one of the chambers.

Preparatory to the shingling operation, one man and a large boy carried all the shingles to the roof and distributed them as shown in Fig. 7. The shingle bunches were all carried up at one point and laboriously distributed over the roof, where they were left for more than two days, taking the chance of a high wind, which luckily did not come, or the surrounding country instead of this roof would have been shingled.

Two courses of shingle were laid over the cornice, then the gutters were placed, and fastened, and the balance of the shingles put on, the workmen being shown at this work in Fig. 7, laying shingles without a shingling stage, and the entire roof covered with no foothold except an occasional 2 x 4-in. scantling tacked to the finished roof.

The staging used consisted of standards of 2, 3 and 4-in. scantling with 8-in. ledger boards nailed to the studding. The boarding was notched around the ledgers, and when the staging was removed, the ledgers were sawn off close to the boarding so that everything was smooth. The covering outside the frame was a good building felt, then redwood clap boards, laid 4 in. to the weather and put on without corner boards. The clapboards were simply sawn off at a slight angle—so that the outer one at the corner coped fairly against the inner clapboard on the other side of the corner.

A piece of tin, or galvanized steel, was placed over each corner joint, the lower edge being nailed, and the upper edge held under the next clapboard above. The tin strips or flashings appeared somewhat unsightly to the writer, but it certainly reduced the cost of corner construction to the minimum.

The redwood clapboards were magnificent, and the exterior of the house presented a very pleasing appearance, and would have looked well indeed could it have been finished in the natural cedar-like effect which it presented.

The painters followed the carpenters very

Fig. 1—View of Central Wall and Floor Joist

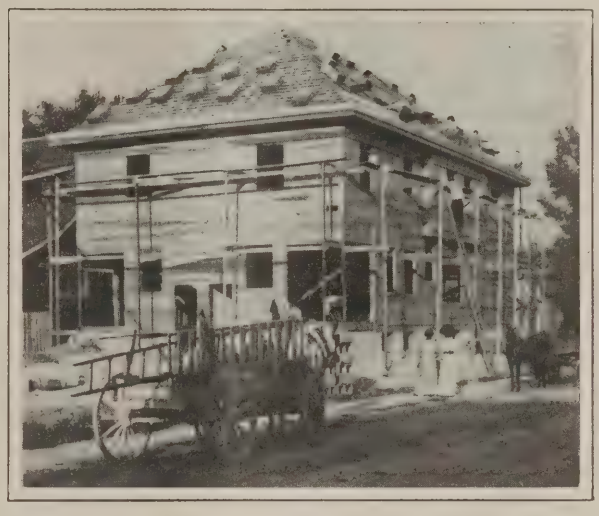


Fig. 7—Manner in Which Bundles of Shingles Were Distributed Over the Roof Area

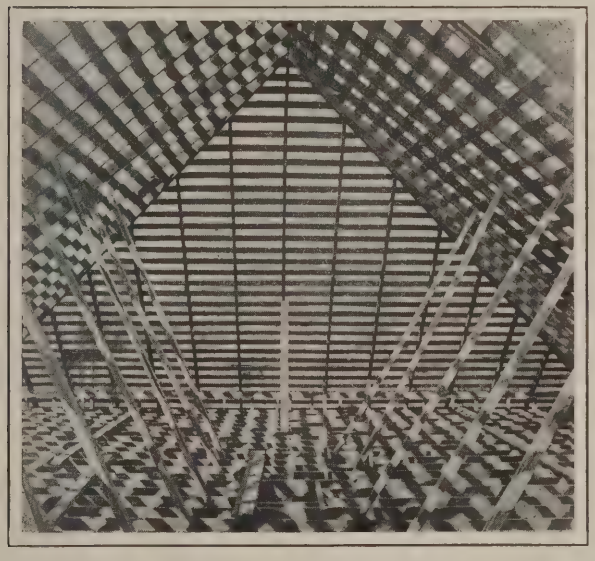


Fig. 6—Appearance of the Roof Framing

Fig. 5—Showing Arrangement of Hot Air Duct

Residence Construction in Indiana—Various Features of the Work

closely indeed, and no sooner was a piece of trim nailed in position, as shown in Fig. 8, than the painter had it daubed with a miscroscopic mixture, but what it really was no man knoweth except the painter and I doubt if even he knew what the stuff was made of, but it would spread marvelously thin, and its covering properties were immense.

At this stage the concrete men cemented the cellars and then went away, taking their gasoline driven mixer with them. The next day another concrete outfit appeared and put in the front piazza.

Fig. 8—The Painters Closely Following the Carpenters

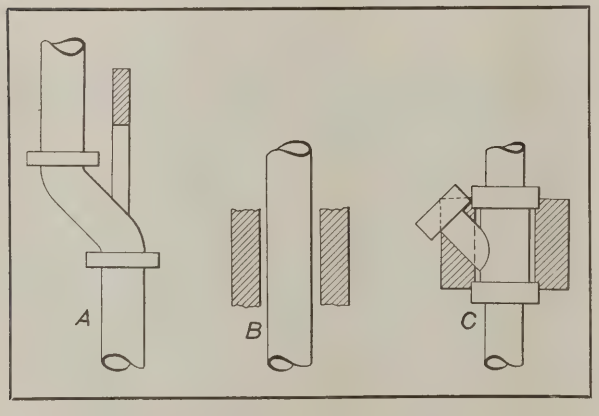


Fig. 9—Some Rather Bad Details

supported on three sides by concrete blocks, and on the other side by adhesion of the concrete to the sill planks of the house.

Had this been my house the space under the piazzas would have been left unfilled, fitted with a door, and used for growing mushrooms—and a tidy bit of income could be derived therefrom, too.

The front piazza was finished with a heavy brick balustrade, posts, at least 16 in. square, and heavy concrete cap stones on top of each post and upon the connecting fence between the posts. Nearly one-fourth of the piazza area was occupied by the heavy rough brick posts and walls. Wire-cut antique bricks were used, the roughest the writer ever saw and the clumsy piazza may be artistic, but it does not appeal to the writer, for it does not harmonize either with the wooden house or the concrete piazza floor or foundations.

In the building of the house, considerable skill was used in locating the studding, and instead of placing them 16 in. on centers and then cutting out for the windows and doors all the openings in the outer walls were framed, the pieces cut to length and nailed in position as the walls were set up. The window caps and lintels—double 2 x 4-in. stuff—were all cut and nailed when the walls were set up,

Fig. 10—Showing How Floor Joist Was Mutilated at Second Story Level

Residence Construction in Indiana—Various Features of the Work

Then they disappeared with their outfit, and a third gang showed up and put in the back and front steps; also the concrete walks. All these teamings and handlings of apparatus were by three men who got the work in three separate contracts, and the owner had to pay for it all. Better to have lumped the contract to one of the men, seems to me.

The floor level of the front porch, or piazza, was over 4 ft. from the original soil level, and just before the concrete was laid, the cavity, about 7 x 14 x 4 ft., was filled with loose cinder from a neighboring factory and was not even tramped—just trod a bit by the workmen who shoveled it in. Then the concrete was laid on top of the cinder, which must settle several inches, leaving that distance open, underneath the piazza floor, which is thus made a virtual bridge, or suspended panel, and after a man once got past a certain section of wall that section was done.

The second floor was put in place as soon as the roof was on, then all the partitions were marked out on the matchboard single floor and the position of each stud accurately shown. Some 2 x 4-in. stuff was then nailed along the floor, the stud marks transferred to these pieces, and the partition stud set up and accurately nailed fair with the pencil marks above noted. Fig. 10 shows a small portion of the central partition, and also the manner in which both the double joists were cut away to permit a bathroom trap to be placed in the floor.

It was evidently the intention of the architect to have the double floor joists at partitions, placed far enough apart to permit the soil and vent pipes to be run between them. But the manner in which

the plumber defeated the architects's good intention, is clearly shown in the picture. Not only was one of the important joists cut entirely off to permit a trap to be placed, but the other joist, the one to which the stairway header was spiked, was cut completely in two.

The manner in which the water, soil and waste pipes were run is also indicated in this picture,

Residence Construction in Indiana—Fig. 11—Framing for Electric Wall Plug

which presents a section of the floor in one of the bathrooms. One good point is apparent in this picture, the vent pipe is not of cast iron, with leaded joints, made up in the usual manner, but is a single length of wrought steel steam pipe, more than 15 ft. long, without a joint up to a point just below where it intersects the roof. There, owing to bad arrangement of rafters, an offset is placed in the pipe—two 45-deg. elbows—to avoid cutting the rafter, and from that point up cast-iron pipe is again used.

Fig. 9 shows the result of somebody's error in placing rafters—an expensive error, for it happened on both sides of the building, making necessary two offsets as shown by sketch A. Sketches B and C also show what happened in the floor as indicated in Fig. 10. The double partition joists were arranged as at B, to clear the soil pipe, but when the plumber tried to locate a V-branch between the joists there was trouble and the joists had to be cut out. Sketch C shows about the position occupied by the V-branch, both the double joists being cut entirely off. This matter should be watched very closely indeed when roof and floor plans are drawn, and provision made for getting the piping into place without seriously weakening or entirely cutting off important timbers.

The house was wired for electric light, and the wire used as sparingly as were lumber and nails. Each room was fitted with a wall switch, built in, but well supported by a frame pocket formed in the position shown in Fig. 11. Two pieces of board were cut in between studs, and the malleable iron wall switch box securely fastened to it by nails. No screws were used about any of the concealed wiring, and the porcelain knobs and cleats were fastened in place with wire nails.

The plastering was done without-grounds, it being simply stopped off at the edges of openings. The door and window jambs were all set before the house was lathed, and the plaster was run right up against the door jambs, but at the windows the plaster was left back at the edge of the pockets, being brought barely close enough to the window to allow the casings to cover. The same was done at top and bottom of windows and at top of doors. The jambs served as a guide for the float, thereby saving the expense of putting in grounds.

The stairs were set up with two stringers in place before plastering. The wall stringer was omitted until after plastering, then it was put in place on top of the motar and the treads and risers cut up against the skirt board, which broke even with the base boards, but as these boards were only 4½ in. wide, same as the casings, the effect was novel, to say the least.

The writer was much amused at the methods of the hod carrier, who invariably filled the hod with a hoe—never using a shovel for that purpose, and the top of the hod being rather above the level of the carrier's head.

Finishing the interior trim of the house was also done with the greatest possible degree of economy —for the contractor. The casings and stool caps were roughly fitted, the stool caps and aprons coped, then placed one side and filled and finished before they were nailed in place.

Oil stain was used. A lot of casing were spread loosely on trestles, the painter "went-for" each one with a big brush filled with oil-stain, then he dropped the brush and rubbed each piece with a rag until the stain was mostly rubbed in—or off. After the pieces had dried they were each given a very light rubbing, indeed, with sand paper, then they were daubed—I will not say varnished—with orange shellac. A little—very little—was taken in a flat brush, daubed along the length of each piece of trim, then brushed out until of microscopic thinness; it covered the filling enough so one could tell that the wood had been treated with shellac.

The trim was then nailed in place, the stool cap

Fig. 12—Rear View of the Completed House

being put on first with three small nails. Then the apron was fitted, the strips of wood cut under the apron, one at either end, reaching to the floor, and driven until the stool was brought square. Then the casings were fitted, cut off at bottom, marked across and cut off at top, under the cap, then the cap nailed. The casings were nailed next, and lastly,

each apron had one nail placed in its lower edge, at each wall-stud; then the braces were knocked out and the window was finished. The sash was fitted and weighted before the castings were put in place. The stool caps were thus held up under a strain to make joints under the side casings, and the cracks which must necessarily develop here with this method of window casing, certainly does not make a good recommendation of that method—to the writer, at least.

The tool keeping question on this job was solved the first day by means of a shanty built in the cellar and covered with roofing felt. Therein tools and supplies were safely locked at night.

In Fig. 12 is shown a rear view of the house after completion.

Building Methods in Canada

Methods of doing building work vary in many respects in different parts of the world, and it is always a source of interest to note wherein the differences exist. A building mechanic in Vancouver, B. C., writing to a recent issue of a London paper, describes methods of doing work in his section, some of which may interest members of the craft on this side of the line. We therefore reprint his letter, as follows:

"I have often wondered, when looking at the plans of houses in the *Illustrated Carpenter and Builder*, why British architects do not arrange the rooms on the ground floors more conveniently. There is no sense whatever in placing the kitchen in some obscure corner as if it were a thing to be despised; it should be placed next to the dining-room, with a doorway leading straight from one to the other, so as to give those who carry the dishes to and from the dining-room as little walking as possible.

"Here in Vancouver, although the exteriors of the houses are sometimes poorly designed, the interiors, on the other hand, are generally conveniently arranged, the dining-room being placed so that it can be easily entered from the kitchen.

"A scullery is considered unnecessary here, the sink being placed in the kitchen in small houses and in the pantry in larger houses. There are no coppers, the clothes being boiled in a wash boiler on the kitchen stove. The clothes are washed in the kitchen in the small houses, and in laundry tubs placed in the basement in the larger houses. The majority of the houses built now have a full-sized basement under the house, in which is placed a furnace for heating the house. A basement of this kind is a great benefit, for it keeps dry-rot from getting into the ground floor joists, besides being handy for a store-room and workshop. There are very few houses built without a bathroom.

"I have often thought what a great benefit to the building trade it would be if the men employed in it were not only acquainted with the methods of their own country, but with those of the whole world. They could then, if they were broad-minded enough, adopt any style of work prevalent in any other country which could be proved to be better than their own. I am an Englishman, a carpenter by trade, and I have worked at it in British Columbia about six years. My own idea concerning the methods of work here is that some are better than British, some not so good, and some about the same.

"Every home I have worked on—no matter how small—has had double floors, the under one being of shiplap generally laid diagonal, and the upper one tongued and grooved. The skirting, or baseboard, as it is called here, is never scribed to the floor, quarter-round being nailed to the floor instead to hide the joint; the skirting can therefore shrink and the shrinkage not be noticed. This method is much quicker, and makes a tighter job.

"Studs are never mortised and tenoned into either sill or head, being rightfully considered unnecessary as nails hold them just as well. Door-hanging is made easier by using loose-pin butts. Staircases are rarely made in the shop, but are built up on the job; this method takes longer, and is not so good a job when finished.

"The sash frames here have no back linings, for they are unnecessary, as on a frame house there is no mortar to contend with. They also have no inside linings, a wide casing being used instead of an architrave, which is nailed to the pulley stile on the inside edge and through the plaster into the studding on the outside edge. The usual way to put the sashcords in here is to cut them into lengths, thread them through the pulleys, and hang the weights before the inside casing is fixed, instead of taking out the pocket. This method causes some enterprising builders to omit cutting the pockets, which neglect causes trouble if a sashcord happens to break. In the smaller towns the sashes are very rarely hung at all, the top one generally being fixed and the bottom one having to be propped up with a stick to keep it open.

"Every carpenter here carries a steel square, although the majority do not know much about its uses, but use it for squaring off boards.

"The Canadian and American carpenters file their saws with the file pointing toward the point of the saw, instead of toward the handle, and the majority of Old Country carpenters adopt this method soon after they arrive in this country. I fail to see, however, that this is any better than the Old Country method, which I still practise."

Ancient Biographical Stone

A biography in stone, written by a man who lived in the third century B. C., is to be found on the island of Paros. It is an inscription embodying the remnant of a biographical account of the famous Parian poet Archilochos. The author calls himself Demeas. The sources used by Demeas are the works of the poet, and a list of the Parian Archontes. The fact that the text of this biography by Demeas is engraven in stone seems to indicate that the inscription was erected upon a spot dedicated to the poet Archilochos, where visitors might find summary information concerning the life and works of the great Parian poet. Unfortunately, the stone is terribly damaged, so that only a few words remain of the passages cited from the poet's verses. The name Demeas is a Delian name. On a white marble altar in the Leeds Museum, supposed to come from Delos, we read the words, "Dionusios Demeon."

CORRESPONDENCE

A Department Where Those Interested Can Discuss Trade Topics—Every Reader is Invited to Participate

A Convenient Sewing-Stand

From E. F. Petersen, Stamford, Conn.—During the winter months the carpenter often has many leisure hours which he can turn to profit by constructing useful household articles, such as the little sewing-cabinet illustrated in the accompanying sketches. For the housewife who does her own sewing this bit of furniture will be found most convenient, I am sure. The top tray for holding

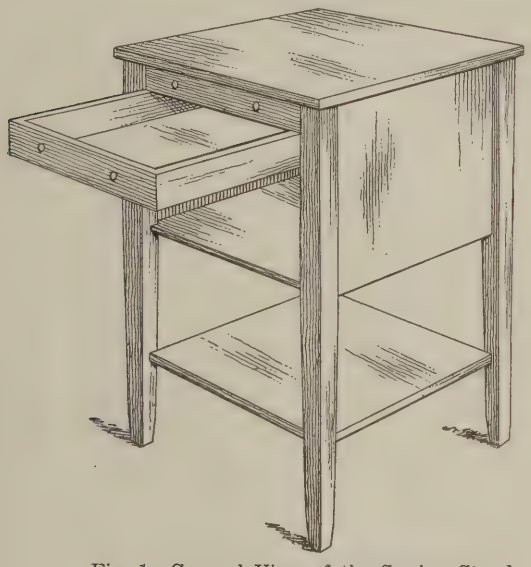


Fig. 1—General View of the Sewing Stand

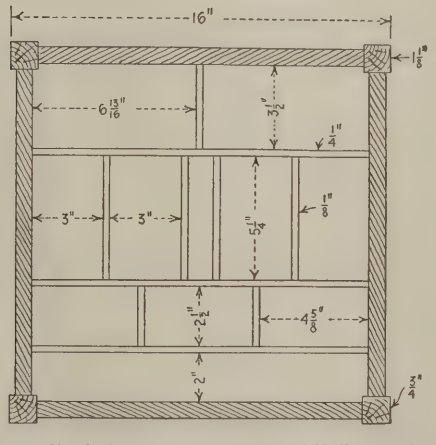


Fig. 2—Detail of Tray at Top. Scale 1½ In. to the Foot

Pieces	Size	Name
4	1¼ in. x 1¼ in. x 2 ft. 6 in.	Legs
3	⅞ in. x 15 in. x 1 ft. 3 in.	Sides
1	¾ in. x 16 in. x 1 ft. 4 in.	Bottom shelf
1	¾ in. x 2¾ in. x 1 ft. 3 in.	Drawer front
1	⅞ in. x 2¼ in. x 1 ft. 3 in.	Front rail
1	⅞ in. x 18 in. x 1 ft. 6 in.	Top
1	¾ in. x 1 in. x 1 ft. 3 in.	Drawer bar
3	½ in. x 15 in. x 1 ft. 3 in.	Shelves and drawer bottom
3	½ in. x 2¾ in. x 1 ft. 3 in.	Drawer sides and back
1	⅞ in. x 9¼ in. x 1 ft. 3 in.	Door
4	¼ in. x 1¾ in. x 4 ft. 6 in.	Partitions
1	⅛ in. x 1¾ in. x 3 ft.	Partitions
2	¾ in. x ⅞ in. x 1 ft. 3 in.	Drawer runners

To the carpenter who is clever with his tools the accompanying bill of material will be found of use in laying out the cabinet here shown.

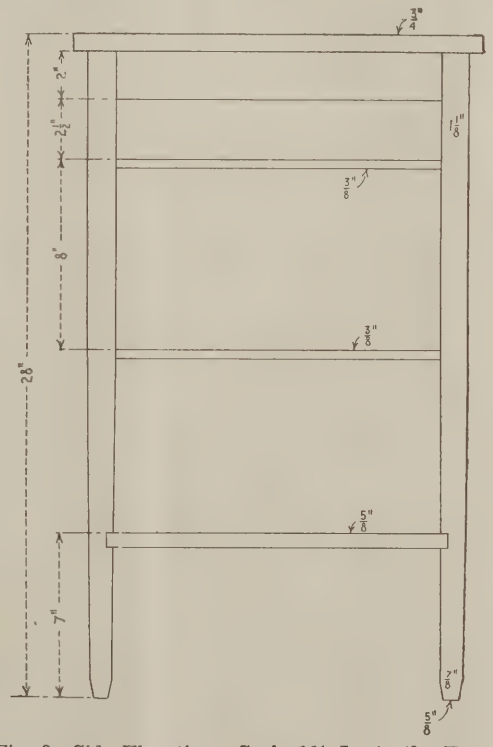


Fig. 3—Side Elevation. Scale 1½ In. to the Foot

A Convenient Sewing Table—By E. F. Petersen of Stamford, Conn.

spools of silk and cotton, buttons, hooks and eyes, needles, etc., will prove a treasure to the busy sewing woman.

The small drawer and the compartment below it are handy for holding the week's mending or any small bits of sewing, while the whole thing may be closed, thus making it dust-proof.

Why the Chimney Tops Overhang

From D. P. B., Redford, N. Y.—Regarding the query of "E. A. N." of Rockville, Conn., the most probable cause of his phenomenon is that the chimneys were built that way. There is no physical property in brick that would cause the chimneys to lean 2 in. within a distance of 5 ft. and stay so. They were likely all built by the same person, who used no plumb and stood on the same side of the chimney and kept pulling the brick toward him. This is no rare phenomenon.

I saw a mechanic (?) build one about 7 ft. high, and it certainly leaned 4 in. to the west. Another mechanic (?) did even worse—both leaned the way the roof sloped. I have had many persons tell me a corner was out of plumb or a foundation out of level when the only thing out of level was the ground. Many streams to many persons flow uphill. One stream seems so to me and a certain piece of road slopes downhill when I am going up, and slopes uphill when I am going down, yet the water flows, as Cosmus Indicopleustes said, the Nile flowed. If I sit on the bank of a rapid stream and gaze for awhile at the water it suddenly seems to flow in the opposite direction.

Trouble with a Damp Cellar

From A. M., Yonkers, N. Y.—There is a farmhouse in which the rain seeps through the foundation walls into the cellar, rendering it damp and uncomfortable. This, however, only occurs during or after a very long and heavy rain. Will some of the practical readers of the paper tell me of a method to overcome this trouble?

We have just put in a new furnace, the cellar having been dug out and a cement floor put under the heater and coal bin. The mason said we should have a drain pipe, but I thought a good pump would be more satisfactory.

Proportions of Barn Ventilators

From Builder, Moffitsville, N. Y.—In reply to the query of "C. B. C.," Saginaw, Mich., I would say that there is no detail of building that varies so much as barn or other ventilators, and everyone has a right to his own opinion without going to war to defend it.

The ventilator should not be more elaborate than the barn itself, although this is often the case. The finest ventilators are rather small of body, high of statue, and rather elaborate. Some of them are 6 ft. square and 13 ft. to 16 ft. from the ridgepole to the vane. Some have perpendicular roofs, others dome-shaped, and still others octagonal. If there is a demand for these, and the editor permits, I will send a few elevations and details for those who may be interested.

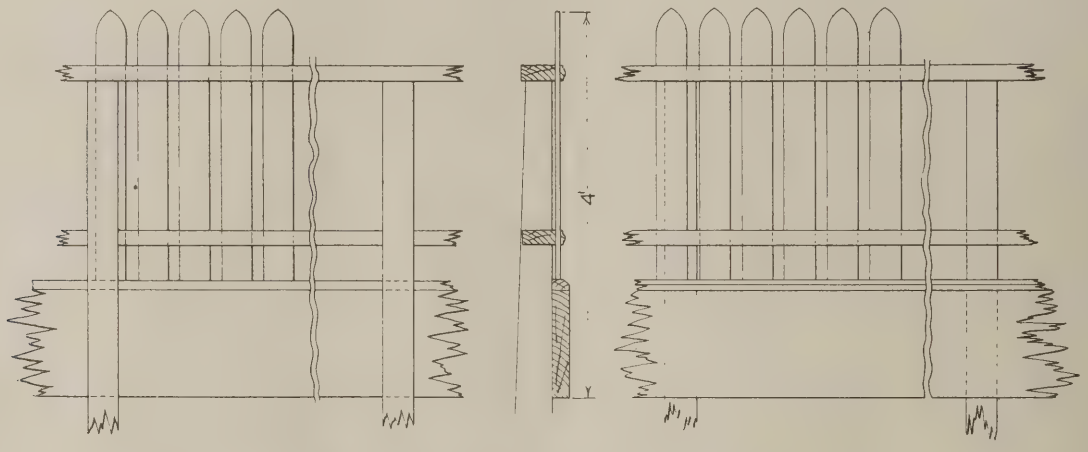
In my personal work, I follow this rule: Make the length of the ventilator 1/6 to ⅛ the length of the barn, and obtain the other dimensions by proportion. This is a good rule for barns up to 80 ft. in length when they have two or more ventilators. For small barns of plain construction the ventilator may be square with a hip roof and having a cornice as heavy as the main building.

Designs Wanted for Fences and Grape Arbor

From W. M. L., Orange, N. J.—I would greatly appreciate it if Mr. Wavreck or other interested readers would furnish designs for panel, picket and board fences, also some designs for a practical grape arbor that would cause as little shade on the lawn as possible. I send sketches showing the present arrangement.

Plans and Elevations for a Castle

From John W. Morton, High Bridge, N. J.—In reply to "M. P.," Wilkes-Barre, Pa., who inquired in the June issue of the paper for plans and elevation of a castle, I beg to submit the accompanying drawings of an old Danish-German castle from about the twelfth century. It is the well-known "truss" style, oak beams being used throughout in connection with red brick or tile. Stucco, however, might be used if preferred.



Designs Wanted for Fences and Grape Arbor—Sketches Submitted by "W. M. L."

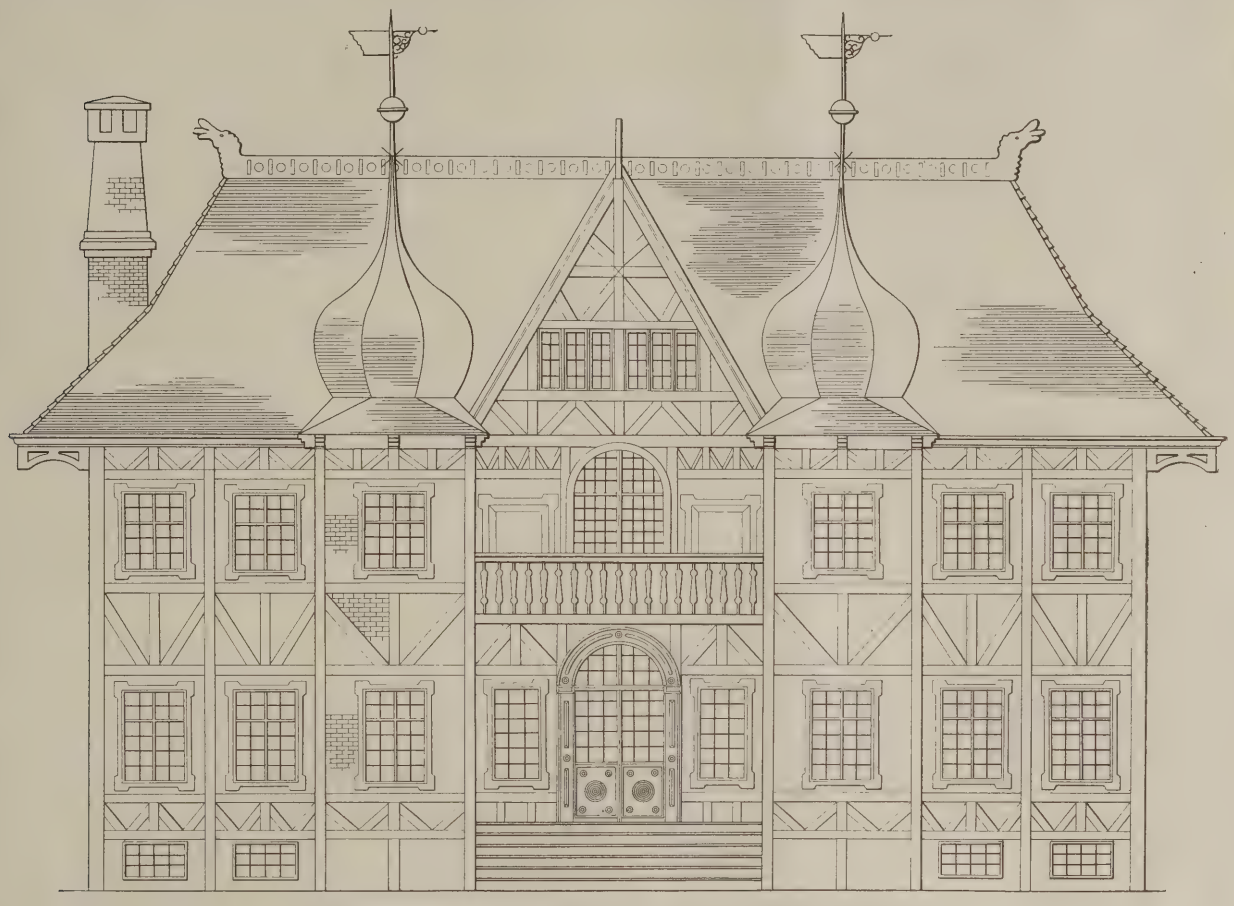
On the ground floor the correspondent will find a kitchen, a library, dining-room and drawing room as specified in his communication in the June issue. This arrangement, however, may be slightly changed in that the library and dining-room may change places, but the writer does not consider this as giving as good a result as the plans show it. There is also a conservatory in the back which leads to the garden. On each side of this there is a spiral stairway leading to the second floor for convenience sake and also for the use of the servants.

In the entrance hall a capacious stairway also leads upstairs where the specified number of bed and bathrooms may be found. In the attic to which the spiral stairway leads will be ample rooms for the servants and there might also be provided guests' rooms. It will be noted that each bedroom is provided with a clothes closet and also in the hall next to the stairway. In front of

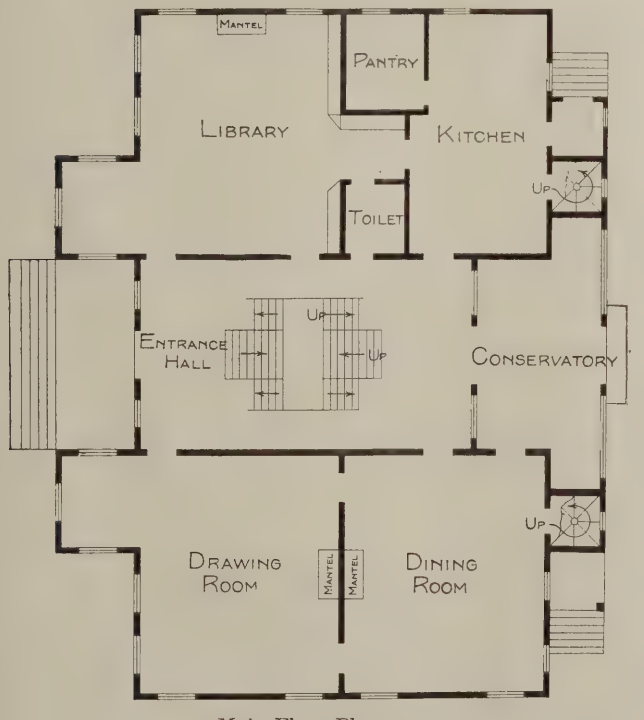
this are glass doors opening out upon the balcony.

The interior finish and trimming should resemble the cozy old-fashioned style with beamed ceilings and high wall panels. Fancy trimming and carving should be used abundantly, especially in the entrance hall, on the stairway post and hand rails, also between the drawing and dining-rooms. All the fancy trimming may be kept in the style of that shown on the ridge. The bedrooms may be finished with plaster panels on walls and ceilings.

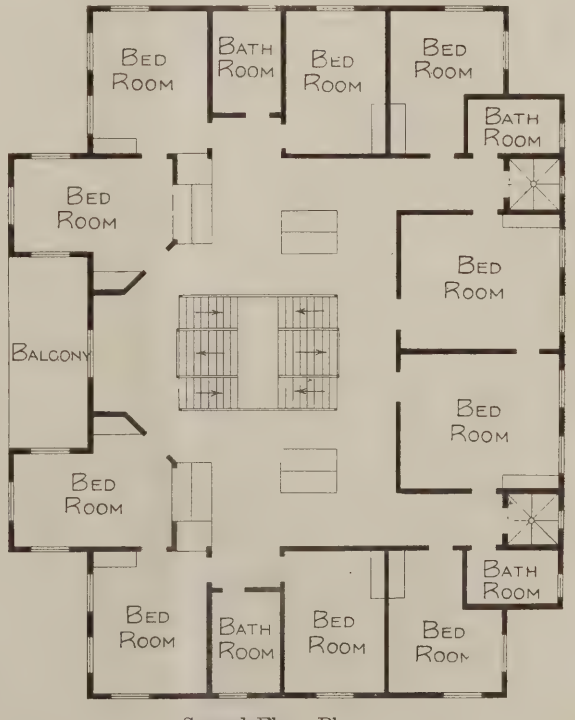
In the entrance hall opposite the conservatory is the stairway leading down to the cellar, where there is room for the boilers for the heating system, laundry, wash room, storage rooms for vegetables, garden tools, wines, etc., also a toilet room may be provided. The radiators of the heating



Front Elevation of Building Showing General Style of Treatment



Main Floor Plan



Second Floor Plan

Plans and Elevations for a Castle—Submitted by John W. Morton, High Bridge, N. J.

system are concealed in panels below the windows.

Referring to the front elevation, the two steeples or towers are made octagon in shape above the first floor and covered with tile shingles of fancy shape. The roofing itself is covered with red tile.

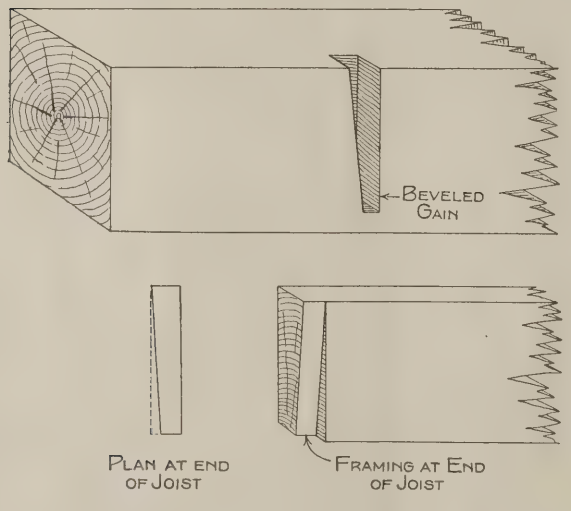
To add to the beauty of the building granite tapered stone about 3 ft. high may be placed in the front of the house from the main steps to either side and about 5 ft. to 6 ft. apart. An iron chain may be hung between them with a slight sag in order to give a graceful curve.

The windows are all made to swing outwards, thus giving a good weather-proofing job while adding to the ease of ventilation, it being simply necessary to open the small set in a panel.

The three fireplaces in the buildings are set in red brick fancy laid, or tile may be used. The writer has many details of the interior trim and also several photographs he would be glad to submit if the correspondent in question is interested.

Carrying Ends of Joists on a Girder

From D. P. B., Redford, N. Y.—I take the liberty of criticizing the construction indicated in Fig. 46 of Mr. McCullough's article, on page 29 of the September issue of the paper, as bad engineering, cheap and unsafe building. The spikes serve as wedges to split the girder as center nailing does



Carrying Ends of Joists on a Girder

rafters. Many of the joists will season check at the top of the bearing strip, and according to the load will badly split. I have had to remedy many jobs like that, and many more I know need remedying. Unless covered top and bottom many joists wind at the ends and tip over as far as the wind will allow; bridging will not hold them up unless very close. In my opinion, all young builders should eschew that method and get up higher.

Use a girder 2 in. higher than the joists and wide enough to carry the load. Cut the gains ½ in. narrower at the bottom than at the top and frame the end of the joist to fit, as indicated in the accompanying sketches. Make a good pattern as for stair balusters, with a stop at the top; it will mark both girder and joists. Bore a hole at the bottom of the gain, chisel it out, and then use a saw to cut the gains. Before putting the joists in place spring the girder upward as much as possible and sledge the joists in place. If you want to do high-grade work dovetail a few.

Building an Ice House

From D. P. B., Redford, N. Y.—I would say to "H. G. G.," Leslie, Mo., that the best way to build an ice house is not the cheapest. If he can obtain such blocks as were described in THE BUILDING AGE for March, 1914, wherein is presented an excellent picture of a small ice house, he certainly should use them. If, on the other hand, he can get field stones, he may lay up a dry wall, which, when thoroughly pointed, makes a good hollow wall and a non-conductor of heat and cold. The walls should be hollow all the way to the bottom. The correspondent will require a solid mass of ice 15 x 20 x 8 ft. to weigh 75 tons.

It is not good practice to dig below the surface of the lower side if built on a hillside. The bottom should be concreted and timbers or joists laid on the concrete, and upon these in turn boards should be placed to allow of a free circulation and for drainage. The ice should be packed solid and free from the walls.

A roof of rough material should be put on. nailed close. An opening a foot wide should be left at the top or peak. A foot above this the permanent roof should be put on, leaving an opening a foot high at the eaves. No other ventilation will be needed.

Before filling, all openings should be left unclosed so that the inside temperature may fall below zero, if possible. One corner may be partitioned off with galvanized iron for a refrigerator.

If the correspondent in question cannot obtain cement blocks or stones, he can make a hollow wall 8 in. thick by using two sets of 2 x 6-in. studs and set them staggering; that is, so they will not stand opposite each other; one set will carry each roof. He may use stucco on each side of the walls, mixing about 5 per cent of Maltha by weight in the cement after wetting. If he prefers, he may cover the inside studs with heavy corrugated galvanized iron. The outside studs may be covered with 2-ply paper and boarded.

Solid walls and single roofs will not keep ice. Packing between walls and ice is not good practice. Sawdust should be kept off the ice. If necessary to cover it, use fine oat straw. I have seen large masses of ice along Lake Champlain in September even when the frail building housing it had burst and exposed the ice to the direct rays of the sun.

Cleaning Promenade Tile

From H. B., West Pittston, Pa.—It is very difficult to remove Portland cement from tile after it is grouted on; it should be washed off immediately after the grouting. However, I am inclined to think that a solution of muriatic acid—about a pint to a pail of water—will do the trick all right, if used with a scrubbing brush.

The saw mill is said to have been the invention that molded the character of American architecture.

Some Designs of Built-in Furniture

A List Embracing Dressers for the Living and Dining Rooms and Cupboards for the Kitchen

By J. Gordon Dempsey

IN considering the laying out of the various rooms of any residence, bungalow, etc., there are certain details which must be considered. Among them are the built-in fittings or furniture in the various rooms. In all modern homes there are more or less dressers, bookcases, seats, etc., being built into them, for they more than half solve the problem of furnishing the rooms.

Many interesting designs of built-in furniture can be made to fit the various sides and corners of the rooms, and are much more decorative and comfortable than detached pieces could be in the same place. Built-in furniture is the keynote to the rest of the furnishings in any room and it is a comparatively simple matter to select the remainder. The fittings must be well located, practical and pleasing to the eye so that they will add beauty to the room.

The designs as here given are all a part of the construction of the house and from them may be derived many valuable suggestions.

Figs. 1, 2 and 3 are designs of kitchen cupboards and beside each is represented a vertical section of it. Fig. 1 is built into the partition wall while with those shown in Figs. 2 and 3 the backs are flush with the walls. It would be an easy matter, however, to change the construction, so as to make the back of Fig. 1 flush with the wall or to build Figs. 2 and 3 into the wall. Figs. 1 and 2 are generous in proportion and would afford ample room for all the kitchen dishes and utensils. Fig. 3 would fit very well in a small room where the space would not permit of a large cupboard. If desired the upper doors could run all the way down and provide more closed in space.

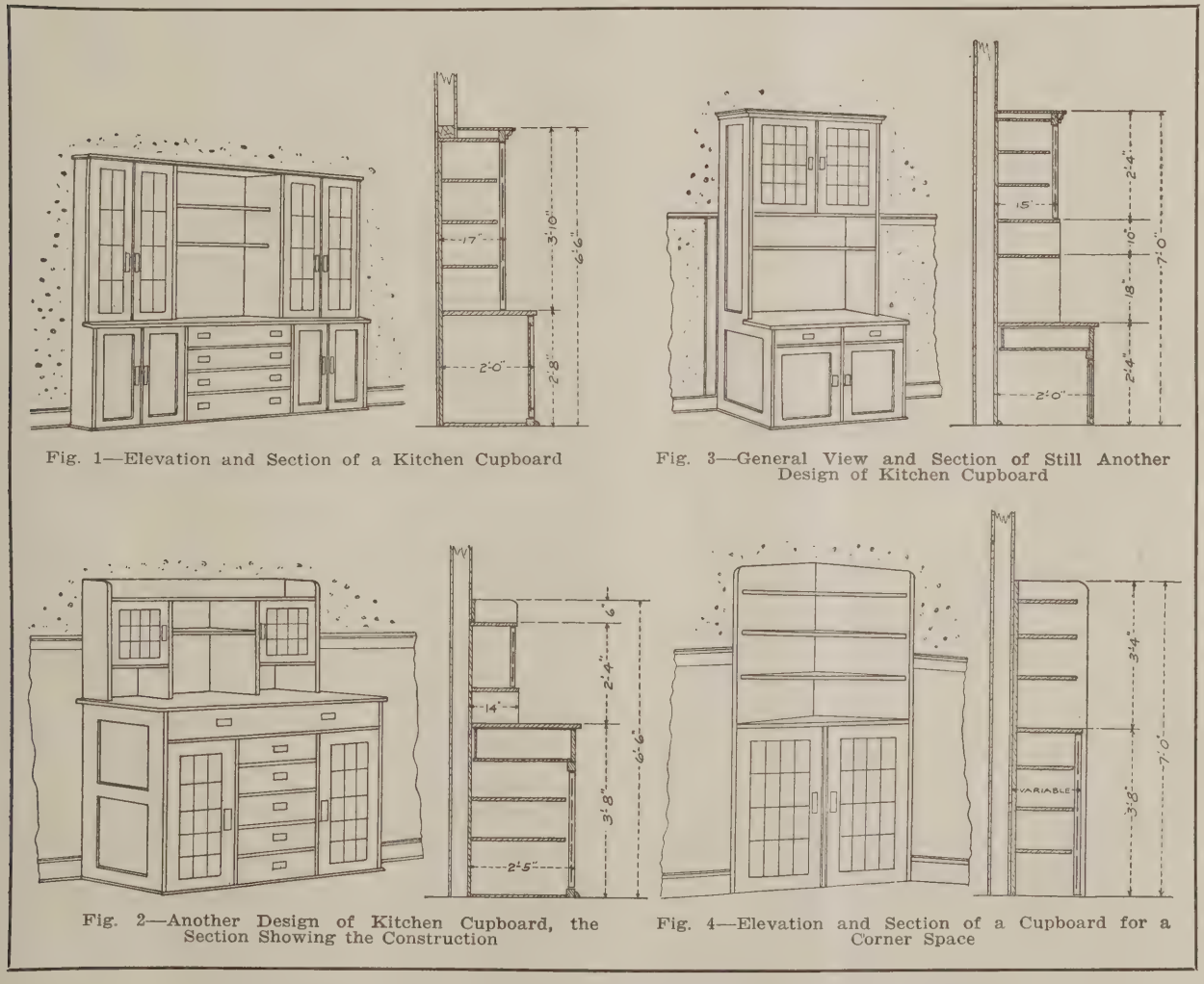


Fig. 1—Elevation and Section of a Kitchen Cupboard

Fig. 3—General View and Section of Still Another Design of Kitchen Cupboard

Fig. 2—Another Design of Kitchen Cupboard, the Section Showing the Construction

Fig. 4—Elevation and Section of a Cupboard for a Corner Space

Interesting Designs of Built-In Furniture—By J. Gordon Dempsey

Figs. 5, 6, 7 and 8 are designs of dining or living room dressers, Figs. 5, 6 and 8 being built flush with the wall while Fig. 7 projects out from the wall. Fig. 5 has a recess between the cupboards and drawers of about 12 to 15 inches. Fig. 6 is built into a bay in the outside wall as is evidenced by the windows. Fig. 7 has two small cupboards above and two beneath, with plenty of drawers, which makes a first-class dresser. Fig. 8 has two large doors extending from the top to bottom in the center and a small one on either side with drawers beneath.

New Club House for Nurses

Among the important building improvements on the east side in the Borough of Manhattan, N. Y., is a Central Club for Nurses, which will rise to a height of fourteen stories and have accommodations for 254 nurses. The facade of the building will be of Italian design, with a base of granite, above which the walls will be of red brick trimmed with limestone and terra cotta. The interior finish will be very simple with the exception of some wainscoting and plaster cornices on the first and second floors. The woodwork in the rooms on the first and second floors will be painted, while for the rest of the building a natural finish will be used. The structure is being erected in East Forty-fifth Street by the Young Women's Christian Association, and the plans were drawn by Parish & Schroeder, 12 West Thirty-first Street, New York City. The estimated cost of the improvement is $240,000. Over the front portion of the building will be a roof garden.

Countersinking for Screw Heads

When the heads of screws are to be concealed by means of stopping, it is necessary for them to go below the surface; but in any case it is advisable for them to go a little below, so that if a plane has to be used on the surface afterward it will not touch the screw, says a recent issue of the *Wood Worker*. When the holes are not countersunk, and the screws are tightened until their heads are sunk sufficiently, this has the effect of twisting and breaking the wood slightly around the screw head; therefore, it is better in most cases to enlarge or countersink the hole. This is done either with a countersink bit and brace or by scooping it out with a gouge.

In neat work a countersink bit is always preferred. Sometimes a larger hole to receive the head of the screw is bored ½ in. or more in depth, so that the head will sink to that distance and can then be concealed by means of a wood plug. When plastic stopping is used, the head is generally not sunk more than about 1/16 in. Another method, adopted in special cases, is to use round-headed screws, the heads of which are not sunk in, but stand above the surface.

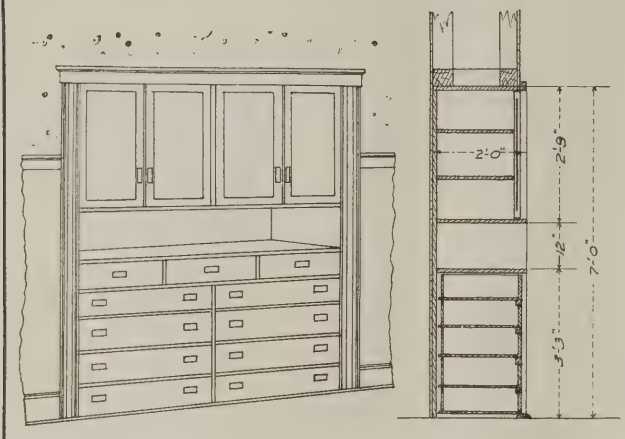


Fig. 5—Elevation and Section of a Dining Room Dresser

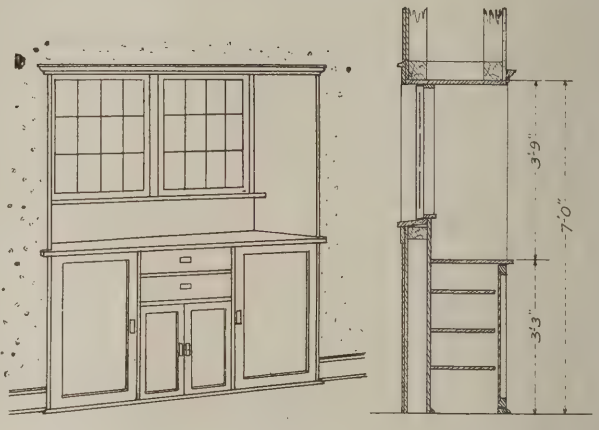


Fig. 6—Dresser Built Into a Bay in the Outside Wall

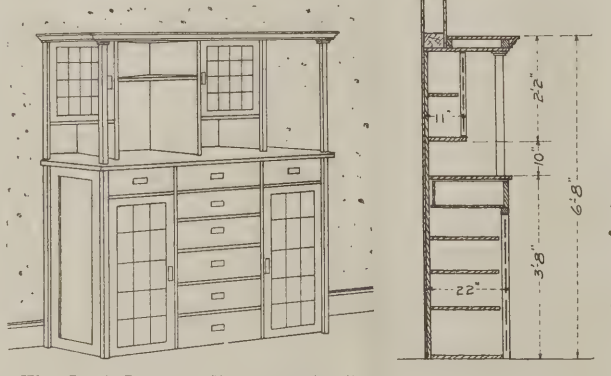


Fig. 7—A Dresser That is Built So as to Project from the Wall

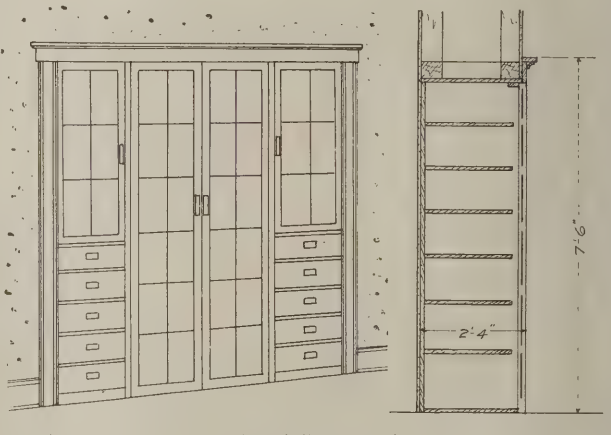


Fig. 8—Another Style of Dresser for the Dining or Living Room

Interesting Designs of Built-In Furniture—By J. Gordon Dempsey

New York's Revised Building Code

Sections of the Code Relating to Chimneys, the Installation of Heating Apparatus, Roofing and Roof Structures

IN our issue for August there was published some of the more important sections of New York's revised Building Code, which up to that time had been approved, and attention was called to many of the changes made in the building regulations. Since then two important Articles have been prepared and issued in preliminary form by Rudolph P. Miller, expert to the Building Committee of the Board of Aldermen. One of these, known as Article 19, deals with chimneys and heating apparatus, while the other, known as Article 20, covers roofing and roof structures.

Classification of Heating Devices

Article 19 provides that all smoke flues must be encased in masonry, the thickness of the walls depending on the character of the heating apparatus to be served. For this purpose heating devices are divided into three grades; low, medium, and high; the low grade being those in which the temperature does not exceed 600 deg. Fahr., such as bake ovens, coffee roasters, hotel ranges, hot-water furnaces, low-pressure steam boilers, etc.; medium grade heating devices are those in which the temperature varies between 600 and 1500 deg. Fahr., such as high-pressure steam boilers, annealing furnaces, smoke houses, gas producers, etc.; the high grade heating devices are those in which the temperature runs over 1500 deg. Fahr., such as blast furnaces, cement kilns, earthenware kilns, porcelain baking ovens, etc.

For ordinary kitchen ranges the thickness of the masonry around flues must be 4 in., unless wood studding, furring or sheathing is placed against it, when 8 in. is required. All flues, however, must be lined. For other low grade heating devices the wall thicknesses of the flues must be 8 in., besides being lined. For medium grade heating devices 8-in. walls are required, besides 4 in. of fire brick for 25 ft. from the smoke connection. The flues for high grade devices must be built double, there being an inner lining of fire brick.

The cutting off of the draft of flues of existing buildings by reason of carrying adjoining buildings to a greater height, which has given more or less trouble in the past, is taken care of by a provision requiring those who are erecting new buildings or raising existing ones to a height greater than adjoning chimneys to carry the chimneys up as the building progresses, placing the responsiblity for this on those doing the new work.

Fireplaces

The provisions as to fireplaces and mantels are very much the same as those in the present code. Eight-inch backing with a fireproof lining is required for fireplaces. Trimmer arches supporting hearths must be provided to all fireplaces or chimney breasts. When heaters are placed in fireplaces, the mantels must be of incombustible material. Woodwork of mantels must not be nearer than 12 in. to the sides or top of open fireplaces. Flame fireplaces must be built against brick walls.

A new section is added covering the construction of metal stacks. Three types of stacks are provided for: independent stacks which stand by themselves and must rest on an independent foundation, stacks immediately outside of the building which they serve, and interior stacks which must be enclosed in at least 8 in. of masonry. All metal stacks must be carried at least 10 ft. above the highest point of any roof within 25 ft.

There are sections dealing with cupola chimneys and underground flues.

Protection Against Fire

One section is devoted to specifying how heating devices of different grades must be mounted to protect any combustible construction on which they rest. This section also provides for the extent to which this protection must be carried on all sides of the device and for the clearances between the devices and combustible construction above and around the same. Heating devices which emit vapors, fumes or gases, or cause the banking of heat against combustible construction must be ventilated by means of hoods and flues carried to a point above the roof.

Ordinary kitchen ranges must rest on trimmer arches and proper hearths.

Vent flues in masonry must be at least 4 in. thick and lined with flue lining. When they are used for the venting of low grade gas-burning devices, three flues may be placed in one passage, provided they are separated by double flue linings. Not more than one gas-burning device will be permitted on any one flue, and no such flue must be connected with a smoke flue.

Ducts for the transmission of air through buildings may be constructed of sheet metal and protected in various ways against surrounding woodwork, depending on whether they run through floors, partitions, closets or open spaces.

Smoke pipes are prohibited from passing through any floor or non-fireproof roof. Clearances between smoke pipes and combustible construction are specified for varying conditions. Protection of smoke pipes from ordinary ranges and stoves through partitions are the same as the requirements of the present code.

Requirements as to steam and hot-water pipes in floors remain unchanged.

The provisions for protection against excessive heat from gas fixtures of different kinds are specified somewhat more elaborately than in the present code.

Roofing and Roof Structures

Article 20 starts out with the general proposition that all construction hereafter placed above any roof of a building within the fire limits, and of any building over 40 ft. high without the fire limits, shall be of incombustible materals. Certain exceptions to this are provided for later on.

Roofing is required, as in the present code, to be of brick, tile, slate, tin, copper, iron, or plastic slate, asphalt, slag or gravel, besides which asbestos roofing or concrete roofing will be accepted.

Cornices and gutters, as heretofore, will be required to be of incombustible materials, except in the case of frame buildings. Existing cornices that become unsafe and dangerous or damaged to the extent of one-half or more must be taken down and if replaced made to conform with the requirements for new cornices. If not damaged more than one-half they may be repaired.

All buildings are required to have leaders for conducting water from the roofs. These leaders must be connected with the sewer, and where there is no sewer the water must be conducted by pipes below the surface of the street to the street gutter or a cesspool.

All skylights hereafter must be constructed of metal; the parts must be all thoroughly riveted together in ad-

dition to any soldering that may be done. Skylights that are placed over shafts of any kind must be glazed with plain glass. When plain glass is used in any skylight, it must be protected by a wire screen immediately above the skylight. In public passageways or rooms of public resort a similar screen must also be placed below skylights with plain glass. No pane of glass in a skylight must exceed 720 sq. in.

Scuttles are required on all buildings over 15 ft. high, except dwellings with peak roofs; and where a scuttle is provided there must be an iron ladder leading to it. They must be covered on the top and edges with sheet metal or other approved incombustible material. All scuttle openings must be at least 2 by 3 ft. in size.

In the provisions regarding roof houses a distinction is made and a rather sharp line drawn between bulkheads and pent houses. The term bulkhead applies only to enclosed structures around stairways, shafts of any kind, tanks, elevator machinery or ventilating apparatus. Any other enclosed structure above the roof is a pent house, provided it is not more than 12 ft. above such roof.

Any enclosed structure except a bulkhead is treated as a story of the building. The only purpose in providing for pent houses is to make provision for a construction of the exterior walls of pent houses where they do not come over walls in the story beneath that is lighter than the construction required for the exterior walls of buildings. Walls of bulkheads on buildings over 40 ft. high must be constructed of fireproof materials. Any construction accepted for fire partitions will be permitted for the construction of bulkhead walls.

The roofs of any such bulkheads, if not constructed as a fireproof floor, may be of angle or tee iron supporting block tile of terra cotta, concrete or gypsum. All bulkheads, however, must be covered on both top and sides with some incombustible, weatherproof material. Such walls of pent houses as are set back more than 5 ft. from the walls of the story below may be of 8-in. brick or 6-in. terra cotta or concrete. They must be supported on steel or reinforced concrete girders.

Windows in roof houses, except where required to be fireproof by other provisions of the law, are to be constucted the same as the exterior windows of the building. Doors in roof houses of any kind must be metal or wood covered with metal.

A provision is made for sun parlors and similar roof houses, which must be of incombustible materials throughout and the floors of which must be constructed as is required for the roof of the building.

Roofs having a slope of more than 60 deg., with the horizontal must be constructed fireproof, as heretofore, and the dormer windows in any such roofs must also be of fireproof construction.

Tanks are to be supported on masonry, reinforced concrete or steel construction of sufficient strength and carried to a proper foundation. An emergency valve must be placed in or near the bottom of every tank. No tank shall be placed near a line of stairs or an elevator shaft. All roof tanks shall have covers with proper slope and if of wood, covered with metal. When hoops are used on tanks they must be of steel of round section.

An Ornamental Sidewalk Shed

DURING the erection of new buildings or the alteration of old ones, it is customary in the larger cities to erect sheds or scaffolds over the sidewalk to protect passing pedestrians while the work is in progress. Sometimes these sidewalk coverings are simply rough plank and timbers calculated to sustain the loads that may be placed upon them by the contracting builders. In other cases, however, the covering is made more ornamental and sightly so that it in no way detracts from the street architecture. Again, the sidewalk shed is utilized for business purposes and thus is made to serve a double advantage to those directly concerned.

An interesting example of the latter treatment is shown in the accompanying picture which represents the arcade or shed over the sidewalk in front of the building containing the Cleveland offices of THE BUILDING AGE. The structure in question is the New England Building on Euclid Avenue, Cleveland, Ohio, and into the outer wall of the structure along the sidewalk shed has been set eight show windows for the display of goods of the company occupying the ground floor of the building now in course of alteration.

Sidewalk Shed in Front of a Cleveland Building During Alterations in the Façade

Industrial Education in the South

How the Mountain Boys of the Blue Ridge Region Are Being Taught Many Useful Trades

IT has been said that the best way in which to keep a child out of mischief is to give it something to do and the best way in which to keep a man out of mischief is to teach him in his youth how to become a useful member of society by instructing him how to do some one thing well. This fact has been recognized in dealing with the problem of the Southern mountaineer, and most of the educational institutions—and there are many—which have been founded with the purpose of solving this problem, lay great stress upon their industrial departments, particularly those in which vocational training is given.

A number of these institutions are scattered along the mountain borders on each side of the Ridge, among them being Berea College at Berea, Ky.; the Berry School at Rome, Ga.; the Willard Industrial School at Landrum, S. C.; the Lees-McRae Institute, Banner Elk, N. C., and the W. C. T. U. Settlement School at Hindman, Knott County, Ky. The Willard Industrial School for the white mountain boys and girls is situated in the northern part of South Carolina at the foot of Glassy Mountain, which is 2706 ft. in hight. The Lees-McRae Institute is situated in a valley in the heart of the mountains, 4000 ft. above sea level, and near the head waters of the Watauga River, in North Carolina. By far the largest and most influential of these institutions is Berea College, located in the village of Berea, in the foothills of the Cumberland Mountains of the State of Kentucky.

In the history of ante-bellum days, the name of Gen. Cassius M. Clay was a leader in the movement for gradual emancipation. He was the founder of Berea College. General Clay noted the fact that the mountain people owned land, but did not own slaves, and he, therefore, decided to found in the edge of the mountains a settlement in which free speech could be maintained. Out of this settlement grew the village and the college of Berea, the latter being founded in 1855.

The students in attendance number about a thousand in the fall when many are engaged in teaching mountain schools, fourteen hundred or more in the winter, and a thousand in the spring, when some must leave to engage in farm work. The number of individual students in any one year is more than sixteen hundred, this number including 250 children of the village who are in the "model schools." The eight mountain States are all represented, but the larger number of students come from Kentucky, Virginia, West Virginia, Tennessee and North Carolina.

Berea was the first institution to note the special worth and need of the mountain people and to make careful adaptation for their benefit. It is thus called upon to do much original, unusual, and constructive work, and the industrial courses, particu-

Industrial Education in the South—Mountain Boys Learning Carpentry in the Shop at Berea College

larly those involving vocational training along the lines of carpentry and building work, are the outgrowth of this necessity for the application of original methods in solving the problems at hand.

Tuition is free at Berea College with merely nominal incidental fees, and the institution is dependent for support on voluntary contributions. It is conducted somewhat like a home and all the necessary work, including care of building, housework, etc., is done by students and extra work is provided so far as possible in shops, field, laundry, etc. All students, whether they need to earn money or not, are required to work as much as seven hours a week, exclusive of school work, unless the supply of work fails, as is sometimes the case during the crowded winter term. In such cases students excused from work are assigned to the gymnasium. Applications for work are made to the secretary by letter, stating what kind of work the applicant can do. Labor is considered a part of the education of the students, and the shop, farm, boarding hall, laundry, etc., are maintained both for their educational value and to enable students to earn partial support.

The regulations place each student under a superintendent who has the power and responsibility of a teacher and signs payrolls. Students at work must wear suitable clothing, refrain from conversation that hinders work and be responsible for damage to material, etc., or loss of tools. No job may be sub-let and the amount of pay is proportioned to the service rendered at rates corresponding to the price of board, etc. Rates of pay are the same in all departments and payment by the piece is the preferred arrangement.

The carpentry course is one of the most important at the institution and the best proof which can be given of the practical character of this work is shown in the college chapel, the auditorium of which has a seating capacity of 1400 persons and contains an upper chapel, three class rooms, and all of the conveniences usualy found in such a building. This structure was built by students of the carpentry and other industrial courses. The student is instructed in the care and use of tools, is taught the varieties and uses of the different woods and the methods of making various joints for cabinet and framing work with their applications; framing, mortise and tenon joints, construction of balloon frames for dwellings and other structures; hip and valley roofs, and general house building, bridge building, also the making of farm implements, window frames, sash construction and stair building. He is given practice in the making of specifications and estimates. A house is designed by students and general and detailed drawings prepared, tracings made and blueprints taken from the tracings. Students who so desire are given the opportunity of working on plans for some small public building, such as a church or schoolhouse. The woodworking building is three stories in hight and is equipped with up-to-date models of the various power woodworking machines. A view of the shop showing members of the carpentry class at work is given in the halftone illustration.

This carpentry course, combined with the other industrial courses, is helping to produce among the mountain people an alert and intelligent body of workers whose self-reliance and energy will gradually convert the Blue Ridge mountaineer into a national asset in place of a liability.

Death of Charles T. Wills

In the death of Charles T. Wills, which occurred on Aug. 31, at Belle Haven, a suburb of Greenwich, Conn., the city of New York lost one of its prominent builders. He was born in the latter city in 1851, and in 1873 entered the building and contracting business with George Sinclair, which continued for a period of five years under the style of Sinclair & Wills. At the expiration of the partnership he continued the business under his own name, and later it was incorporated as Charles T. Wills, Inc., in which George T. Wills, his brother, is vice-president; Charles S. Wills, his son, is second vice-president; Ernest C. Wills, his second son, is director and superintendent, and Ernest G. Gardner is secretary and treasurer.

The buildings erected by the concern constitute a long list and embrace some of the most prominent structures in New York City and New England. Among the contracts were the American Surety Company's Building, the Johnson Building, the first Gillender Building, the Bank of Commerce, the New York Life Building, the Presbyterian Building, the American Bank Note Company's building, the Hanover Bank Building, the New Stock Exchange, the J. P. Morgan Library, the Emigrant Industrial Savings Bank, the residence of John D. Rockefeller, Jr., the Montauk Club in Brooklyn, the depot in Jersey City of the Jersey Central Railroad, the Judson Memorial Church on Washington Square, the Mail and Express Building, the Delmonico Building, the University Club, the Morgan Memorial at Hartford, Conn., as well as many other structures.

Course in Architectural Construction at Wentworth Institute

The second year of the course in architectural construction which is for the training of building superintendents, specifications men, and constructionists for architects and building contractors will shortly be inaugurated at the Wentworth Institute, Boston, Mass. This new course covers a very much needed field and judging from the applications which the faculty has received the demand for it is exceedingly gratifying. Only those engaged in the building trades realize how modern fireproof, steel and cement construction has created a demand for men especially trained in these new branches, and the course in architectural construction mentioned is intended to meet this demand.

From a copy of the new catalogue of the Institute which has just been received we learn that there is being added two new courses, the first of which is a one-year trade course in forging, hardening and tempering, and the second new course is a one-year day trade preparatory course intended for young men who wish to enter some one of the manufacturing industries but who require a year in which to be tried out to discover in what direction they show special skill and ability.

Our Colored Supplement for November

The subject of our colored supplement plate for the November issue will be a double or twin house conveniently arranged for occupancy by two families. It has a porch extending entirely across the front of the building, and there is a separate entrance for each family. The main walls, as well as the party wall, are to be of hollow tile, while the exterior finish will be of stucco. The roof will be covered with fire resisting shingles.

The interior arrangement provides parlor, dining room, kitchen, three bed rooms and bath room for each family. At the rear of the main floor is a laundry with two-part wash trays. In addition to plans and elevations there will be presented a varied assortment of constructive details all to scale.

"Builders' Week" at the Panama Exposition

A short time ago we made announcement that various branches of the building industry of San Francisco had joined forces to celebrate American Builders' Week from October 18 to 23, and this calls to mind certain additional interesting facts which are otherwise likely to escape the attention of architects, builders and others visiting the Panama-Pacific International Exposition.

The Exposition covers an area of 625 acres, on which has been constructed a beautiful living Exposition city complete in every detail. Most of this work was done by contract involving nearly 1000 separate contracts varying from nominal amounts to $800,000, and the total expenditure was about $14,500,000. All this was accomplished in three years time, within the estimated cost, and above all, within the time set for opening the gates to visitors.

Apart from general interest in a comprehensive exhibit of the world's progress, everyone concerned in buildings, construction or building materials, will find an added source of attraction in the structural features of the Exposition and to view these as the guests of the men who were responsible for them will be a unique event for American builders.

H. L. Lewman of Louisville, Ky., president of the National Association of Builders' Exchanges, is to make an address before the conference, his subject being "National Organization in the Building Industry—Its Need." Another notable speaker will be R. Clipston Sturgis, president of the American Institute of Architects.

Liability of a Corporation in Contract Employing Architect

A corporation is not liable on a contract employing a firm of architects to prepare plans for a building if the agreement was not authorized by the Board of Directors, and if the proposed building would involve an expenditure largely in excess of the capitalization of the company. This, in effect, is the decision announced by the Appellate Term of the New York Supreme Court in the case of Thompson & Frohling vs. Marseillaise French Baking Company, 147 New York Supplement 402.

The plaintiffs, a firm of architects in New York City, sued for compensation for preparing plans for a building to cost $125,000. The defendant company defended the suit on the ground that its president, with whom the contract was made, had not expressed or implied authority to contract so expensive a building when the capital stock of the company was only $10,000; especially in view of the fact that the land on which it was proposed to erect the building did not belong to the company.

The court sustained this defense, declaring that the making of such a contract was not within the scope of the president's general authority and that the plaintiffs were bound to take notice of the limitations upon his authority in this respect.

A New Skyscraper Near Grand Central Terminal

What will probably be, when completed, the tallest structure in the Grand Central Terminal zone in New York City, is now being erected at the corner of Forty-second Street and Madison Avenue, New York City. The scheme comprises a central building, self-contained, twenty-five stories high and culminating in a tower, while a portion of the site will be improved with a five-story building taking in the entire frontage but reaching back in such a way as to leave open light on all four sides above the first floor.

The design of the main building is Italian renaissance. The first five stories will have a facade of white marble and the shaft rising above will be of light brick with ornamental terra cotta treatment of the cornice and pilaster treatment of the upper three stories and the surmounting tower.

Something new in the way of office building service for the recreation of tenants will be a squash court and shower baths on the twenty-fourth floor. Access will be provided to two tower promenades, and these and the apex of the tower will be electrically illuminated.

A New Building for Printers

One of the latest improvements in the vicinity of the Pennsylvania Railroad Terminal in New York City is a massive building to be named after William Caxton, the first man to introduce printing in England in 1476. The building will stand on the former site of the Wililam H. Jackson Iron Works in West Twenty-eighth Street, and will be twelve stories in height. Each floor of the new structure will have a rentable floor space of 11,500 sq, ft. with a lithographer's studio on the roof. It has been planned throughout for the proper housing of printers, lithographers and publishers who wish to locate in the Pennsylvania station zone.

Thomas Atkinson, for many years prior to 1909 connected with the advertising department of THE BUILDING AGE as a traveling representative when the paper was known as *Carpentry and Building*, died Aug. 29 at Milford, Mass. Mr. Atkinson's earlier business career was in the hardware trade and for 20 years preceding 1881, when he went with the David Williams Company, he traveled for an importing and jobbing house dealing in cutlery and fancy hardware.

Coming Boom in the Building Trades

What One of Our Contemporaries Has to Say Regarding the Future of the Building Business

THAT an unusually active and prolonged building "boom" is approaching seems to be the general impression among those who are identified with large construction work, says the *American Contractor*. Predictions of it are getting more commonly into the papers. Prominent men, here and there throughout the land, are committing themselves to predictions of its approach. Men in positions to catch the first intimations of this expansion are going on record to that effect.

General Business Conditions

Business conditions are making immense strides toward betterment. There is scarcely an important factor in the general summary of trade and commerce that is not expressing a most cheering message. The iron and steel industry, long recognized as the most trustworthy barometer to general business conditions, has been mounting recently towards the pinnacle of extreme activity with almost amazing swiftness. It is reported that the largest producer of the industrial metals is active close upon 100 per cent of its enormous capacity and is now turning out more metal than ever before in its history. The reports of railroad earnings, that are finding the light of publicity, tell the tale of an unfolding expansion to which they have long been strangers. It is the big trunk line systems that are making the decisive gains. Next to iron and steel, and perhaps even superior to that industry, railroad earnings strike the keynote of general business, for in all business transportation enters to a greater or less degree, and to the greater degree with those basic industries that are at the foundations of prosperity.

Influence of War Orders

It is quite patent that the big war orders so many of the large industrial concerns of the country have been receiving in recent months have contributed in large measure to this renewed and still renewing activity of trade. But close observers say that business, thus primed and started by the demand for munitions, has widened out and gone into other industries, has in fact permeated the entire line of manufactures and awakened them from the droning dullness of the past year or two. The sun has come out from behind the clouds and all are impelled to seek a share in the genial glow of its beneficent rays. It is becoming the fashion to talk in the cheerful mood, to come out from the enveloping shell of caution, not only to bask but to get busy. The business world is almost persuaded to forget its imagined troubles, to lay aside its oppressive self-consciousness, and to dash for the open with something like the old time spirit of confidence. For this subtle but momentous change the war orders may be primarily responsible. The aeroplane needs the support of the substantial plain in pluming itself for its flight, but soon forgets the earth and unaided soars to the higher altitudes.

If the doubter must have an excess of evidence, he need only use his eyes to become convinced of its existence. The foundations for improvement are laid so broad and wide that they appear to be everywhere. Never in the history of the country has the influx of the precious metals, the basis for all commercial money, been so tremendous as in recent months and there is no indication of a slackening in its receipts.

But what about construction work? The builder, the contractor, the architect, the manufacturer of building material, may look with friendly interest upon these many evidences of increased activity in iron and steel and in other industries, but how about building? That a boom will arrive sooner or later is without question. All past history records, successive periods of excessive and deficient activity, repeated time after time. This is to be said at the present moment. There is more talk about the nearness of this great expansion in construction work than at any time since the latest visitation of comparative inactivity has appeared.

A Public Utterance

Merely to quote one of the many public utterances, the Washington *Post* says:

"Throughout the United States there is evidence of the inauguration of a vast movement in the construction of industrial plants, business buildings, apartment houses and residences of all classes. For the past four years construction work has been dull, and, as compared with the ten prior years, may be said to have reached a minimum. All this is changed now, and changed by two factors, and these two are of a permanent nature and may correctly be considered as guaranteeing a large volume of construction work for a decade to come.

"First—Business throughout every part of the country has emerged from its depressed condition, the industrial populations are once more fully employed at good wages, the agricultural populations are prosperous, and manufacturers and merchants and all the various interests benefited by general activity recognize and appreciate the change from dullness to active times.

"Second—Money is now available to the business men of the country to a measure never before even hoped for, and billions of dollars can be had within the coming twelve months for legitimate business purposes.

Sewage Disposal for Country Homes*

Disposal of Sewage by Means of Surface or Subsurface Distribution—Single Chamber Tank Systems

WHERE the soil is porous or sandy and there is plenty of area available which is used for no other purpose, the sewage from the septic tank may be discharged through 4-in. distribution tile laid on the surface of the ground in gridiron or herringbone fashion. It has been found that 450 to 500 sq. ft. of area are necessary for each person served if the soil is very porous and sandy, and the soil should either be tile-drained or have natural under-drainage.

A better method of disposal is by subsurface distribution. In this method the tile are placed in the ground herringbone or gridiron fashion, not deeper than 14 in. or 16. in. from the surface of the soil

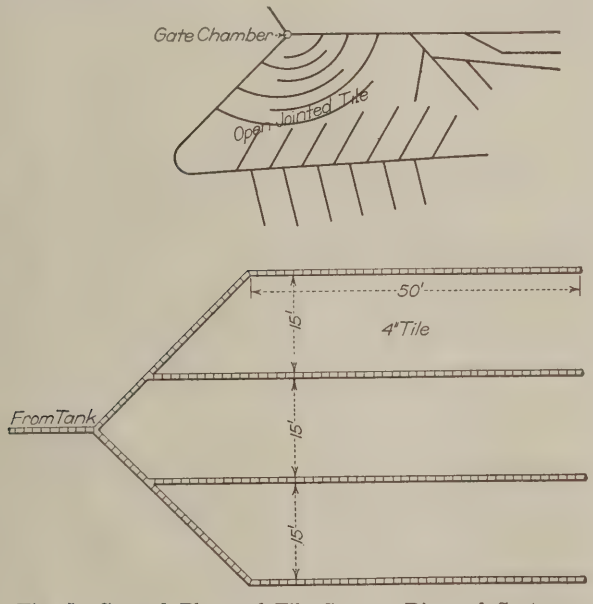


Fig. 5—Ground Plans of Tile Sewage Disposal Systems

Sewage Disposal for Country Homes

to the top of the tile. Ground plans of tile sewage disposal systems are presented in Fig. 5. In very porous or sandy soils 1 ft. of 4-in. tile per gallon of discharge per day is sufficient. In the heavier loam soils 2 ft. of 4-in. tile are necessary and sometimes more for every gallon. A rough estimate should be made of the number of gallons of sewage in each discharge from the tank and the number of discharges per day. Not less than 35 ft. of 4-in. tile per person should be used in sandy or porous soil and not less than 60 ft. per person in very heavy loams. In average loams 300 to 400 ft. of tile are sufficient for a family of six or eight.

Aeration of heavy soils can be brought about by the use of coarse cinders or gravel laid in 12-in. to 16-in. layers in the bottom of the tile ditch, with the top about 12 in. below the surface. The

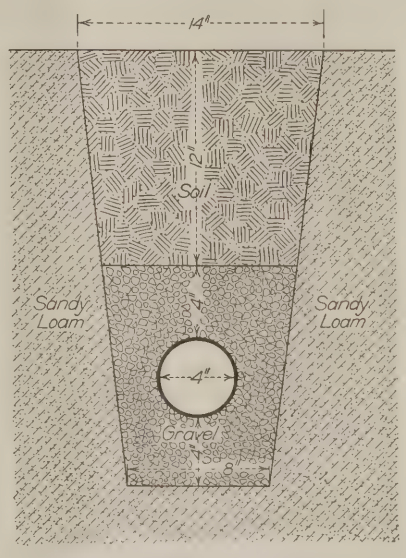


Fig. 6—Cross Section of Single Tile Sewage Disposal System Showing Method of Aerating Heavy Soils

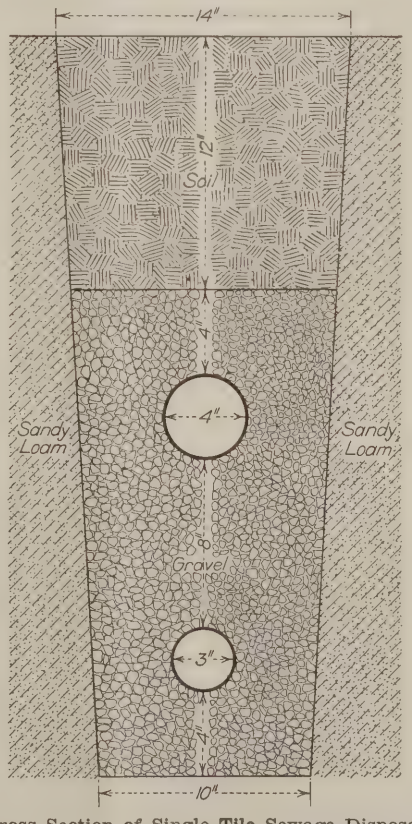


Fig. 7—Cross Section of Single Tile Sewage Disposal System Showing a Second Tile Below for Underdrainage

tile are laid in these at the usual depth. Fig. 6 shows such an arrangement.

The disposal tile should have a fall not to exceed

*Continued from page 65 of the September issue.

1 in. in 50 ft., else the water will rush to the lower end and water-log the soil there. The tile are usually laid about ¼ in. apart and in rows about 15 ft. apart. The latter distance, however, will vary with the porosity of the soil. Where there is no subsurface drainage, artificial drainage should be provided by means of tile drains laid below the sewage tile as shown in Fig. 7. In some cases an impervious stratum underlying the filter earth is underlain by a stratum of sand. Cases have been noted in which this impervious stratum has been broken by dynamite at 15-ft. to 20-ft. intervals along the tile line, thus providing natural drainage.

If subsurface disposal is not feasible, for instance when the soil is compact and nearly impervious or is swampy and underdrainage is difficult to obtain, disposal by intermittent sand filtration is necessary.

The sand filter usually is a bed of sand 3 to 4 ft. thick which is fine on top and gradually increases in size to coarse gravel at the bottom. The sewage from the tank is distributed over the filter by means of tile laid loose-jointed over the surface in much the same manner as in the ground-surface distribution system. The filter should be sufficiently porous and there should be sufficient natural or artificial under-drainage to allow every dose of sewage to sink away rapidly. Sewage should not stand on the surface of the filter for any length of time, as this will soon destroy its purifying properties. About 45 sq. ft. of filter should be provided for each person served by the sewer. The area should be divided into from three to five beds so that each bed may be allowed to rest occasionally. Fig. 8 shows a plan and partial section of a sand filter for a family of eight persons.

In constructing a filter a sufficient area should be leveled off and small earth embankments be made 18 in. to 2 ft. high to inclose the beds. The depth of the filtering material will depend largely on the porosity of the subsurface and the means of under-drainage, but it is well to have it not less than 2½ ft; 3 to 5 ft. is better, but the depth should not exceed 6 ft. A good plan is to allow a minimum of 1 cu. yd. filtering material for every 50 gal. of sewage flow.

Single-chamber septic-tank systems may be made to give fair satisfaction if properly designed and operated. In such a system the sewage is received, partially purified and discharged by one chamber.

There is necessarily considerable disturbance of the sewage in the tank, and, in addition, the discharge is continuous. This makes necessary two disposal systems, with a diverting gate to allow an occasional breathing spell for each system. If such an arrangement is not used the system must be of much larger capacity than for the double-chamber tank system, in order to prevent the continuous discharge from waterlogging the system.

If a single-chamber tank is used it should be designed and constructed on the same basis as the settling chamber of a double-chamber tank, with the elbows at inlet and outlet and baffle boards be-

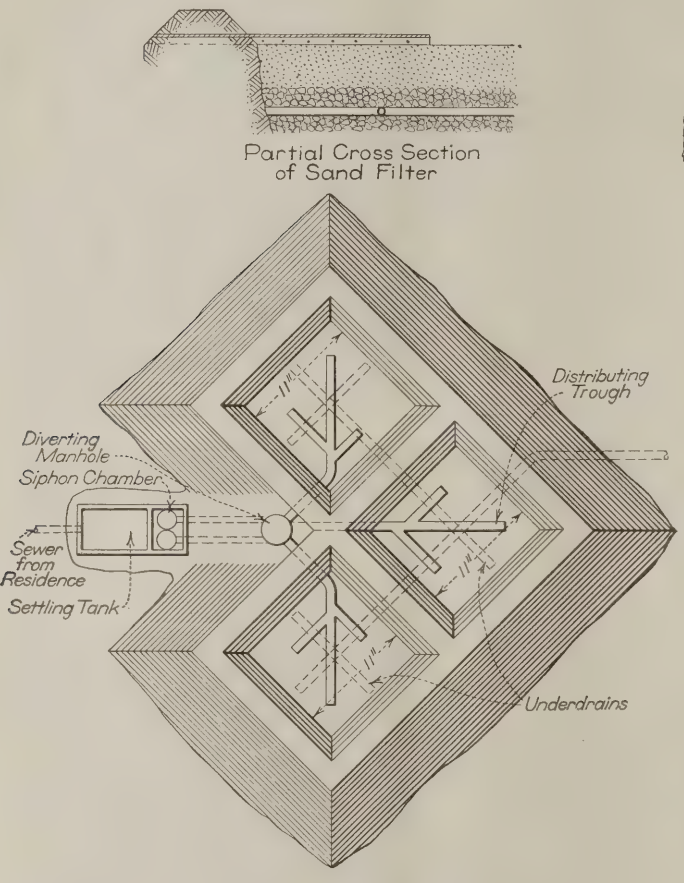


Fig. 8—Partial Cross Section and Plan of Sand Filter for Eight People

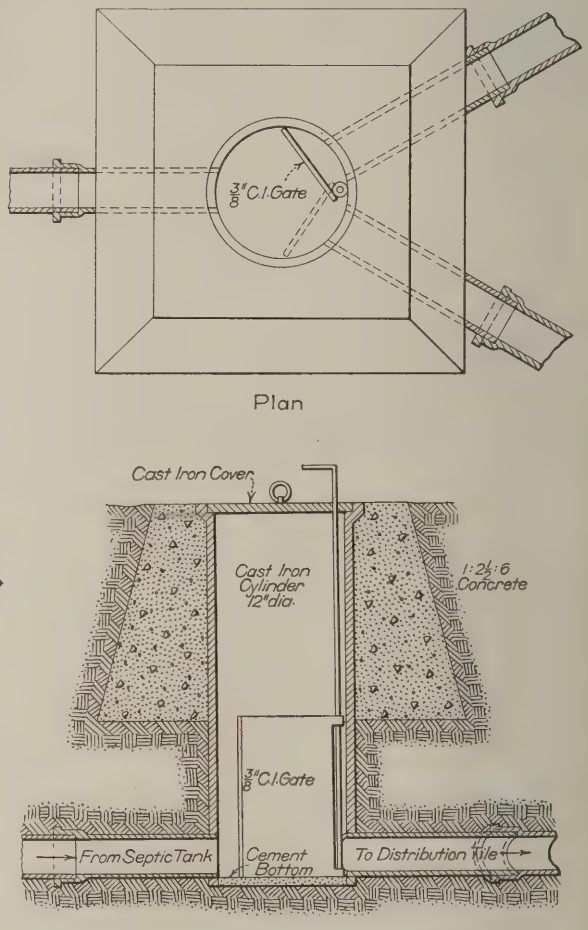


Fig. 10—Plan and Section of Sewage Diverting Gate

Sewage Disposal for Country Homes

fore these openings so as to break up the current.

Fig. 9 shows a single-chamber tank for a family of six. This tank has a continuous discharge, and it is necessary to use a switch or diverting gate, as shown in Fig. 10, so that the liquid sewage may be intermittently diverted from one part of the disposal system to another.

The disposal system should be divided into at least two divisions and the capacity of the system should be 10 to 15 per cent larger than for a double-chamber tank system.

The single-chamber septic tank system requires considerable attention, since there is no provision for automatic discharge. Figures taken from the work of the Wisconsin Agricultural Experiment Station show that in the long run there is little difference in the cost of the single and double-chamber tank system.

The grease trap acts as a separator of the grease and sewage from the kitchen sink or dairy room.

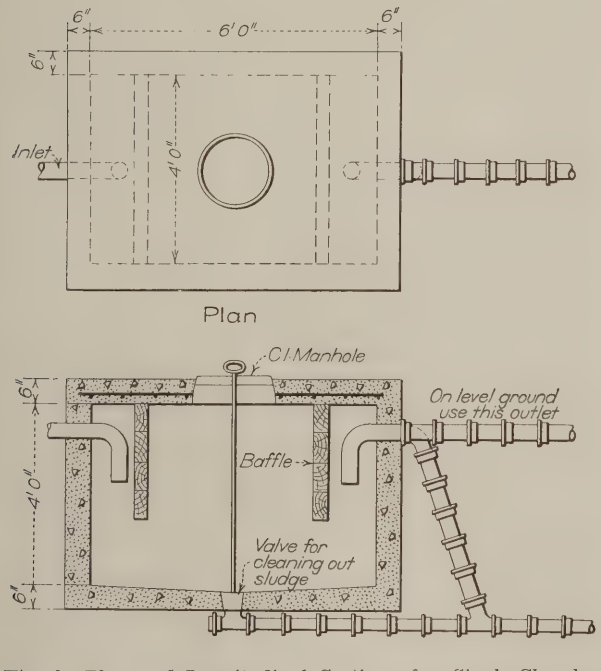


Fig. 9—Plan and Longitudinal Section of a Single-Chamber Septic Tank for Six People

erate his plant on an entirely satisfactory basis.

It is hoped that the foregoing discussion has presented information of a nature practical enough at least to indicate the general requirements to be met in planning sanitary systems adapted to the average farm home. Nevertheless, should the farmer feel that, though desirable, such an installation is beyond his own skill, the matter is still of such importance as to make it advisable to employ a reliable pump expert, plumber, or sanitary engineer, local prices of labor and materials and other conditions permitting. Enormous expenditures are being made by progressive cities in the installation of sanitary systems to protect the health of their people, and similar protection is surely due the country resident. It is urged, therefore, that the questions discussed in this bulletin be considered of prime importance in planning or improving the farm home, instead of being postponed to a time when other matters do not press for attention.

No costs of material or labor have been quoted, since these will vary with time and locality. Suffice it to say, however, that nothing has been recommended in this bulletin which is not considered to be an economical investment for any progressive farmer. It is believed that convenience, comfort and economy may be combined in the practical application of the suggestions made, providing common sense and proper care are exercised in the installation, operation and maintenance of the conveniences.

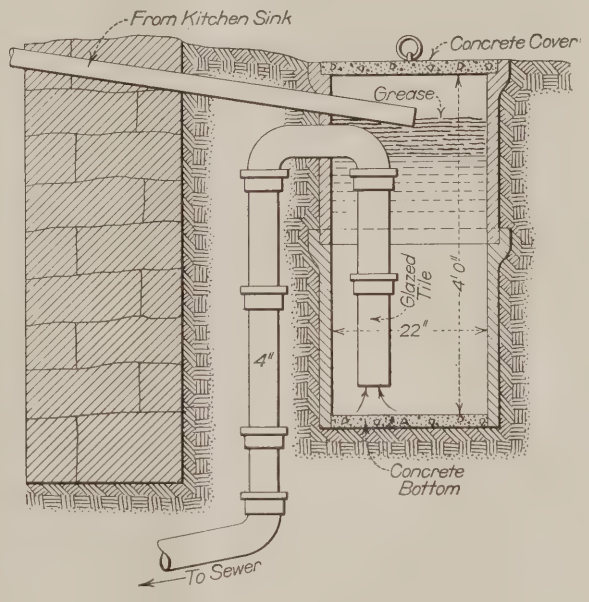


Fig. 11—Sectional View of a Grease Trap

Sewage Disposal for Country Homes

If grease is allowed to enter the sewer it accumulates and eventually clogs the system.

Fig. 11 shows a grease trap. Two large, glazed sewer tiles are placed in the ground. The inlet is usually a 2-in. iron pipe. The outlet must be so arranged that the mouth of it is at all times below the surface of the sewage. The grease, being lighter, naturally floats upon the water, and is thus prevented from entering the outlet. The outlet is made of 4-in. glazed sewer tile and is connected with the sewer inlet of the septic tank. A concrete cover is provided, and grease and dirt which may accumulate are removed when necessary.

Contrary to the usual opinion, small sewage systems require some watching and care. It is well to study the system and watch the action in the entire plant for any signs of clogging or water-logging. In this way one will soon become acquainted with the conditions of location and soil best suited to his needs and will be able to op-

Death of Joseph M. Sayre

Joseph Monell Sayre, who for many years had been active in the building business in Newark, N. J., and who was formerly president of the Builders' and Traders' Exchange of that city, died at his home in Madison, N. J., on September 9 at the age of 63 years. He began his business career in 1872 and later became a member of the firm of Russell & Sayre, which constructed a number of the largest buildings in and about Newark.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in August, 1915, and August, 1914

THE figures covering building operations throughout the country for the month of August are of a more gratifying character, as contrasted with a year ago, than has been the case for some time past. This is due in a measure to marked activity in some of the more important cities, especially Chicago, where the settlement of the labor troubles released a vast amount of work that was being held up. As a consequence, the value of the estimated improvements for August are very materially in excess of those of the corresponding month last year. Another gratifying change is found in the figures covering the Borough of Manhattan in Greater New York. Here the increase over a year ago is due to the larger number of costly apartment houses projected in certain sections of the city where the value of the land is such as to call for high grade improvements in order to afford an adequate return upon the investment.

Reports for August covering 114 cities of the country indicate a gain as compared with August last year of 4½ per cent, there being 62 cities showing increases, while 52 show decreases.

In the leading cities of the Eastern States the amount of building projected in August was practically the same as for August, 1914. Changes in the various cities reporting are shown in the accompanying table:

CITIES OF EASTERN STATES

	August, 1915	August, 1914
Albany	$249,745	$479,685
Allentown	208,585	79,211
Altoona	114,063	130,274
Auburn	41,474	68,373
Binghamton	279,917	193,619
Boston	4,752,000	5,147,000
Bridgeport	842,755	147,063
Brockton	142,040	77,475
Buffalo	1,175,000	950,000
East Orange	83,368	43,210
Elizabeth	94,748	91,190
Erie	272,990	366,290
Harrisburg	29,325	101,275
Hartford	528,934	185,990
Haverhill	108,100	96,925
Hoboken	21,656	12,645
Holyoke	88,975	130,175
Manchester	206,765	137,255
Newark, N. J.	569,441	3,196,233
New Bedford	197,260	175,550
New Britain	94,865	57,225
New Haven	440,274	500,567
New York:		
Manhattan	7,960,328	4,476,176
Bronx	1,620,725	1,272,343
Brooklyn	3,999,600	4,292,600
Queens	2,456,775	1,020,758
Richmond	164,318	206,658
Passaic	137,826	36,665
Paterson	182,827	221,598
Philadelphia	3,993,625	2,642,810
Pittsburgh	740,265	1,127,069
Portland, Me.	142,395	140,875
Reading	181,150	29,400
Rochester	772,174	808,457
Scranton	88,779	185,338
Schenectady	143,774	96,368
Springfield, Mass.	400,095	489,290
Syracuse	404,000	256,948
Trenton	258,026	211,425
Troy	82,465	51,275
Utica	235,985	86,670
Woonsocket	30,875	20,010
Wilkes-Barre	55,032	58,391
Worcester	534,538	679,692

In what may be designated as the middle or central zone the 34 cities reporting indicate an increase over the same month a year ago of 25¾ per cent. Here, as already intimated, the increased activity is traceable to the greater volume of operations in Chicago, Cincinnati, Detroit, Milwaukee, Minneapolis, St. Paul, Toledo and Kansas City. Noticeable decreases are reported by Cleveland, Indianapolis and Youngstown.

CITIES OF MIDDLE STATES

	August, 1915	August, 1914
Akron	$499,010	$602,315
Cedar Rapids	125,000	282,000
Canton	115,125	314,500
Chicago	9,513,150	5,769,450
Cincinnati	3,048,475	1,128,060
Cleveland	1,987,520	2,318,470
Columbus	544,895	647,325
Davenport	182,705	91,205
Dayton	403,890	111,643
Des Moines	150,500	111,150
Detroit	3,217,490	2,353,345
Duluth	262,051	238,023
East St. Louis	91,420	67,977
Evansville, Ind.	101,455	76,495
Fort Wayne	176,530	153,800
Grand Rapids	281,765	268,677
Indianapolis	463,972	572,436
Kansas City, Mo.	725,830	527,395
Kansas City, Kan.	91,665	80,863
Lincoln	133,015	136,865
Milwaukee	1,073,659	673,729
Minneapolis	1,031,070	943,975
Omaha	350,610	521,065
Peoria	114,810	253,081
Saginaw	72,085	90,785
St. Joseph	103,428	93,623
St. Louis	932,446	797,165
St. Paul	1,066,026	646,923
Sioux City	258,975	227,485
Springfield	109,500	72,800
Superior, Wis.	111,365	77,852
Toledo	747,083	490,047
Topeka	66,719	20,399
Youngstown	154,815	261,565

From the southern sections of the country we have reports from 20 cities, of which 6 show increases and 14 decreases, with a resultant loss of 21½ per cent, as contrasted with August a year ago.

CITIES IN SOUTHERN STATES

	August, 1915	August, 1914
Atlanta	$370,600	$372,033
Baltimore	447,923	1,012,846
Birmingham	137,615	314,549
Chattanooga	46,540	116,270
Dallas, Tex.	155,117	220,175
Huntington, W. Va.	83,368	114,703
Jacksonville	40,505	161,705
Louisville	203,930	426,860
Memphis	273,295	175,660
Nashville	84,843	91,441
New Orleans	246,708	236,910
Norfolk, Va.	75,632	241,625
Oklahoma	86,820	99,115
Richmond, Va.	197,019	183,410
Savannah	442,805	150,830
San Antonio	181,260	170,050
Shreveport	41,584	79,506
Tampa	103,920	358,865
Washington	742,773	627,472
Wilmington	154,368	203,059

Coming now to the extreme western section of the country, we find a marked falling off in operations, due to lessened activity in San Francisco, Los Angeles, Seattle, San Diego and Tacoma, while in Denver, Portland, Stockton and Oakland, a greater amount of new construction work was projected than in the corresponding month a year ago.

CITIES OF WESTERN STATES

	August, 1915	August, 1914
Berkeley, Cal.	$134,900	$161,750
Colorado Springs	6,975	16,885
Denver	179,810	150,620
Little Rock	101,798	83,313
Los Angeles	1,001,980	2,081,396
Oakland	506,041	411,889
Pasadena	104,057	137,430
Portland, Ore.	728,970	409,390
Sacramento	62,953	62,258
San Diego	62,770	208,408
Salt Lake City	213,300	480,045
San Francisco	970,090	1,415,271
Seattle	454,960	1,565,525
Spokane	50,335	31,585
Stockton	116,380	7,350
Tacoma	53,378	139,460

For the eight months of the year the falling off as compared with last year is only about 7 per cent.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

"International" Asphalt Shingles

A very interesting booklet containing evidence clearly demonstrating that no matter whether the building be of high, moderate or low cost construction "International" asphalt shingles are always serviceable and harmonize with any type of architecture has been issued by the International Roofing Manufacturing Co., 5305 South Western Avenue, Chicago, Ill. The company claims its shingles are heavy; that the surfacing

Fig. 1—Row of Houses Covered with International Asphalt Shingles

of each shingle is rolled in by special process which maintains a constant exterior which will not loosen up or come off; that the shingles are easy to lay, and will not leak or warp. Furthermore, they are made of the best materials obtainable, are guaranteed fireresisting and waterproof and will resist heat and cold. Each shingle is reversible, and either the red or green half may be exposed to the weather as taste may dictate. In Fig. 1 is shown one of many rows of low cost bungalows in Chicago, all of which are roofed with these shingles. They are made in seven styles, one of which is said to be cheaper than wooden shingles. Style No. 1 is a shingle 8 x 12¾ in., and 424 are used to a square. The second is a strip shingle 12¾ in. wide, reversible, supplied in lengths of 76 ft. The next style is a standard 8-oz. shingle covered with natural stones of unfading quality. Shingle No. 4 is of standard size, 8 x 12¾ in., known as the "Jumbo," made of extra heavy felt. Fifth on the list is a heavy 5-ply felt shingle, stiff as a board. The exposed portion measures 8 x 8 in., 225 being needed for a square. Number 6 is a one-color strip shingle 10 x 12¾ in., while the last is of the saw tooth variety. This is made in rolls 32 in. wide, 48 ft. long, exposed 12½ in. to the weather.

Metal Weatherstrips a Profitable Business for Builders

As the winter season approaches and building operations are greatly lessened, the carpenter-contractor and the builder find a profitable field in contracting for metal weatherstrips—an industry which is no longer confined to a few hands. Popular patterns of metal weatherstrips can now be purchased direct from the manufacturers and the installation can be done by any enterprising and wideawake carpenter and builder at a figure which gives him a good return for his trouble and labor. In entering upon a business of this kind there are two things of great importance to the permanent success of the weatherstrip contractor: First, a definite and complete selling plan must be given him, based on practical experience, and, second, he must be supported and assisted during the first year of his weatherstrip work by practical advice on the subject of installation. The novice in the business is apt to underestimate the number of openings he will be called upon to equip and the consequent variety in the installation. If all doors and windows were carefully and accurately fitted in the first place, and if they did not warp, shrink or get out of square, any one of a number of weatherstrips might be used and the installation would prove a very simple matter. The old shrunken and warped openings, however, are the ones which need weatherstrips most of all, and the contractor must not only have a weatherstrip which will adapt itself best to all conditions, but he must be guided as to the proper application of the strip. In 1911 J. D. Pierce, who has the management of the Allmetal Weatherstrip Company, 224 West Madison Street, Chicago, Ill., originated the plan of teaching carpenters and builders by mail how to sell and install metal weatherstrips. He believes the continued success of the company depends upon the success of its agents, and therefore gives an unusual amount of support and co-operation to new contractors starting in the metal weatherstrip business. Those readers of THE BUILDING AGE who are interested in this proposition can secure samples and detailed information by writing to the company at the address above given.

The Enduring Qualities of Concrete Buildings

Everyone has doubtless read of the disastrous hurricane which recently devastated the city of Galveston and the ruin which was wrought by wind and water. One of the most striking examples of the enduring

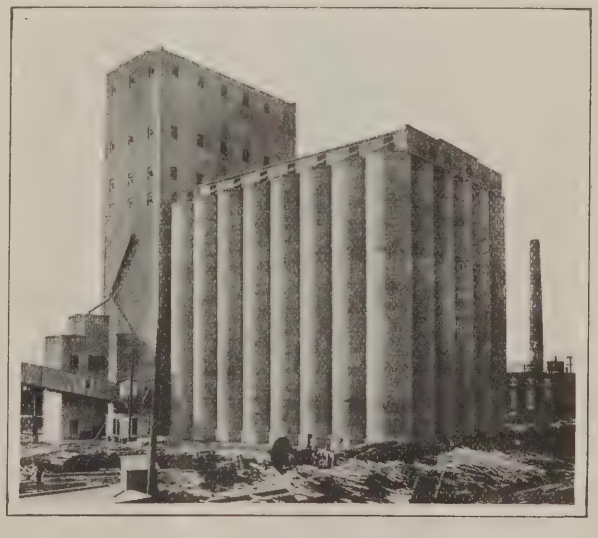


Fig. 2—Concrete Grain Elevator That Survived the Recent Galveston Cyclone

qualities of concrete construction was found in the large grain elevator which was completed in June of the current year, and erected to replace a wooden elevator that was burned in 1914. This concrete grain

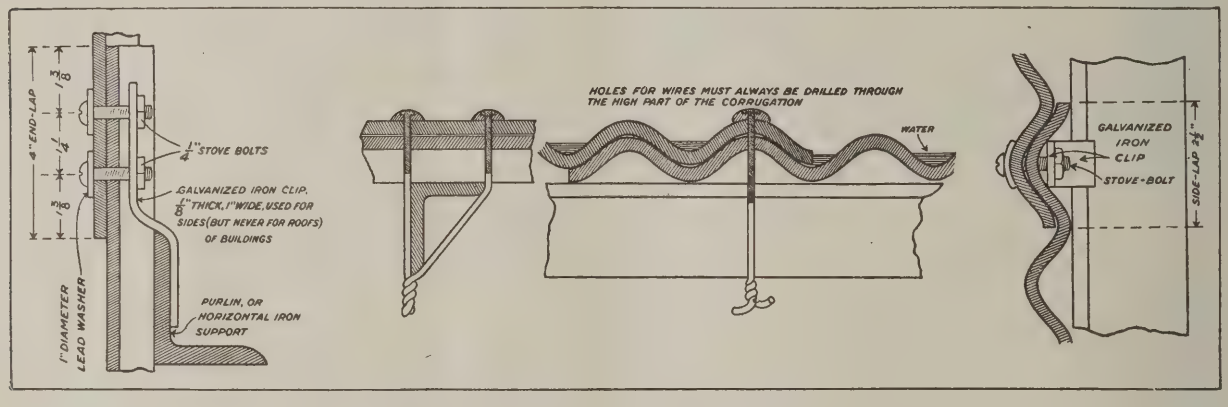
elevator, a general view of which is shown in Fig. 2, came through the storm in fine shape with no injury except the broken windows, which were smashed by flying debris. The basement was flooded with sea water, but this appears to have done no harm. The builders were James Stewart & Co., and in this connection it is interesting to note that over 22,000 bbl. of Alpha cement furnished by the Alpha Portland Cement Company, with general offices at Easton, Pa., were used. The picture here presented is extremely interesting as showing how a building of this type withstood the ravages of a storm which some people thought would even batter down the concrete sea wall erected to protect the city.

Corrugated Asbestos Roofing and Siding

After ten or twelve years of experimenting there has been brought out a corrugated asbestos roofing and siding, which marks the final step in the process of development which first took flat sheets of asbestos building lumber and bent them while soft into the corrugated form. This was afterward supplemented by the placing of iron wire mesh or screen between the layers of asbestos to give the material greater tensile strength. It was found, however, in some cases where the material was exposed to corrosive fumes or to salt air that sufficient moisture would enter through minute fissures in the convex side of the corrugations, ultimately causing the reinforcing material to disintegrate. The process of manufacture was then modified so that the material could be compressed while in the corrugated condition, a pressure of approximately 100 tons per square foot being employed. The resulting product, which is the outcome of the experiments of the Keasbey & Mattison Company of Ambler, Pa., is a dense and thoroughly compacted structure that will withstand rough treatment and not be affected by weather influences.

Hydraulic cement is mixed with water and asbestos fiber in a beating engine similar to that employed in the manufacture of paper pulp. The material then passes to the vat of a modified paper machine, where it is kept in a state of agitation until picked up in thin coatings by a fine wire screen on a revolving cylinder, from which it is passed by an endless belt to a second rotating cylinder, upon which it accumulates in layers until the desired thickness is secured. The material is then cut across and removed in the form of sheets, which are piled one upon another and placed between metallic plates. These are subjected to heavy pressure. The numerous layers provide for the crossing of the asbestos fibers in all directions, giving the finished material a texture of great homogeneity and toughness. The corrugated sheets are made 27½ in. wide and in lengths ranging from 4 to 10 ft. The corrugations are 2½ in. wide and 1 in. deep from top to bottom of the corrugation. The material varies in thickness from 3/16 to 5/16 in. and weighs from 2.8 to 3 lb. per sq. ft. The method of applying and supporting the material for roofing and siding purposes is shown in the details in Fig. 3. The roofing is lapped two corrugations sidewise and 6 in. endwise, the inclined joints in succeeding courses being staggered from those of the preceding ones by the amount of the side lap. The supporting purlins are spaced so that the maximum distance between them is not more than 36 in. for roofing and 40 in. for siding. The method of attaching the roofing sheets to steel and iron framework is by aluminum tie wires, as shown in the details. Iron wire nails with lead washers are substituted for the aluminum tie wires where the material is to be applied to wooden purlins. Where siding is used the arrangement for fastening is somewhat different. Here a galvanized iron clip bent so that the inner end rests over the purlin or other horizontal iron support is employed. The clip itself is fastened to the material by two ¼-in. stove bolts, the heads of which are outside of the siding and rest against soft lead washers. Nails are used for fastening the siding to wooden framework.

For protecting corners and ridges, rolls of the same material are employed. The corner protective devices are half cylinders made in lengths of 16, 42 and 56 in. and applied so that the ends overlap. The ridge rolls have 6-in. wings which overlap the corrugated roofing. To enable the ridge roll to be applied to any peak or angle, it is made in two parts, the half cylindrical ones turning one within the other to provide the desired angle for the wings.



Corrugated Asbestos Roofing and Siding—Fig. 3—Various Details Showing Construction

Program of the Arkansas Soft Pine Bureau

With the motive of emphasizing the real place of origin as well as the character of its product, and to establish a more ready contact between members and headquarters, the Arkansas Soft Pine Bureau has recently been transferred from Chicago to Little Rock, Ark. Offices have been established in the Bankers' Trust Building at the latter city and the advertising campaign in behalf of Arkansas soft pine will be conducted hereafter from Little Rock. Three years have now elapsed since the lumber manufacturers composing the Bureau inaugurated their publicity program in behalf of "Pick of the Pines" and "Satin-like Finish." At that time, the fall of 1912, they were the pioneers of the yellow pine industry in the general lumber advertising field, and their efforts are shown in the very favorable acquaintance with Arkansas soft pine, which has been created. However, the excellent quality of the wood itself has been the underlying factor, to which the successful results produced by the advertising must be credited. "Lumber may be lumber," substantially said the group to itself, "but Arkansas soft pine is extra good lumber for certain uses; therefore let's tell the public about it."

With its establishment at Little Rock, comprehensive plans have been outlined by the Bureau whereby its advertising will be vigorously pushed. Some slight changes in the general program will be made as compared with that of previous years; but on the whole, the campaign is to be conducted along established and recognized lines, as heretofore. Active co-operation with dealers will, however, be a feature in connection with a somewhat new departure in the way of lumber publicity a little later on in the year.

The Bureau will be under the direction of Robert H.

(Continued on page 74)

Brooks of Little Rock. Mr. Brooks has for the past four years been Southern representative for one of the lumber trade papers. Recently, however, he established an advertising agency at Little Rock under his own name, in connection with which he will supervise the advertising of Arkansas soft pine.

Parks Upright Hollow Chisel Mortiser and Borer

A machine designed for general use in woodworking shops where accurate mortises are required is that illustrated in general view in Fig. 4, and which has just been placed upon the market by Parks Ball Bearing Machine Company, Station A, Cincinnati, Ohio. The construction of the machine is such that the foot treadle gives a powerful stroke which forces the hollow chisel into the wood and at the same time leaves the hands of the operator free to handle the work. The treadle is such as to give a stroke of 3 to 6 in. to the chisel or

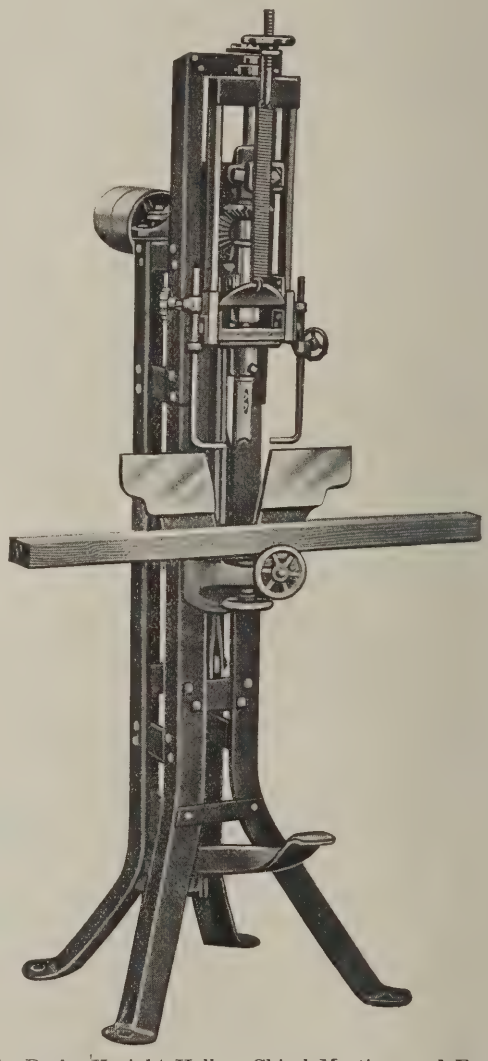


Fig. 4—Parks Upright Hollow Chisel Mortiser and Borer

boring bit that may be used. The table has quick and accurate adjustment for different thicknesses. The hand wheel, clearly shown at the front of the machine, moves the guide back and forth and will take in 3 in. to the center of the bit while the hand wheel underneath holds it securely. The guide bed rests on a tilting device which can be inclined to an angle of 45 deg. and the machine can be changed to the thicknesses desired without interfering with the angle and can be lowered to take in 12 in. below the point of the bit. The capacity of the machine is such that it will take any size chisel from ¼ in. to ⅝ in., and any size mortise can be made by repeating the cut either lengthwise or crosswise. For example, if a ½-in. chisel is used, and it is desired to make a 1-in. mortise, it is only necessary after the ½-in. mortise is made to slip a ½-in. board between the material and the guide and then repeat the operation. The board is easily taken out and slipped

(*Continued on page* 76)

"This Shingle Put *Me* on the Map"

The first NEPONSET Shingles put on, down my way, were put on by Yours Truly.

Naturally I got the next job—and the next job—and the next job. Any other carpenter could have done it just as well but the NEPONSET shingled roofs were advertising *me* all the time and so one job just followed the other. I have covered 15 roofs and still going strong. I use

NEPONSET Shingles

PATENTED

because I *know* they are durable and fire resisting and *any one* can see they are architecturally perfect. Don't think they are stamped out of ready roofing. This is not so. They are built up specially—heavy butt end and all that.

I'm a NEPONSET Shingle enthusiast.

This shingle put *me* on the map!

The same materials are used in NEPONSET Shingles as in the well known NEPONSET Paroid Roofing, also used in NEPONSET Proslate, the highest grade colored ready roofing ever made.

NEPONSET Wall Board, NEPONSET Waterproof Building Paper and NEPONSET Floor Covering are other well known NEPONSET products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me a sample of the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

back for making each mortise. The machine will mortise to a depth of 3 in. and by reversing the stock a 6-in. mortise is produced. It will also take any size boring bit with ½-in. round shank. The shafts are 1 in. in diameter, with 3-in. bearings, and the tight and loose pulleys are of 5-in. diameter with 3-in. face, and should make 900 r.p.m.

Medal for H. V. Jamison

H. V. Jamison, advertising manager of American Sheet & Tin Plate Company, Pittsburgh, has been awarded a gold medal by the Panama-Pacific International Exposition Society for valuable services rendered in the installation of the large exhibits of the U. S. Steel Corporation and its subsidiary companies.

When the Steel Corporation decided to make an extensive exhibit at San Francisco Mr. Jamison was appointed director of exhibits. The results were so successful that the Steel Corporation and its subsidiaries were accorded the grand prize for the excellence of their exhibits, and Mr. Jamison was awarded a gold medal in recognition of his services.

American Floor Surfacer

The smoothing and polishing of wood floors, more particularly those in connection with which the finish floor is of hard wood, has developed into a business almost by itself, and is regarded at least as a profitable

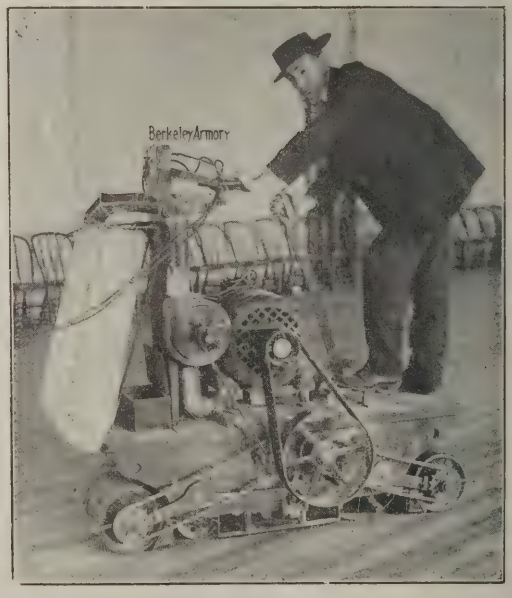


Fig. 5—View of One of the Machines in Use on the Floor of the Berkeley Armory, Berkeley, Cal.

side line by many a contractor and builder. It is generally conceded that a profitable business can be developed in almost any community by meeting the demands for surfaced floors in almost all kinds of buildings, and especially in resurfacing old floors in halls, stores, dwelling houses, schoolrooms, etc., etc. With a view to meeting the requirements of a business of this kind the American Floor Surfacing Machine Company, 520 South St. Claire Street, Toledo, Ohio, is offering the surfacing machine illustrated in Fig. 5 of the engravings. It is referred to as "the original floor surfacing machine, greatly improved and protected by the basic patents on floor surfacing machines." It is provided with two rolls 9½ x 18 in. in size covered with sandpaper, and driven 600 revolutions per minute by an electric motor which also propels the machine, doing not only rapid work, but, it is claimed, at a fraction of the cost of any other method. The machine is reversible and can be operated as readily backward as well as forward. It also has a dust-cleaning device, as shown in the picture, which makes it work clean without inconvenience to surroundings. A pamphlet entitled "Surfacing Floors Is a Business" has been issued by the company, and any reader may readily secure a copy upon application to the address given.

(*Continued on page 78*)

Improvement in Plastergon Wall Board

We have received from the Plastergon Wall Board Company, 102 Fillmore Avenue, Tonawanda, N. Y., a sample of the improved wall board which it is bringing to the attention of architects, builders and house owners generally. One end of the sample board has been treated with the company's new waterproofing solution which gives it added strength, stiffness and imperviousness to moisture, while the opposite end is untreated and presents a marked contrast to the treated end. One reason for waterproofing the board the company states is to overcome the greatest of all objections, namely, taking up dampness and not giving it off, thus causing the board to warp and pull from the nails. In addition to the new treatment being a protection against dampness it is also a sizing which means that as soon as the board is applied it is ready for decorating without further attention. This, of course, results in a great saving of time and labor which it is readily possible to estimate in dollars and cents. We understand that the treated board has been in use for over a year under all sorts of adverse conditions and has been demonstrated to be most dependable in every instance. The treatment of the board is such that the hardening, stiffening, waterproofing and sizing are all done in one operation.

Mechanic's Pressed Steel Work Cabinets

The line of pressed-steel work-cabinets which the Berger Mfg. Company of Canton, Ohio, has just put on the market provides secure and convenient storage facilities for special dies, tools, blue-prints, etc. Substantially constructed of formed sheet steel, each cabinet is equipped with an especially solid and rigid top which can be used for laying out work or handling heavy parts.

Fig. 6—Mechanic's Pressed Steel Work Cabinets

The height of these cabinets is such that they fit readily under the mechanic's machine or at its end, where they are out of the way. As shown in Fig. 6 each cabinet is divided into two compartments with individual locking facilities. A mechanic and his helper can share one cabinet between them, each occupying one compartment. This feature is particularly valuable also where day and night shifts are employed, and one man operates the machine in the day time and the other at night. These pressed-steel work-cabinets form a valuable adjunct to Berger's well-known sectional steel bins and shelving construction, steel skeleton racks, tote boxes, tool trays and other shop accessories of tried and proved merit.

The "Sterling" Levels and Transits

During the last few years great strides have been made in the application of the level and the transit to building work of all kinds ranging from the small private garage up to the expensive mansion and the towering office building. This is due in a large measure no doubt to the higher standard of efficiency of the present-day instruments as compared with the cumbersome devices of the past. Among the new designs in surveying instruments which have been brought out to meet the needs of various branches of the building business is the "Sterling" convertible level, the new model of which is known as No. 55 and made by the Warren-Knight Company, 136 North Twelfth Street, Philadelphia, Pa. This is referred to as a strong, compact and exceedingly practical instrument, covering a wide

(*Continued on page* 80)

scope of usefulness and one which the up-to-date builder cannot fail to appreciate. It is provided with an excellent telescope giving clear and brilliant view, thus enabling the instrument to be used under both favorable and unfavorable conditions, and which, by a special arrangement of lenses, is said to clearly show objects near at hand as well as those at a distance. The company is also directing attention to its new contractor's transit No. 25, its new builder's transit No. 35 and its new reconnoissance No. 30. These instruments are made with the utmost care and under the most critical inspection, the materials being frequently subjected to tests of the most exacting nature. The great nicety with which the centers, plates and other bearings are fitted by means of special tools, is only possible through the continuous use of micrometer measurements, which in some instances are read to one ten-thousandth part of an inch.

A Water Heating Garbage Burner

One of the latest candidates for popular favor in the way of a water heating garbage burner is the construction shown in broken view in Fig. 7 and just placed upon the market by the L. J. Mueller Furnace Co., 190 Reed Street, Milwaukee, Wis. With a moderate fire it is said that a full charge of garbage will be consumed in three hours, and in less time with a very hot fire. The owner, it is claimed, is assured of

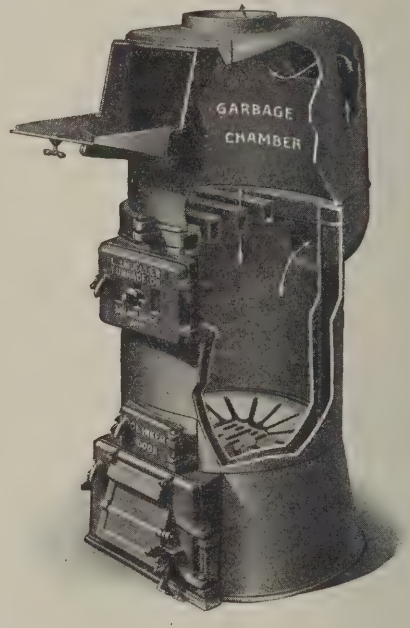


Fig. 7—A Water Heating Garbage Burner

a constant hot-water supply because the equipment is used the year around, and garbage is disposed of in a sanitary and economical way. The equipment is of cast iron. A special flue construction carries smoke and gas to the rear and over the top of the garbage chamber to dry the refuse. The garbage is then burned by the flames passing through the water or garbage grate, the feed door giving access to the refuse chamber is 7 x 7 in., while the latter will accommodate at least 2 gal. The heater has a 12-in. grate. The grates are of the shaking and dumping type, and are made close enough to permit the use of pea or slack coal. The tank heater is of identical construction as the garbage burner, except, of course, that it has no garbage chamber.

A Satisfactory Coating for Cement

It is a well known fact that in order to prove in all respects satisfactory a cement coating must contain no elements of a corroding nature, and it is equally desirable that it dry on the walls without destroying the texture of the material. It is generally conceded that the proper medium is one which does not contain an oil affected by alkali, and one which evaporates as soon as it is applied. This leaves the base of the coating an

(*Continued on page 82*)

integral part of the surface and preserves the distinctive texture of the cement because it settles in the pores. A cement coating for which strong claims are made is that known as the Bay State Brick and Cement Coating, made by Wadsworth, Howland & Co., Inc., Federal Street, Boston, Mass. This product is made from a base of a concrete nature, does not turn yellow and is said to admit of many pleasing tints. As neither rain nor snow can penetrate cement walls thus treated there is no discoloration and the natural dampness of the cement is said to be reduced to a minimum. One of the most interesting pieces of evidence which the manufacturers of this coating submits to architects and builders is a comparative photograph showing a concrete or stucco building before and after it has been coated. This is only one of many interesting photographs reproduced in the new catalog which the company has published and a copy of which will be sent to any interested reader who may make application for it.

Bostwick "Truss-Loop" Metal Lath

In a loose leaf catalogue which has just been issued from the press by the Bostwick Steel Lath Company, Niles, Ohio, there is presented a vast amount of interesting information relative to the "truss-loop" metal lath made by this concern and which is referred to as a "distinctive type of self-furring, fire-resistive, reinforcement of proven efficiency and economy." The illustrations are halftone engravings showing the appearance of the lath itself and of some of the many buildings in connection with which it has been used. These include structures of all kinds, ranging from the modest stucco-covered garage to private dwellings, apartment houses and public buildings. Various pictures also show the method of application of the company's products, including expanded metal lath, truss-V-rib, metal corner beads, metal wall plugs, corrugated wall ties, etc. Not the least interesting feature are "reasons why stucco on Bostwick 'truss-loop' is permanent and economical." The page used in this loose-leaf catalogue conforms to the size for advertising matter adopted by the American Institute of Architects. The company has a branch warehouse at 125 North Twenty-second Street, Philadelphia, Pa., and special representatives in the leading cities throughout the country.

Re-Roofing Leaky Roofs

One of the features of the business of the carpenter and builder which he probably does not always turn to the greatest profit is the re-roofing of leaky roofs. No doubt there are numbers of buildings in the immediate territory in which the builder operates that need to be repaired or at least re-roofed, and the owner in every case is probably allowing the leaky condition to continue simply because no one makes a determined effort to sell him a new roof. This is merely an example of the business in every city and town that is waiting to be secured by the proper amount of effort. In order to stimulate efforts along this line the asphalt shingle manufacturers are calling attention to what they have designated "A National re-roofing week," realizing, as they do, the large amount of re-roofing business that is simply waiting to be obtained if some one would only lead the way. They know that every carpenter, builder and roofer would like a share of this business and through their advertising and concerted action they are helping the live contractors to get it. This "National re-roofing week" is from Oct. 4 to Oct. 9 inclusive, and the shingle manufacturers are urging house owners to re-roof their houses and permanently stop the leaks by using asphalt shingles. It is suggested that every carpenter and contractor make a definite campaign for this re-roofing business and in conducting the campaign letters mailed to owners of those houses which are known to be in need of repairs should develop many orders, particularly if the contractor mentions asphalt shingles and their merits as a roof covering. A number of personal calls upon likely prospects would also yield excellent returns. The whole plan for "Re-roofing week" and the advertising of which it is a part, is conducted by the Asphalt Shingle Publicity Bureau,

(*Continued on page* 84)

854 Marquette Building, Chicago, Ill., which is supported by the leading manufacturers of asphalt shingles. They feel that by co-operating in the manner indicated they can teach the public in the quickest and broadest way the superiority of asphalt shingles as a roof covering and they realize that in this way they can best aid the building contractor in his solicitation for new business along the line indicated.

The Simplex Roofing Nail

The present high prices of metals, and especially those entering into the coverings for roofs, is said to have greatly increased the use of prepared roofings, and in order to apply coverings of this kind satisfactorily special fasteners are required. It is pointed out in this connection that the Simplex roofing nails are of a nature to make a perfect seam and therefore insure long life to the roof in connection with which they are used. This nail, made by the H. B. Sherman Mfg. Company, Battle Creek, Mich., combines two features in one—the one-piece idea and the large head. The very nature of roofing material demands that roofing nails, to be a success, should have a head of sufficient size, and it is stated that the actual area of the head of the Simplex nail is four times that of the so-called large-headed wire nail. For regular use these nails are put up in 100 lb. to a keg and, where shipped by makers of roofing paper, they are put up in cans.

TRADE NOTES

In the article presented in our last issue illustrating and describing the Rex Strip Shingles made by the Flintkote Mfg. Company, 98 Pearl Street, Boston, Mass., it should have been stated that the "cut-outs" are ½ in. wide and not 1½ in.

Martin J. Lanbis and R. H. Hitchins have opened offices in the Citizens Bank Building, Sikeston, Mo., for the practice of architecture and would be glad to receive manufacturers' catalogues and samples.

(*Continued on page* 86)

J. G. Speidel, Reading, Pa., has just issued an attractive catalogue of the elevators, dumbwaiters and hoisting machinery which he manufactures. Special attention is called to the "Columbia" and "Jumper" dumbwaiters, for which strong claims are made. The catalogue is profusely illustrated and the matter arranged in a way to strongly appeal to the builder and house owner.

Sanitary Steel Lockers is the title of a very attractive pamphlet of a size convenient to carry in the pocket, sent out by the Hess Warming & Ventilating Company, 1201 Tacoma Building, Chicago, Ill. The lockers are made in several styles, thus adapting them to meet varying requirements. Attention is called to the Hess steel medicine cabinet for the bathroom illustrated in these columns some time ago and which is used in the finest of homes and apartment houses.

Northwestern Compo-Board Company, Minneapolis, Minn., is distributing a very attractive pamphlet telling how and why Compo-board is used for walls and ceilings in the staterooms and dining halls of large and lavishly furnished steamships. Those of our readers who are interested can secure a copy of this very attractive pamphlet by making application to the address given.

Blystone Mfg. Company, Cambridge Springs, Pa., issues monthly in the interest of Blystone mixers and kindred products a four-page house organ called the "Pepper Pot." Naturally the text relates to matters in which concrete workers are likely to be interested.

THE BUILDING AGE

TABLE OF CONTENTS FOR NOVEMBER, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

NEW YORK, NOVEMBER, 1915

The Moving Picture Theater of To-day

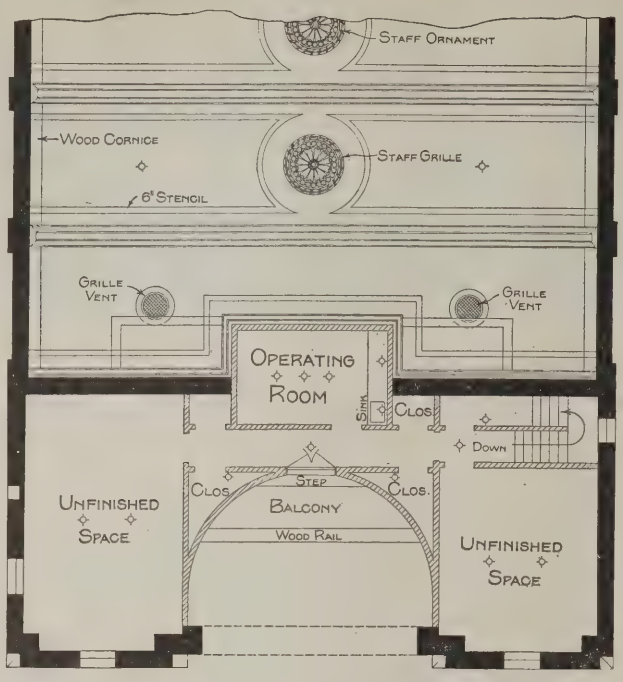
Ventilating System an Important Factor — Details of Construction Interesting to the Builder

SOME months ago we laid before our readers illustrations of a modern moving picture theater designed by a firm of specialists in this line and which attracted no little favorable comment. In the present issue we show another theater of this character by the same architects recently completed on the Pacific Coast and involving features which cannot fail to interest builders generally throughout the country. It is a brick structure 51 x 130 ft. in area, occupying a corner lot, and having a 10 ft. alley in the rear which is a decided advantage for exit purposes. In the halftone engraving on this page we show a front view of the completed building, while upon following pages are two interiors, one looking from the stage toward the entrance and the other from the main entrance toward the stage. The floor plan shows the general layout of the interior, while the various details clearly indicate constructive features.

The front of the building and the first bay of the side are highly ornamented as may be gathered from an inspection of the halftone engraving and also from the elevations among the details.

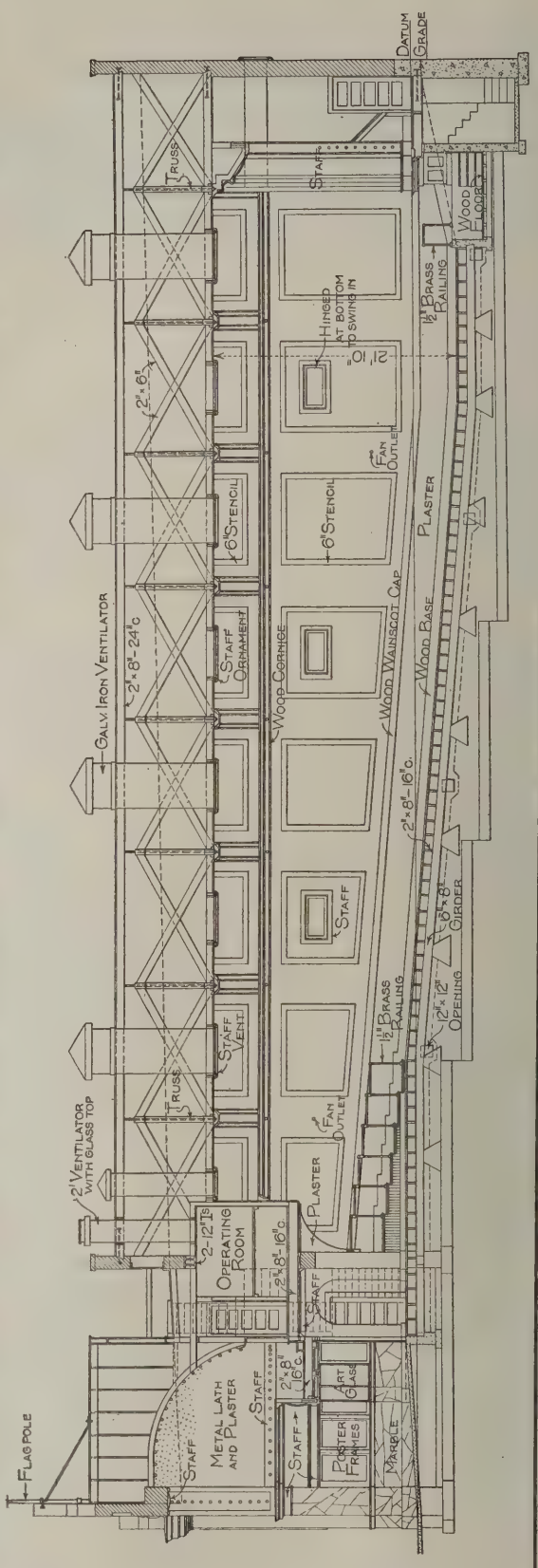
The "Sunbeam" Moving Picture Theater in Los Angeles, Cal.—Architects L. B. and A. L. Valk

The ornamental effects are produced by the use of staff applied over the cement plaster. Running across the front of the balcony over the box office at the main entrance, is a series of ornamental wreaths, above which the shell effect involves rows of electric lights set in ribs of staff radiating



Partial Plan of Ceiling of Auditorium with Plan of Operating Room, etc.—Scale 1/16 In. to the Foot

Main Floor Plan—Scale 1/16 In. to the Foot



Vertical Longitudinal Section Through the Building Showing Slope of Floor, Operating Room. Position of Ventilators, etc.
Scale 1/16 In. to the Foot

The Moving Picture Theater of To-day—Floor Plans and a Longitudinal Section

from a common center. Above this shell and conforming to its graceful curve is the word "Sunbeam"—the name of the theater.

The box office is of art glass set in copper frame and is of ornamental design. There is a brass wicket and a marble deal plate at the window, an automatic ticket selling machine and cash register.

The foundation walls are composed of a mixture of concrete made up of 1 part Portland cement, 2½ parts clean sharp sand, and 3½ parts crushed rock of a size to readily pass through a 2-in. ring. The walls of the superstructure are of brick 17 in. thick laid up in lime and cement mortar.

The entire building is covered with Malthoid roofing which is laid directly on the roof boards. iron vents each 4 ft. in diameter with dampers as clearly shown on the longitudinal section presented on another page. The operating room has a vent with wire glass top 2 ft. in diameter.

The floor of the audience room is carried by 2 x 8 in. joists placed 16 in. on centers and resting on five rows of 6 x 8 in. girders. The subfloor is ⅞ x 6 in. material, over which is a finish floor of 3½ x ⅞ in. No. 1 Oregon pine, tongued, grooved and blind nailed.

The floor starts to pitch from the front of the loge seats and drops 3 ft. in 58 ft. 8 in., from which point to the stage the floor is level, all as clearly indicated in the longitudinal section. The auditorium, including eighty-two loge seats in the

The Moving Picture Theater of To-day—View in the "Sunbeam" Looking from the Stage Toward the Main Entrance and Showing the Flag Draped Front of the Operating Room

This is composed of a layer of hot Maltha spread over the boards and on it in turn are two layers of P. & B. No. 2 asphalt saturated felt weighing 14 lb. per 100 sq. ft., one width being laid 17 in. over the other. After the roof was entirely covered, the laps were nailed every foot, then another heavy coating of hot Maltha was applied, and into it was imbedded a 2-ply Malthoid roofing lapped 2 in. and thoroughly cemented to the felt. Galvanized iron flashings were inserted in the brick walls, securely fastened with metal plugs and well pointed with cement. The fire walls above the roof were mopped with hot coal tar up to the under side of the copings.

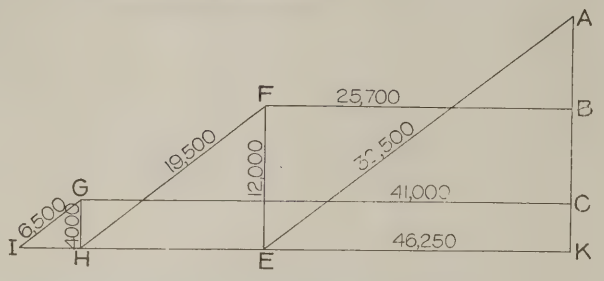
Extending through the roof are four galvanized

rear which are inclosed within brass railings as indicated on the main floor plan, has a seating capacity of 702 people. There are two main aisles 5 ft. 6 in. wide running the entire length of the auditorium, and these are carpeted.

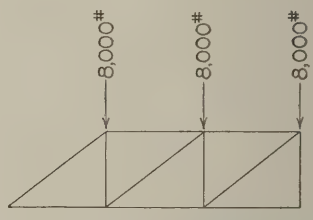
The orchestra pit has a cement floor in which wood sleepers are imbedded, on which rest ⅞ in, Oregon pine flooring. The front of the stage is laid off in panel work as indicated in the details. The orchestra is surrounded with a 2-in. brass rail and standards 2 ft. 6 in. high. Each side of the stage has an exit to the 10-ft. alley in the rear of the building. The floor of the stage rests on 2 x 8 in. joists placed 16 in. on centers.

Not the least interesting feature of the construction is found in the trusses supporting the roof. In a general way this construction is indicated in the cross section looking toward the stage. The top and bottom chords are 6 x 10 in. and the diagonal struts are 2 x 6 in. The two outer rods are ning through both top and bottom chords as shown in the detail on page 25 of this article. The inner edge of this plate is let into the bottom chord 1 in. and has two 1-in. bolts with washers.

Each truss rests on a cast iron plate 1¼ x 15 x 18 in. with a 1-in. lug in the center of each plate,

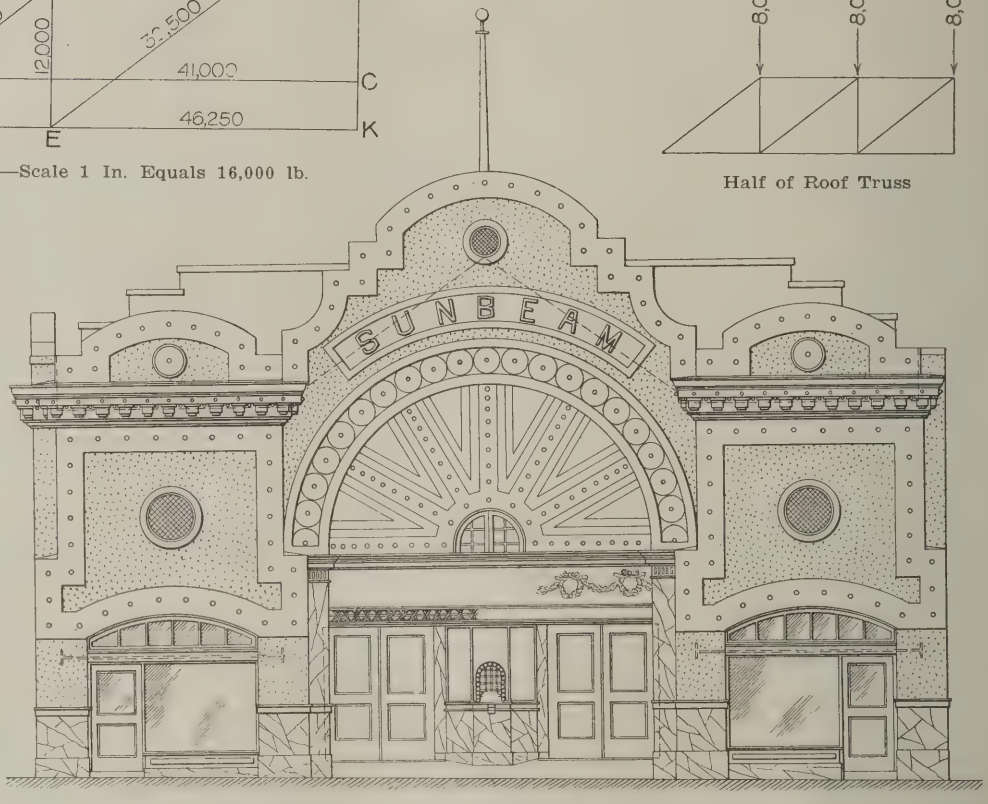


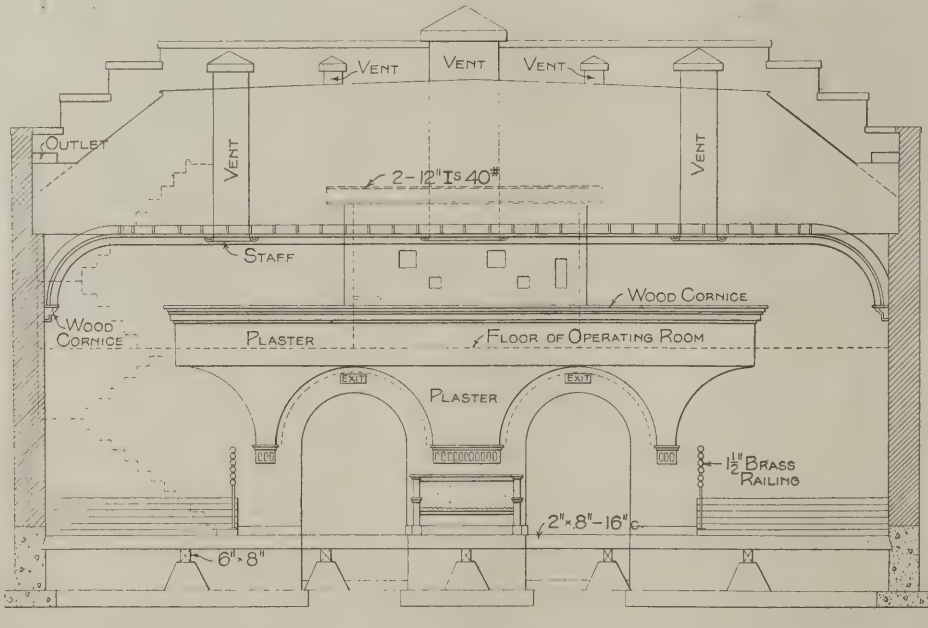
Stress Diagrams—Scale 1 In. Equals 16,000 lb.



Half of Roof Truss

The Front Elevation of the Building on Pasadena Avenue, Showing the Ornate Character of the Exterior Treatment — Scale 3/32 In. to the Foot





Vertical Cross Section of the Building Looking Toward the Street Entrance and Showing the Situation of the Operating Room, Vents, Etc. — Scale 3/32 In. to the Foot

The Moving Picture Theater of To-day—Elevation, Cross-Section and Stress Diagrams

1½ in., then come two which are ⅞ in. in diameter, then a center rod of ¾ in. diameter. The joints at the intersection at the top and bottom chords are reinforced with iron plates ½ x 8 in. and turned up at the top chord 4 in. with two 1-in. bolts run- all as shown in the detail referred to. The rafters are 2 x 8 in. placed 24 in. on centers.

The main ceiling is composed of 2 x 6 in. joist placed 16 in. on centers laid in between the trusses and stiffened with cross bridging. At the sides

next to the wall circular ribs are sawed out and placed 16 in. on centers.

All the interior partitions are plastered on metal lath and the main ceiling on wood lath.

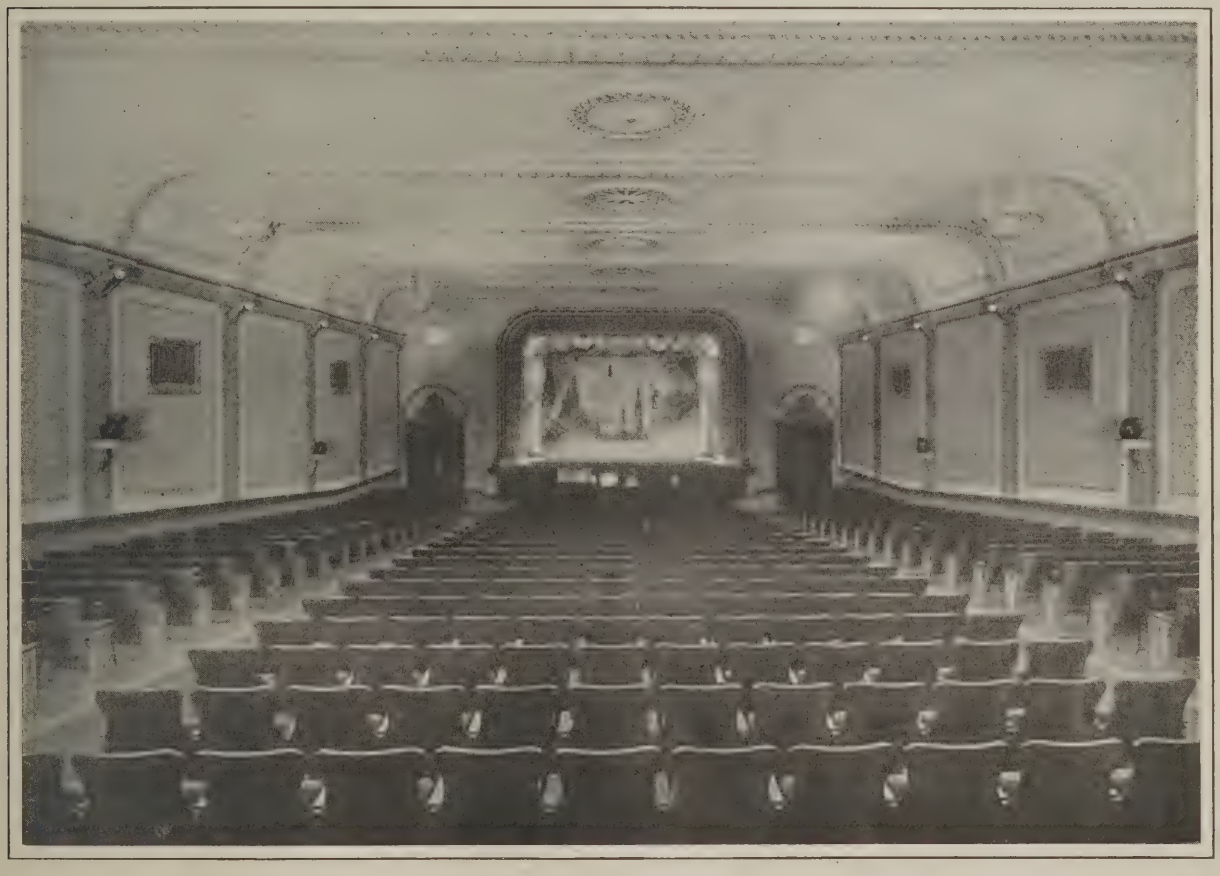
Referring again to the floor plan, it will be seen at the right and left of the outer lobby is a small store with cement floor and having show window for display purposes. Each store is also provided with a toilet and wash basin. At the right and left of the foyer just beyond the box office are the toilets for men and women. The plumbing equipment is of the modern type, the fixtures being of the make of the Crane Company, Chicago, Ill. The location of them is shown on the plans.

The operating room is directly over the inner foyer, that is, the one just beyond the box office, and having a tile floor. It is reached by the stairs so marked just at the right as one enters the inner foyer. The operating room is of fireproof construction lined with ¼-in. asbestos, over which is placed No. 26 gage galvanized sheet iron for the side walls, floor and ceiling. The room contains two No. 6-A Powers moving picture machines, one dissolving stereopticon, a spotlight and a mercury arc rectifier which transforms alternating current into direct current.

The illumination is by indirect lighting system, using X-ray reflectors in the hanging fixtures. The electric system is so arranged that all the lights on the stage embracing the footlights, strip lights, etc., are controlled from the operating room, as well as from the stage switchboard. The lights in the hanging fixtures of the main ceiling are on three circuits, with dimmers, so that all the lights can be raised and lowered at will.

The ventilation is by the intake and exhaust system. The fresh air is driven into the main room by two 24-in. electric fans located over the exit doors at the stage end of the building, while at the front end, in the main ceiling, are located two 24-in. exhaust fans which are connected with a 24-in. galvanized iron pipe extending up through the roof and provided with dampers as shown on the plans of the roof and ceiling. In addition to these are four openings in the main ceiling each 4 ft. in diameter and connected with a galvanized iron pipe extending through the roof, also provided with dampers so that the ventilation can be regulated as circumstances may require.

It might not be without interest to refer a little more in detail to the halftone interior views accompanying this article. The picture looking from the stage toward the main entrance doors shows the orchestra pit in the foreground, the general seating arrangement, the small balcony over the entrance doors and the front of the operating room which is draped with flags. It also shows the ceiling beams of staff and the round ventilators in the ceiling. The ornament in the staff work of the ceiling is high-lighted with gold bronze paint and the side walls are laid off in panels decorated with stencil tapestry.



The Moving Picture Theater of To-day—Interior View Looking from Entrance Toward the Stage

The interior view looking toward the stage clearly indicates the setting of the latter, the procenium arch, the royal border, one of the handsome "drops" representing an oriental scene, also the two intake openings over the exit doors containing 24-in. ventilating fans which supply fresh air to the auditorium. At the opposite end are two similar openings which exhaust the foul air.

The picture also shows the hanging lighting fixtures which are made of staff decorated to match the decoration of the room and containing three X-ray reflectors and three 100-Watt Tungsten lamps arranged on three circuits with dimmers, so that they may be controlled at will from the operating room. This view further shows the opera chairs, the main cornice, the ventilating openings in the main ceiling and the side wall openings, together with fan brackets on the side walls.

The moving picture theater here shown is located at the corner of Pasadena avenue and Avenue 58, Los Angeles, Cal., and cost complete, without equipment, $18,500, distributed as follows:

Masonry and carpentry work	$12,375
Plastering inside and out	1,216
Electric wiring	987
Marble and tile work	847
Painting and decorating	775
Staff work	890
Plumbing and gas fitting	740
Galvanized iron work	670

The plans were prepared by Architects L. B. and A. L. Valk, who make a specialty of theater design, 424 to 426 Stimson Building, Los Angeles, Cal.

The general contractor was E. A. Harshman, Black Building, Los Angeles, Cal., who had the masonry and carpentry work, while the other classes of work were sub-contracted. The plastering was done by A. Malone with offices in the Black Building; marble and tile work by Musto-Sons-Keenan Company, 1949 Santa Fe Avenue; the painting and decorating by A. Renz-Warren Company, 2121 W. Pico Street; the plumbing and gas fitting by the Westlake Hardware & Plumbing Company, 690 Alvarado Street; the staff work by Watkins Bros., 2227 Maple Avenue; the electric wiring by the Crescent Electric Company, 629 Wesley Roberts Building, and the galvanized iron work by the Hartfield Hardware Company, 3301 San Pedro Street, all of Los Angeles, Cal.

Floor Surfaces in Fireproof Buildings

In discussing floor surfaces in fire proof buildings Sanford E. Thompson states that the selection of the type of floor is dependent on the character of the structure, the nature of the wear, and the architectural appearance. Every building must be considered by itself. Suggestions for the type of surface to select are covered in the following paragraphs:

As a preliminary guide, the material suitable for different conditions may be given as:

Basements: Granolithic finish with troweled surface made with approved materials and workmanship.

Factory floors: Granolithic finish with troweled surface; hardwood.

Machine shops: Granolithic finish with troweled surface; hardwood on substantial base.

Ground floors for heavy manufacturing: Wood block; granolithic.

Warehouses; Granolithic with troweled surface; asphalt composition; hardwood.

Offices: Hardwood; linoleum on concrete; magnesium composition.

Corridors and halls for institutions and office buildings: Terrazzo; granolithic finish with ground surface.

Entrance pavilions: Terrazzo; mosaic; tile; natural stone.

Classrooms, lecture-rooms and drawing-rooms: Linoleum on concrete; granolithic with ground surface; hardwood; magnesium composition.

Laboratories: Granolithic with troweled surface; magneisium composition; tile; hardwood.

Lavatories: Terrazzo; granolithic finish with ground surface; tile.

The above selections are given in the order in which choice might be made for the average building or room of each class.

Keeping the Air in Circulation

There has been more or less outcry against the practice of keeping the air in a house warmed by a furnace in constant circulation. Those who made it will be somewhat startled by the investigations which seem to lead to the conclusions that within reasonable limits a human being does not pollute an atmosphere in which life is maintained to an extent to require it to be constantly changed. Careful investigation seems to show that it is more important to adjust the temperature and humidity to the needs of those occupying the rooms than it is to remove the air and renew it. Whatever those who desire to argue the question may advance or ignore, the fact remains that there are a large number of homes in the sections of the United States in which the climate is most severe and in which during the winter season the air within them is kept in circulation and the only change of air in these houses is due to leakage through doors, around windows and through the walls. It would seem that the time-honored practice in cold climates is to be vindicated by the searching study that is now being given to the effect of air in health and what is positively needed in the way of ventilation. Builders and furnacemen can doubtless add something to the facts bearing on the situation by observing the health of those who live in homes warmed by furnaces supplied with air from the inside. They can also induce some of their patrons to add water evaporating equipment to their furnaces and learning how their service affects health, comfort and the temperature maintained in these homes. All careful observations seem to indicate the need of more moisture and better heat control rather than more air, disquieting as this may be to the fresh-air enthusiasts.

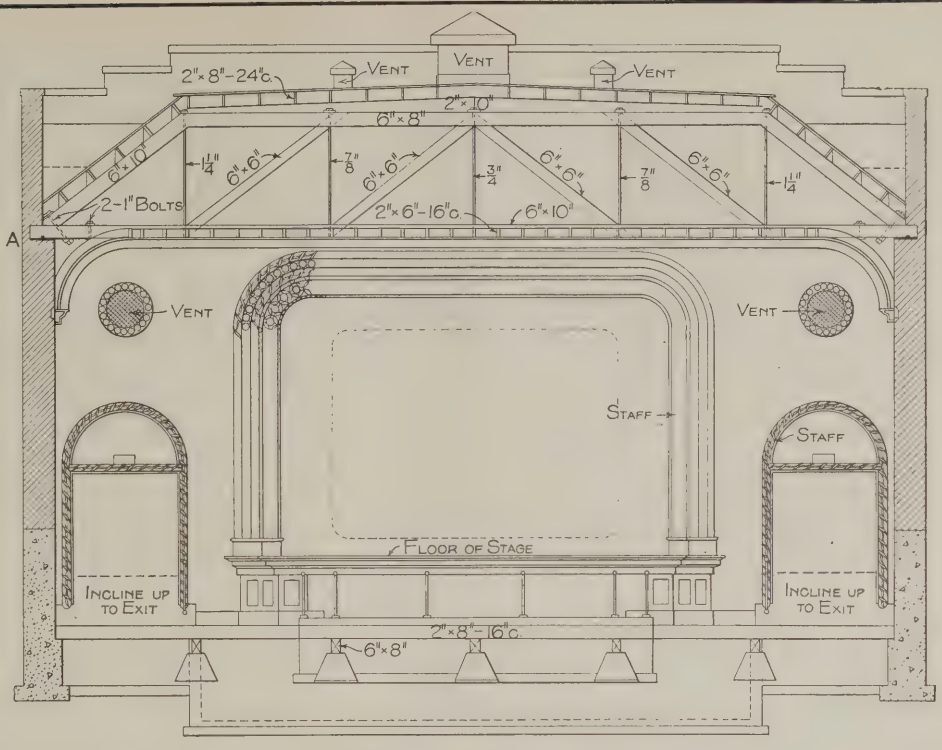
Uniform Rating of Concrete Batch Mixers

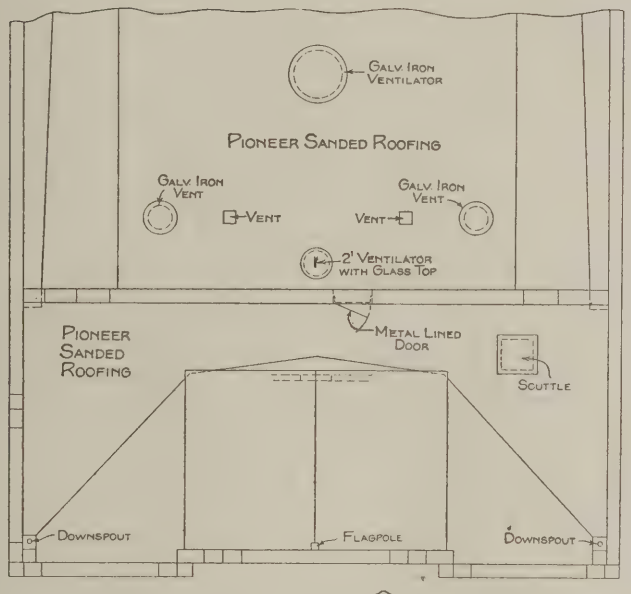
We have received from the secretary of the National Association of Mixer Manufacturers the following announcement which will be found of great interest to building contractors and all others engaged in the execution of concrete work:

Up to the present time there has never been any standard method of rating batch mixers. Some mixer manufacturers rate their machines by their capacity in mixed concrete, while other manufacturers rate them by their capacity in loose unmixed material. It is a well-known fact that a mixer having a batch capacity of 8-9 cu. ft. of unmixed sand, stone and cement will hold only about 6 cu. ft. of mixed concrete per batch. For this reason the term 3, 4 or 9-ft. mixer has never had any real definite significance.

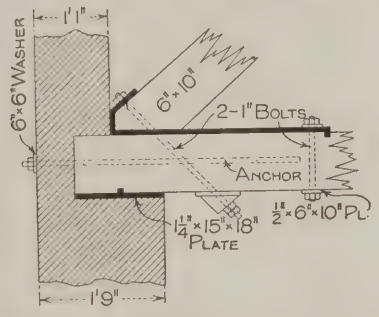
The National Association of Mixer Manufacturers, at

Vertical Cross Section of the Theater Building Looking Toward the Stage and Clearly Showing the Truss Construction of the Roof — Scale 3/32 In. to the Foot



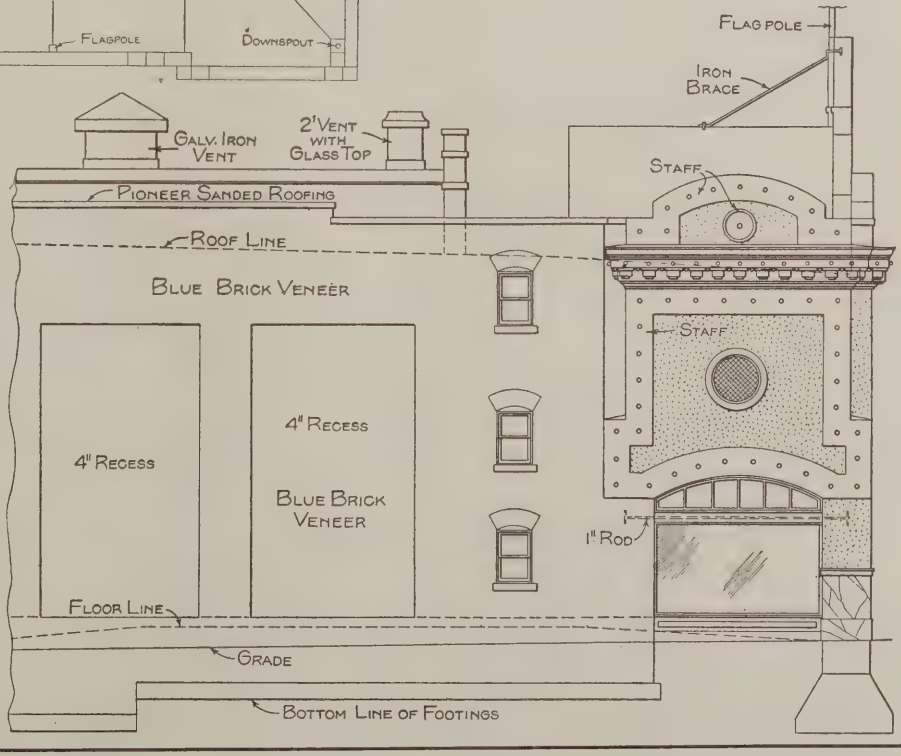


Partial Roof Plan —Scale 1/16 In. to the Foot



Detail of the Truss Joint at "A" of the Cross Section—Scale ⅜ In. to the Foot

Partial Elevation of Side of the Building on Avenue 58, Showing the Decorative Staff Treatment of the Bay — Scale 3/32 In. to the Foot



The Moving Picture Theater of To-day—Partial Roof Plan, Detail, Section and Elevation

their August meeting, took steps toward remedying this difficulty by adopting a resolution providing for the uniform rating of batch mixers. This resolution provides that the members of the association in future catalogs and circulars shall specify the capacity of their mixers as "size of wet mixed batch," and not otherwise. The resolution further provides that the dry unmixed capacity of a mixer may be approximated as one and one-half (1½) times the wet mixed batch, assuming the use of cement, sand and one and one-half (1½) inch crushed stone, with 1¾ gal. of water per cu. ft. of mixed concrete. The members of the association further agreed not to use the dry batch rating in their correspondence, advertising, etc., unless the standard wet batch rating were used also and with equal prominence.

We feel that the step we have taken is a very desirable one—one that will prove beneficial to all contractors, mixer manufacturers and everyone, in fact, connected with the concrete and cement industry. A contractor can now arrive at a real comparison between mixers—not only in price, but in capacity. This would have been much more difficult without a standard rating.

Freak Buildings in England

There are many strange structures found in various sections of England which bear a most interesting history, some of them appearing to be more than they really are. In fact, many of them are nothing more than freaks, and a close inspection by one with even a little knowledge of architecture will show the deceit, said an architect lately returned from a trip abroad, as reported in the New York *Sun* not long since.

A family in search of social position, for example, builds a place along the lines of the great castles of Richard the Third's time. The estate is guarded as if the King lived there, but this is for the purpose of preventing the deception being discovered. As a rule, such buildings are a series of hollow arches and domes and turrets and spires around a comparatively small dwelling.

Not far from Aylesburg is one of those fabric castles. It is a reproduction of a great mediæval stronghold. From the road it looks to be just what the owner had in mind when he built it, but if one gets close to the buildings it will be found that the walls are far from massive and the windows too large for the mediæval home it resembles at a distance.

There are freaks of another kind in England. There is a house near Ilford which is a freak if there ever was one. It is a mausoleum used as a dwelling and locally known as the castle. Some years ago a titled Englishman discovered the family hadn't a proper mausoleum so he tumbled down his house and erected on its site a big mausoleum. Below the structure he had built a number of catacombs. Over this was the chapel in which funeral services were to be held and over this apartments for mourners were provided.

The builder did not take the Bishop of the district into his confidence when he started the structure. He didn't see the reason for it. Not until the structure was finished did he learn the value of the Bishop in such matters. The structure would have to be consecrated and the Bishop was the only one who could do this. When he went to the Bishop he refused to consecrate the mausoleum. Finally the apartment provided for the mourners over the chapel was rented. There are only four rooms inhabitable in the structure. These are reached from the chapel through a well-like spiral staircase which extends to the roof. The spire is one of the features of the structure. The building stands against the hillside as a monument to the vanity and folly of the builder.

Near Carshalton is a massive gateway of wrought iron and stone something like 240 ft. wide. Though it has stood for many years its value now is placed at $25,000. From this can be gleaned the original cost. The gateway was to lead to a great mansion that was never built. Financial reverses prevented it. The mansion was to be built for a great London merchant. He had a title, but apparently wanted a greater one, and the building of a house that would be the gossip of all England was the means he selected to get it.

His attention was first concentrated on the gateway. As this would give the first glimpse of the estate to visitors he wanted to convey at the beginning the impression of greatness. So for months he and his architects studied gateways in search for the most impressive. The gateway was built first. But the beginning was the end of this great undertaking. The gateway had been finished but a short time when work on the estate was stopped. Reports from London said that the master was in trouble. These reports proved correct, for the merchant was in bad straits and the building of his great country home had to be given up.

The gateway is one of the sights of the place and is usually referred to as the "Lion of Carshalton."

An Unusually Long Flagstaff

Within recent years many long flagstaffs have been reported, but the latest candidate for first place grew in British Columbia and is Douglas fir, 216 ft. in length, according to Consul General R. E. Mansfield at Vancouver, B. C., who recently made a special report concerning it. In its original state the stick was 5 ft. in diameter at the butt and 14 inches in diameter at the top, but dressed into shape the staff has a diameter of 32 inches square at the butt for a distance of 16 ft. For the next 100 ft. it is octagonal in shape, and for the last 100 ft. it is round. The upper 200 ft. is a gentle taper from 32 in. to 12 in. in diameter. The old Douglas fir flagstaff at the Kew Botanical Gardens just out of London, England, and which the new stick is to replace, was for many years the tallest in the world. It was recently taken down on account of decay. The tallest now in existence is said to stand in the exposition grounds at San Francisco.

Among the plans recently filed in the borough of Manhattan, N. Y., were those for a sixteen-story fireproof commercial loft building to be erected on the northwest corner of Thirty-first Street and Madison Avenue, and representing an investment of $1,000,000. It will have a frontage of 116 ft. on Thirty-first Street and 148 ft. on Madison, and 22 ft. on Thirty-second Street. The architects are Sommerfeld & Steckler, 31 Union Square, New York.

The average width of a shingle is 4 in. and if laid 4½ in. to the weather 800 will cover a square; if exposed 5 in., 720 will cover a square.

A Western Home of Frame Construction

A Seven-Room House at Cheyenne, Wyo.—Details of Interest to Builders—Cost, $4,750

By Charles A. Park

THE ideal home is as numerous as there are home-loving individuals, but the peculiar fact about it is that each is so radically different. Architects who continually come into contact with this diversity of opinion long ago gave up any attempt to standardize home-building, and have given way to the various ideas regarding essentials, the object being to secure for each individual client a plan embodying the features considered by the owner as necessary to a perfectly planned home. Not only is there an ideal home for each individual, but there are usually several, varying with the predetermined expenditure. It is, in fact, this very diversity of tastes and ideals that is responsible in a large measure for the variety of beautiful and practical homes which adorn so many of the thoroughfares of our cities and villages.

Our ideal home was determined upon after a considerable amount of study and the rejection of many tentative plans. After, however, the plans finally assumed definite form no changes were made, and the result was entirely satisfactory—an experience which I am led to believe is rather uncommon to home builders. Believing that the general layout and details of this moderate priced home will prove of interest to many of the readers of The Building Age, the essential features are herein set forth. While it is only *one* ideal it is believed that many desirable features are embodied in its construction and arrangement that will commend it to those desiring a small but roomy home at not too great a cost to the owner.

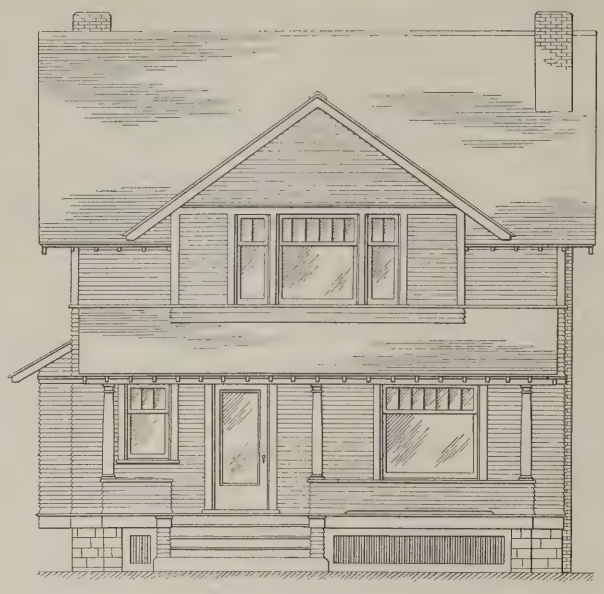
The Completed House from the Dining Room Side

As will be seen from the pictures and drawings, the house is of frame construction, having monolithic concrete basement walls, while the portion above grade is of cement, plastered and laid off in courses.

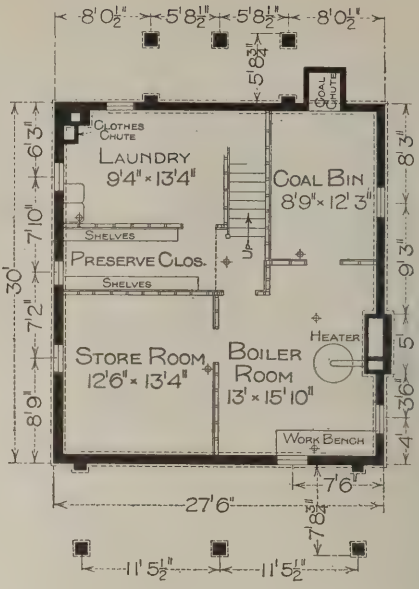
Partial View of the Living Room Looking into the "Den"

The concrete for the foundation walls consisted of a mixture of one part Portland cement, three parts sand and five parts screened gravel mixed wet and deposited in wood "forms" made of 7/8 in. dressed lumber secured to 2 x 4 in. verticals placed 2 ft. on centers. All of this lumber was later used for sub-floors and studding. The sand and gravel was all obtained from the excavated material. The "forms" for both inside and outside of the walls were the same construction. The walls above grade were plastered with a 1-in. coating of cement mortar mixed in the proportion of one part cement to two parts sand. The basement walls were allowed to set for ten days before removing the "forms."

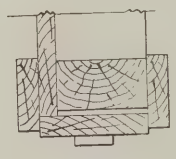
The basement is 6 ft. 8 in. in the clear, the first story 9 ft. and the second story 8 ft. 6 in. This height is somewhat reduced in the closets of the second floor, but all closets have good head room. All rooms of the second floor have full height ceilings except where formed otherwise for effect. Main stud walls are cut from 16-ft. stock. The height of plate selected is such as to relieve the house of that stilted appearance so common among two-story dwellings and at the same time give it no appearance of squattiness.



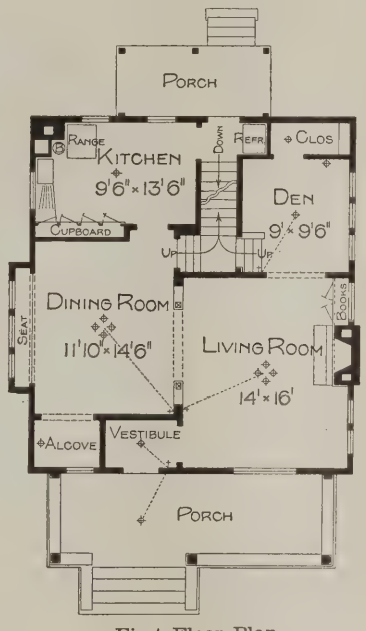
Front Elevation of the House—Scale 3/32 In. to the Foot



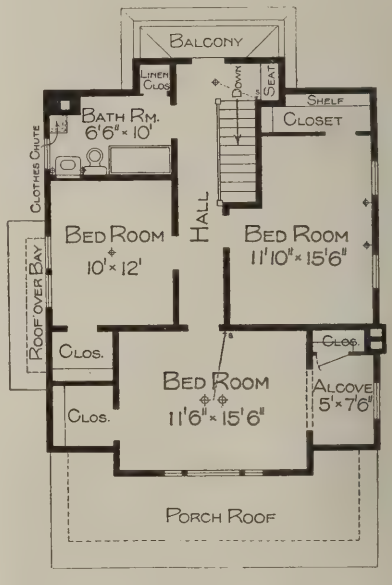
Foundation Plan—Scale 1/16 In. to the Foot



Detail of Basement Door Frame—Scale ¾ In. to the Foot

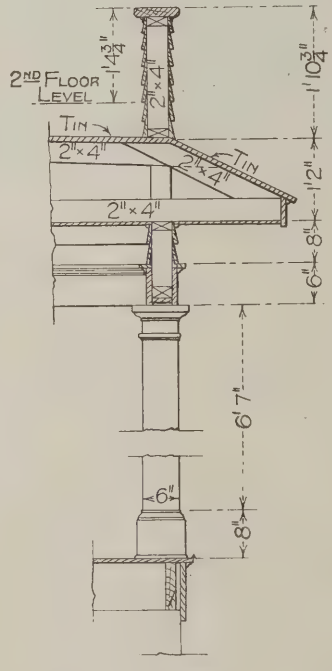


First Floor Plan



Second Floor Plan

Scale 1/16 In. to the Foot



Details of Rear Porch Construction —Scale ⅜ In. to the Foot

East or Right Side Elevation of the House—Scale 3/32 In. to the Foot

Miscellaneous Details of a Western Home of Frame Construction—Charles A. Park, Architect

The framing timbers of the house embrace 2 x 4 in. studs, 2 x 8 in. joists, and 2 x 6 in. rafters. The roof is covered with cedar shingles laid 4½ in. to the weather.

Great care was exercised to bring the tops of all doors and windows on the first floor to a uniform height of 7 ft. above the finished floor level, while

A Western Home of Frame Construction—The Completed Building from the Living Room Side and Showing the Outside Chimney

on the second floor a uniform height of 6 ft. 8 in. was maintained; the height selected being such as to suit the doors in each case. This arrangement made possible an exterior belt course forming a continuous cap for all doors and windows in the first and second stories. The interior finish was also adapted to utilize this feature by placing a continuous head casing entirely around the rooms giving a paneled effect with the casings of openings which was very pleasing. This head casing was also made to serve as a picture molding and as a separation line between the tints or papering of ceilings and side walls.

In the exterior finish on the second story another belt course was run at the level of the main window subsills and forming an extension of them. The three-member belt at the heads of the first story doors and windows defined also the height of the porch soffits, both front and rear, while the single member belt at the second story window sills formed the rail of the back porch balcony and a flashing line for the roof of the front porch. These details were all carried out precisely as planned and added much to the attractiveness of the home.

The interior space was planned to leave absolutely no waste room on the first floor, and on the second floor the hall is only large enough to provide ready access to the bed rooms and the bath room. The living room on the main floor is reached from the porch through a vestibule provided with bevel plate full length glass front door of solid quartered white oak. A built-in bookcase with full length leaded glass doors takes up the space to the left of the chimney, the latter being built on the outside wall and adding materially to the general exterior effect. A feature of the living room is the open fireplace with its improved coal grate. The hearth and facing are of mat glaze, soft brown 3 x 6 in. tile. On the right side of the fireplace the mullion window is set just high enough to allow a piano to be conveniently placed beneath it. Here again, attention was paid to detail, the design of the oak mantel and bookcase having been made to harmonize and the top of the latter made to form the stool of the single sash window immediately over it. The height of windows, mantel and bookcase were thus made to harmonize across this side of the room.

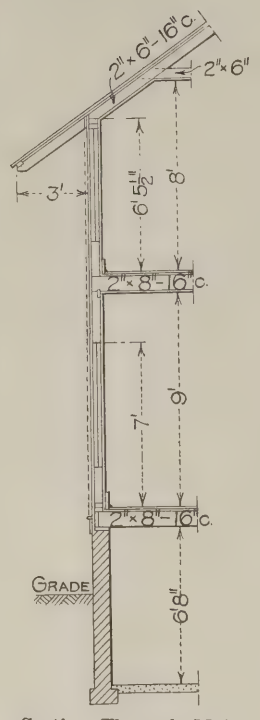
At the left of the living room is the dining room, reached through a broad cased opening with paneled colonnade. The room is well lighted from a triple window set in a square bay and is fitted with a paneled seat. The openings between the two rooms is cased full width the same as a door opening, thus giving it a very attractive appearance and making it an important feature of the room. An idea of the effect produced may be gathered from some of the pictures presented herewith. The finish of this room is somewhat different from the living room in that a ceiling molding of two members is used and the continuous belt above windows and doors omitted. A plate rail is placed at the usual height. A cozy sewing nook with large window to the front and having a broad opening from the dining room has proved very serviceable.

The den, like the dining room, is lighted from a triple window and is reached directly from the living room. The windows are placed high to give wall space for a desk or couch. A large closet nearly the full width of the den is an important detail of the first floor arrangement.

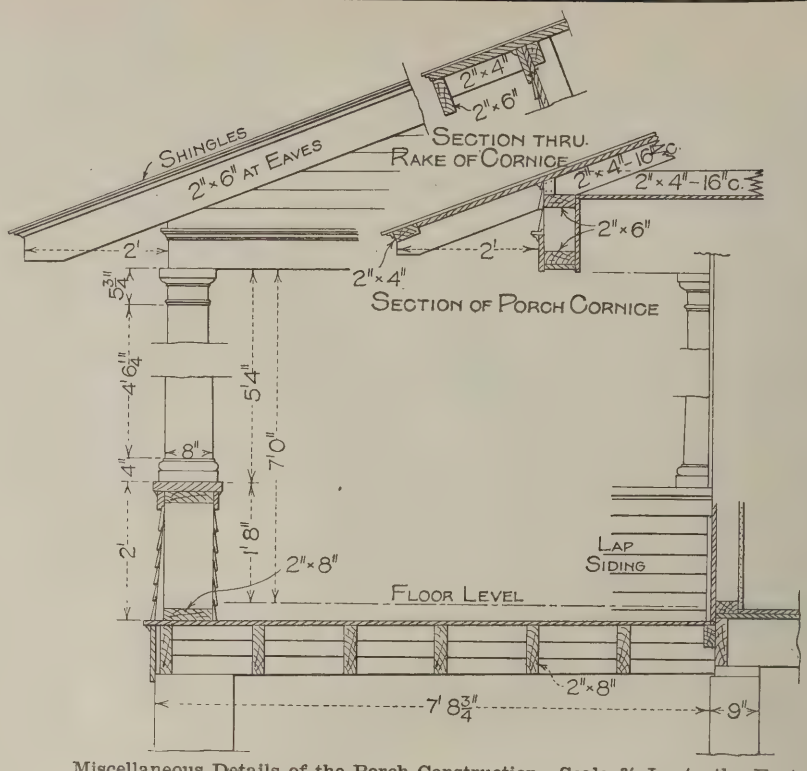
The great care taken in the planning of the kitchen to provide a convenient arrangement was well justified in the results obtained. Three windows furnish an abundance of light and ventilation. The chimney and clothes chute occupy the corner, and in front of them is a 1-in. slate slab on which

The Dining Room Looking into the Living Room

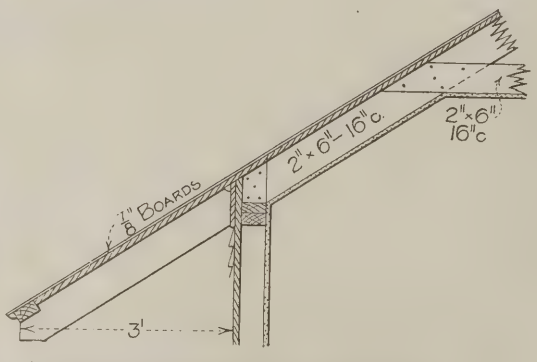
the range is placed. The sink—a one-piece pattern—is placed on the outer wall beneath a broad high window. To the left of the sink the built-in kitchen cupboard is within easy reach. This cupboard is large and well fitted to hold dishes, culinary supplies and utensils. Very few steps are needed in the work of this kitchen. The work table occupies the unused wall space on the inner wall. Con-



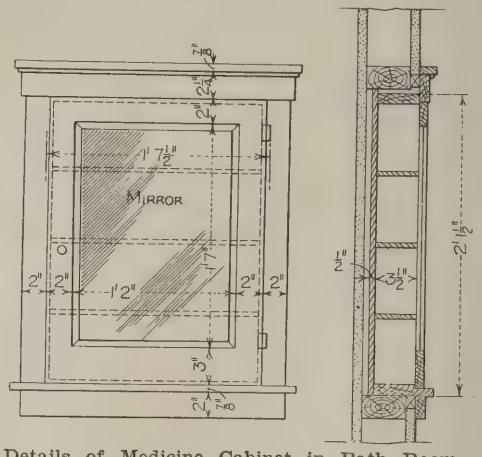
Section Through Main Wall of the Building —Scale ⅛ In. to the Foot



Miscellaneous Details of the Porch Construction—Scale ⅜ In. to the Foot

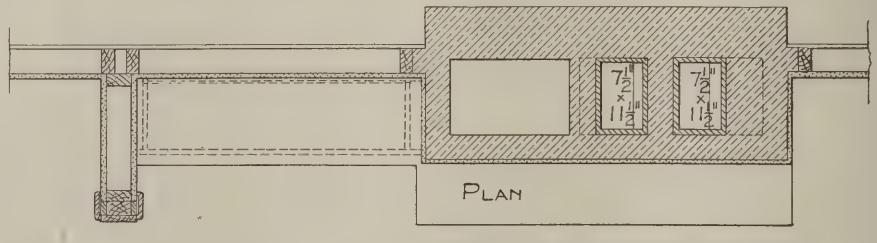


Details of the Main Cornice—Scale ⅜ In. to the Foot

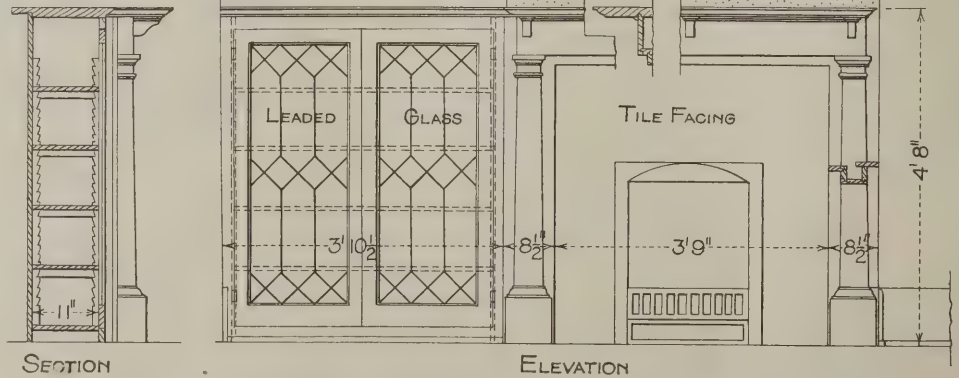


Details of Medicine Cabinet in Bath Room—Scale ¾ In. to the Foot

Section of Plate Rail—Scale 3 In. to the Foot



Base



Various Details of the Book-Case and Mantel in the Living Room—Scale ⅜ In. to the Foot

Miscellaneous Details of a Western Home of Frame Construction

venient access is had to the back porch or basement through the entry opening off the kitchen. The refrigerator is conveniently located in a recess built for that purpose in the rear entry.

Perhaps the most satisfying feature of the entire plan is the stair arrangement. The main stairs

A Western Home of Frame Construction—View of Living Room as Seen from the Dining Room

rising from the den adjacent to the living room are conveniently placed and the common landing with stairs leading down to the dining room serves all the purposes of a separate back stairway. The swing and placing of doors are such as to completely shield one in passing down the back stairs into the kitchen from the view of persons in either the living or dining room. The compactness of the plan and the generous room sizes throughout are largely accounted for by this economical and convenient stair arrangement.

For the first story trim the head casing belt consists of three members, including cap and cove molding, while for the second story a single member with rabbet cut on the back at the top and with front edge rounded was used. The doors were selected to harmonize with this panel effect on the walls, those of the first story being two panel with horizontal intermediate rail, while those of the second story are single panel. In each case the panels of the doors are veneer.

The second floor hall with a sash door to the balcony over the rear porch furnishes a common access from all bed rooms to the bath and to the balcony. In the front of the house is a large bed room with alcove suitable for use as a sewing room or for a child's bed. Opening out of the front room is a large closet and there is one also in the alcove. The ceilings of the front room and alcove are furred down to slope to the rafters to the top of the head casing belt, giving a very pleasing effect. In all bed rooms the openings have been so placed as to give excellent wall room for the beds. This feature makes the furnished rooms have the appearance of being much larger than they really are.

The bath room, an interior view of which will be found among the pictures here presented, is large, well lighted and provided with clothes chute, linen closet and medicine cabinet. A shower with ring and curtain is placed over the top.

The doors used throughout the house are veneered and of materials to match the rooms in which they are placed. Those on the first floor are quartered white oak, except in the kitchen and back entry, where they are of yellow pine. All doors on the second floor of the house are of selected fir with panels of yellow pine.

The floors of the first story rooms are of selected white oak, while those of the second story are of edge grain yellow pine. All baseboards are housed into the plinth blocks and all belt courses tongued together in angles. Not an open joint has developed in the work thus far, and it is difficult to see how it can ever open up. Natural wood varnish finish was used in all second story rooms, except the bath room, where the walls, ceilings and finish are white enameled. The oak woodwork on the first floor was slightly stained. All finish was three-coat work rubbed with pumice stone and oil to a soft finish. The floors throughout were given a coat of shellac and two coats of liquid granite, except in the bath room, where spar varnish was used with good results.

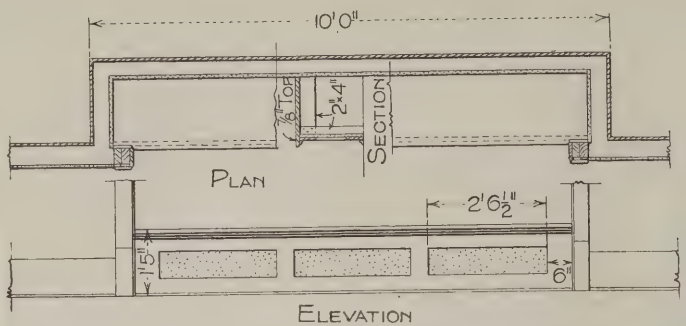
All outside woodwork was given three coats of white lead and oil, and the roof two coats of shingle stain.

The hardware used was brass in plain pattern, except in the bath room, where nickel plated fixtures were used.

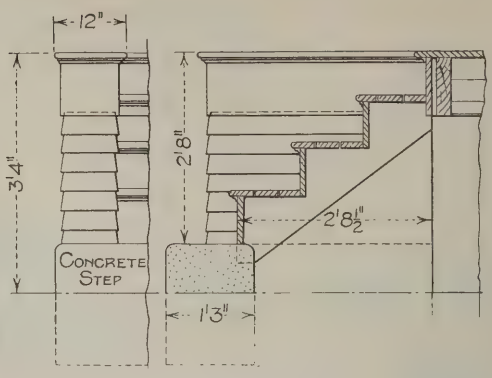
The house was built at Cheyenne, Wyo., for our own occupancy, and all possible precautions were taken to secure warmth. High winds are a feature of the Cheyenne climate, and at times the weather is quite cold. Blizzards are not uncommon and the

The Bath Room as Viewed from the Hall

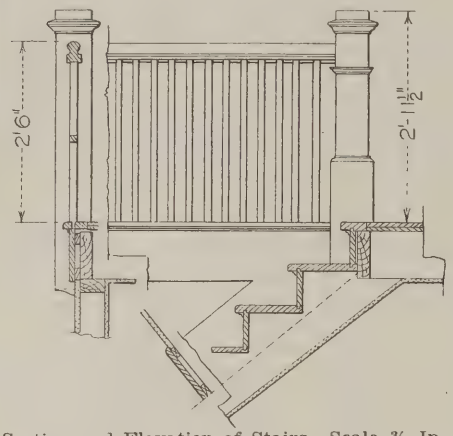
exposed side on a corner lot required tight construction. All outside walls were diagonally sheathed, the boards being driven up tight and completely covered with heavy tar paper. Over this the exterior was covered with siding. The roof was



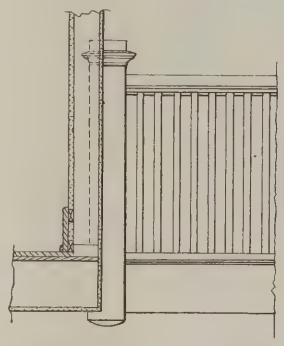
Details of the Window Seat in the Dining Room—Scale ¼ In. to the Foot



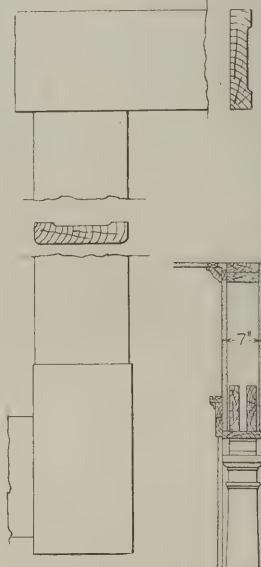
Various Details of the Front Porch Steps—Scale ⅜ In. to the Foot



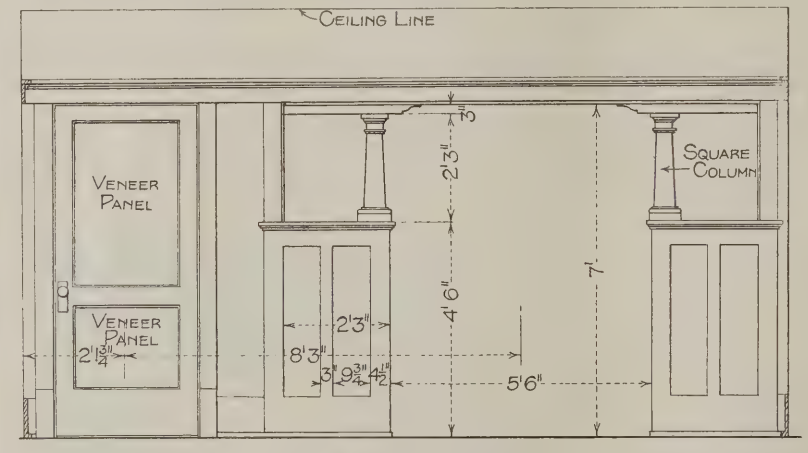
Section and Elevation of Stairs—Scale ⅜ In. to the Foot



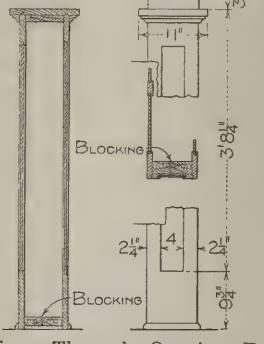
Another Detail of the Stairs —Scale ⅜ In. to the Foot



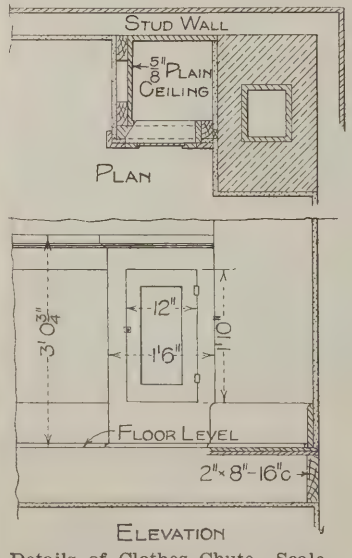
Closet Trim—Scale 1½ In. to the Foot



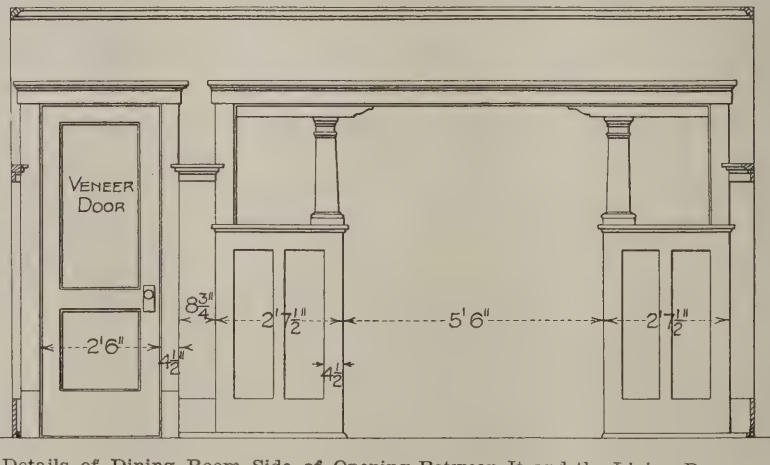
Details of Living Room Side of Opening Between It and the Dining Room—Scale ¼ In. to the Foot



Sections Through Opening Between Living Room and Dining Room—Scale ⅜ In. to the Foot

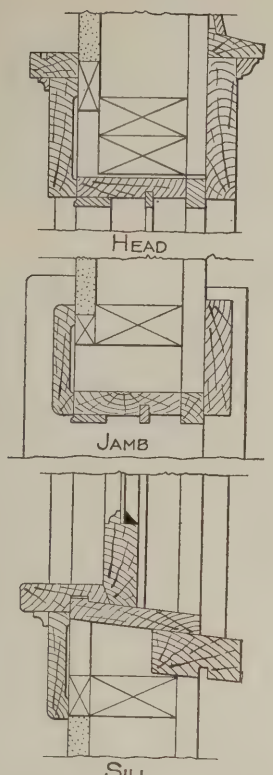


Details of Clothes Chute—Scale ⅜ In. to the Foot

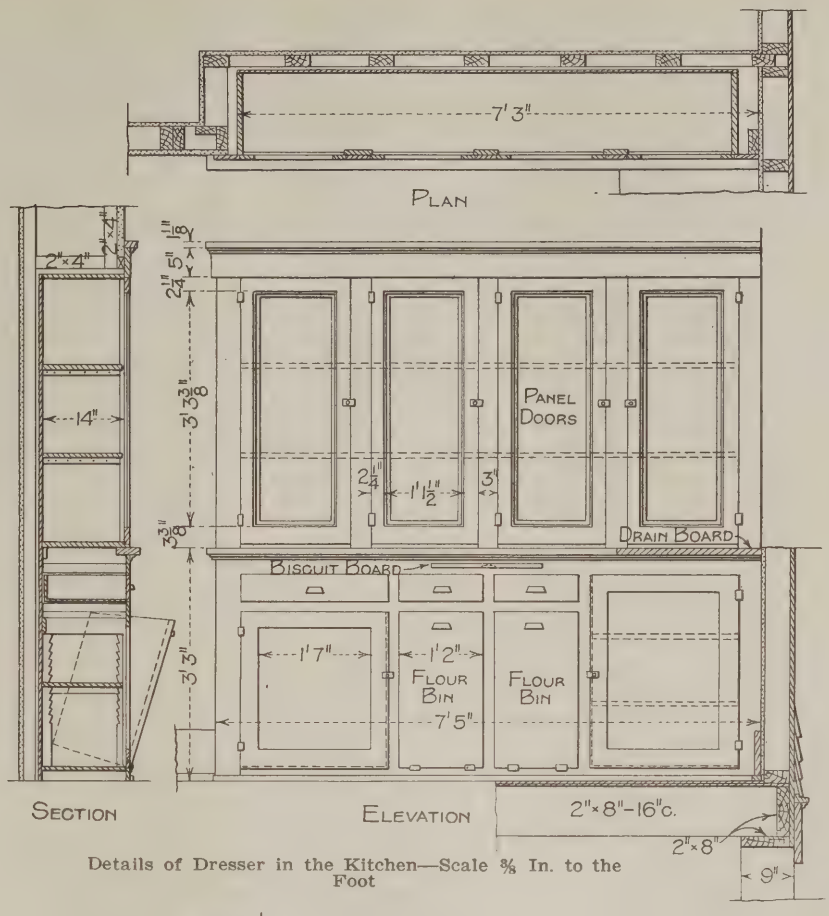


Details of Dining Room Side of Opening Between It and the Living Room—Scale ¼ In. to the Foot

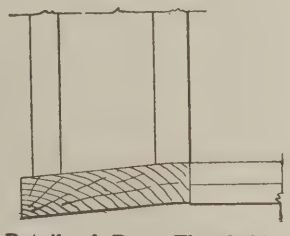
Miscellaneous Details of a Western Home of Frame Construction



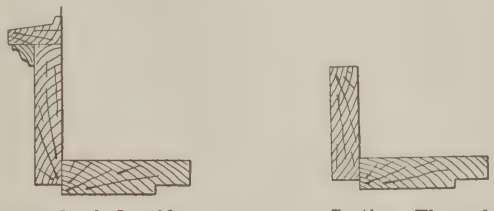
Details of Window Frame and Interior Trim—Scale ¾ In. to the Foot



Details of Dresser in the Kitchen—Scale ¾ In. to the Foot



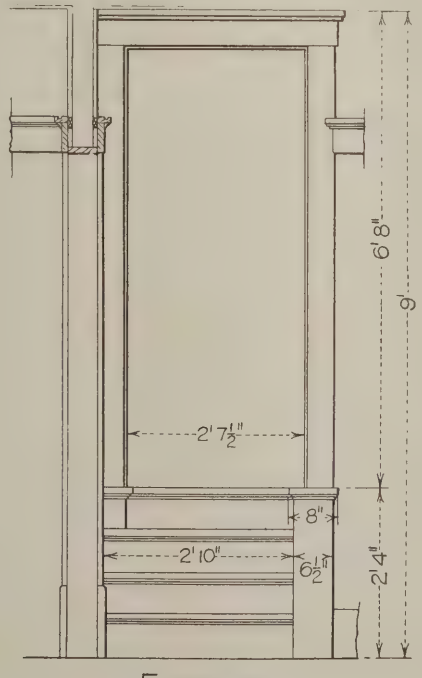
Detail of Door Threshold—Scale 1½ In. to the Foot



Head of Outside Door Frame

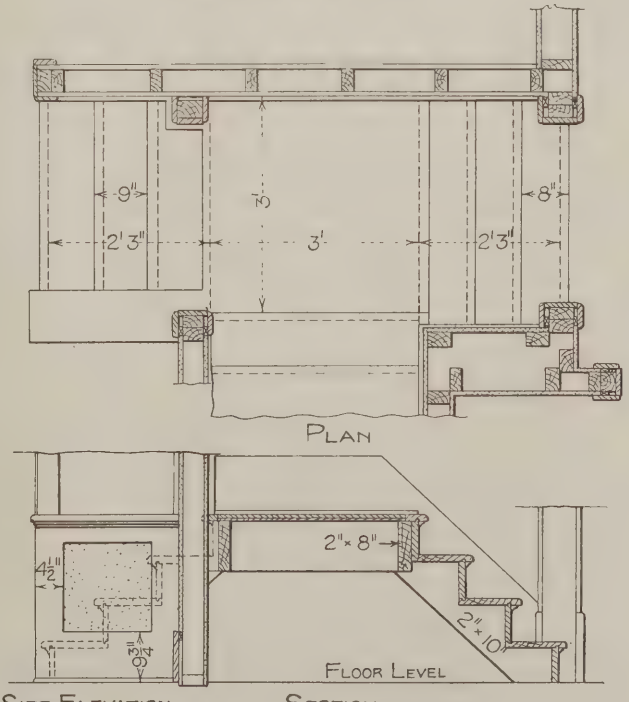
Section Through Jamb of Door

Scale 1½ In. to the Foot



ELEVATION

Front Elevation of Main Stairs—Scale ⅜ In. to the Foot



SIDE ELEVATION SECTION

Various Details of the Combination Stairs—Scale ⅜ In. to the Foot

Miscellaneous Details of a Western Home of Frame Construction

also solidly sheathed and covered with tar paper. Projections on the bay in the dining room and over the front and rear porches were tightly closed by placing concrete between the joists. Weatherstrips were used on all exposed doors and windows. Where groups of three windows occur, only the center one is hung, the side windows being made in the form of single sash and leaded in place, being secured by screws.

A description of this house would not be complete without some mention of the basement. This is subdivided into boiler room, laundry, store room, coal bin and preserve closet, each room being lighted by windows and electricity. The partitions are of 2 x 4-in. studs placed 16 in. on centers, sheathed each side with ship-lap and painted. Panel doors are fitted to all openings. The American Radiator Company's "Arco" hot water boiler furnishes heat to the house. All rooms are heated by direct radiation of the Italian flue pattern. The total amount of radiation is approximately 420 sq. ft. Both the dining room and front bed room are provided with two radiators.

In addition to the basement rooms all closets in the house are electric lighted—a slight extra expense but one well justified.

In building the house I used only first-class materials throughout, hiring the labor and letting minor contracts for such items as plastering, painting, plumbing, etc. The cost approximated $4,750, not including the site or taking into account considerable work which I did myself. The house was planned for permanency and as a home, and thus many items were incurred not usual in ordinary construction. It would, doubtless, be possible to build this house in a favorable location and without going into much refinement as to quality of materials or workmanship for about $4,000.

The plans and exterior are in a style usually well liked and would appear to be well suited to contractors who build houses for sale. The house is also readily adaptable for use with tile or brick for the first story and shingle, siding or stucco above, and would be attractive when so built.

Measuring Slate Work

In view of the discussion which has occurred at intervals in the past regarding the proper measurement of slate work, the following comments on the custom prevailing in the Manchester district, England, and which appeared in a London contemporary, may be interesting to American readers:

"Here slating is taken in yards super. Net area of the roof from eaves to the ridge by length is measured. The linear dimension of the eaves is taken for extra to eaves, and nothing is taken for the finishing course at the ridge. Hollows over 6 ft. super are deducted, and a labor item given for hollows, or the measurement for cutting given. Under 6 ft. super no hollows are given or cutting measurement taken; the measurement of the slating stands as an equivalent.

"Bevel cutting to gutters and walls is measured in feet linear for labor and waste. Bevel cutting to valleys and hips is measured for single cutting; that is, the two edges of the valley or hip are measured.

"If hips are close mitered and pointed they are so stated, and verges are measured linear for pointing, slate creasing, or any particular finish. If slate and half is used for verges, hips or valleys it is mentioned in the cutting item as feet linear. Single cutting to hips, including slate and half-ridges and hip tiles, is measured linear. Stops, miters, finials, foot irons, etc., are numbered, stating any particular design or finish required.

Rebuilding the City of Colon, Panama

It will be recalled that on the last day of April a considerable section of the city of Colon, Panama, was destroyed by fire, and in rebuilding the section it has finally been decided by the municipal council "that every building which shall be constructed in the city of Colon shall have the external walls of concrete, brick, stone, concrete block, or galvanized expanded metal," and that "the roofs of these said buildings shall be of wooden frame work covered with galvanized iron or may also be of concrete." There were 430 buildings covering an area of twenty-two blocks destroyed by the fire and practically all of these will be replaced by concrete structures. Most of the contracts have been placed with an American firm, which has an office in Panama, and the cement will come from the United States.

A Unique Factory Building

One of the most unique structures among the building improvements recently completed in the city of Chattanooga, Tenn., is the main building of a stamping and enameling plant, consisting of one room 100 x 300 ft. in size into which are built ovens for treating steel in its different stages during the process of enameling. One of the distinctive features of this main building is the creosoted wood block floor which is said to be the only one in Chattanooga constructed of that material. The wooden blocks are supported by a concrete base something after the manner of street paving work. Hundreds of panes of glass in the walls and roof give the interior of the building abundance of light and permit of thorough ventilation.

Another feature is the ample provision for sanitary draining of foundations and toilet fixtures. The gases from the enameling ovens are conveyed through underground conduits to the steam boiler and consumed as fuel.

The building was designed by W. H. Sears and erected by M. K. Wilson, of Chattanooga, Tenn.

New Bank Building for Mineola

Work is about to be started on a new individual bank building for the Nassau County Trust Company of Mineola, Long Island, N. Y., to cost in the neighborhood of $72,500. The building will follow the Florentine style of architecture, and is to be constructed of rug-faced tapestry brick, with terra cotta base and trimmings. Contract has been awarded Hoggson Brothers of New York, and the work will be done under the Hoggson building method, a single contract for the structure complete, with the cost guaranteed. The architect is H. Van Buren Magonigle, 7 West Thirty-eighth Street, New York City.

Suggestions for Estimating Mill Work

How Estimates for Mill Work Are Made at the Present Day—A Typical Example Described in Detail

ESTIMATING is being accomplished along more scientific lines each succeeding year, and the estimator who has a good, rapid and accurate system for this important work possesses something to be proud of. When I say rapid system I don't refer to the estimator who, when called upon to make an estimate on some work, begins by finding the number of cubic feet in the building or case and multiplies this by some mysterious fraction. While a few of these systems do very well in making a lump bid, they are not practical when considered from a business standpoint.

Methods That Are Fast Disappearing

But these methods are fast disappearing. One reason for this is that the mill owner now wants his work done with some system. Most mills now have a list made out of all the different parts, and the listed forms are turned over to the estimator, who places the estimate on each part separately. These sheets are then handed to the proprietor or general manager for final approval. This listing of the different parts serves a two-fold purpose. One is that when the estimate is receiving its final examination, if one sees some part on which the estimate looks to be either too high or too low, the item can be checked off and the matter taken up with the estimator. The other good feature is that quite frequently the builder desires to make some change in the plans, such as leaving out a door or window or some interior change, and by referring to the parts to be changed the estimator can inform the builder in a few moments just what it will cost to make the change.

One Method of Estimating Dwellings

One method employed on dwellings, by some estimators, is to take the number of square feet contained in each floor and multiply this by some fraction; on furniture and store fixtures they find the number of cubic feet in the piece and multiply by some fraction, says L. M. Wilson in a recent issue of the *Wood Worker*. I have found, however, that this method is the cause of a great deal of annoyance. For instance, should the proprietor ask what a certain part of the work had been estimated at—that is, a section of some case that had been estimated in one solid body—you have to refigure this section, while if you make a list you can secure the estimating sheet for this contract and show him in a few moments the amount at which this section has been estimated.

When estimating store fixtures or interior finish, it is only necessary to find the cost of one lineal foot and multiply the number of lineal feet in the design by this cost. But when estimating what is termed open work, one can work very accurately and rapidly by using the following method: Suppose we have to make an estimate on some wall shelving, say 8 ft. high, 20 in. deep and 32 ft. long, the ends to be paneled and all exposed parts to be made of quartered white oak, the top, bottom, shelves and back to be made of cypress, the shelving to be made with eight compartments, 4 ft. on centers, joint to be in center, the pilasters to be ⅞ x 3 in. x 7 ft., with base 5 in. and cornice 7 in. high.

Estimating Store Fixtures

First we find the amount of material in the paneled ends, which is 25 1/3 ft., and in the nine pilasters, 15¾ ft. Next find the amount of material needed to construct the style of cornice and base. Then find the amount of material required to edge-veneer the shelves and any part of the top or bottom which will be exposed. Add these amounts together and multiply by the fixed price you have on quartered white oak. Some estimators figure the strips to be used as edge veneers at a much lower price than the rest of the stock. I think this is wrong, for the firm pays just as much for the strips as for the wider stock, therefore they should be estimated at the regular market price.

Having obtained the amount of quartered oak required, and cost of same, we next find how many feet of material there is in one lineal foot of the top, bottom, back and shelves, and multiply this amount by the length of the case, which gives the total amount of stock required to construct these parts. Next we find the amount of material in one division, which may be either of frame or panel construction, and multiply this amount by the number of divisions required, which, in this case, is eight, two being used at the center joint. Then find the amount of material in floor ribs, add all the amounts together and multiply by the market price you have on cypress. As to the amount to add for loss on these two woods, you must decide this for yourself. Under average conditions I add 35 per cent. on quartered oak and 15 per cent. on cypress.

Quality of Men and Equipment

In estimating the machine and cabinet work much depends on the kind of men your firm employs, also the equipment of the plant. Where one has no cost sheet to refer to, doubling the cost of material will prove a very safe way to estimating this kind of work—that is, the style of case described. Suppose the total cost for the material required to complete this case amounts to $30. To this we will add $30 more, to cover the cost of machine and cabinet work, making a total of $60 for material and labor. On work which requires a large amount of machine and cabinet work this rule is not applicable, a great

deal depending on the experience you have had in estimating on high-class work.

Next take the finishing. There are several good methods for estimating this part of the work, but I will only give two of them, and, owing to there being such a large difference in the cost in different factories, it is impractical to give exact figures. On large contracts first note the quality and kind of finish required—some work and some parts may only require one coat, some two and some three—and if it is to be a rubbed and oil finish. The first thing to find out is the amount of the different kinds of material to be used which will be required to finish one square yard or foot. By considering the scale of wages paid the finishers, and the number of square yards or feet in the contract, one can make a safe and close estimate on the work. There is such a vast difference in the price of material purchased, and methods for doing the work, that when entering the employ of a new firm it is best to consult the invoice book and cost sheet of the finishing room.

Estimating Odd Work

On odd work, where one has no cost sheet to refer to and no specified kind of finish to be used, I usually add 15 per cent., which in this instance would be $9. This brings the total cost of shelving to $69, to which we will add 25 per cent. for overhead charges, or $17.25, making the entire cost of the shelving $86.25, or about $2.69½ per running foot. If the manufacturer has to bear the expense for shipping, 7 per cent. of the total cost will usually cover it. Do not be misled and take these figures as a basis for making an estimate, as they are only approximate and only used to illustrate the method. As stated in the beginning, one must be governed to a certain extent by the labor conditions and the equipment for getting out the work. Some estimators on this class of work find the number of square feet face and multiply by 3. There being 282 ft. 8 in. face measure in the case used as an illustration, it would make their estimate about $84, but this is not a safe method and should only be used in giving an approximate cost.

Estimating a Frame Dwelling

In making an estimate on a frame dwelling, find the cost of one square of the outside walls and multiply the number of squares by this cost. This method can be used also in estimating the inside walls, floors and roof. Figure the corner strips and cornice separately; the average cornice will cost from 25c. to 30c. per lineal foot. Most mills have their own fixed price for the regular sizes of door and window frames, but in estimating odd frames, such as French windows, front entrances with side lights and special dormers, I have found it the best policy to make a list of the actual amount of material and the different kinds required to construct the frame. Then by comparing the construction of the frame with the regular stock or some similar frame which you have the cost of, you are almost sure to give a correct estimate on the frame to be made. When one has had several years' experience in different mills, working under various conditions, the work of estimating becomes more simplified, and it is not long until you can almost tell what an odd frame is worth by looking at the drawing; but this is not a safe method when competing with other firms.

Another reason why it is a bad practice to depend entirely on one's judgment and experience in estimating some part of the work that looks familiar, or in making a lump bid, is that if the firm employing an estimator who has adopted this method should install a cost system, he would be in hot water almost continually. Allowing that the total amount of the bid is correct, yet when the cost is figured up on the different parts you will find that the estimate may be $15 too high on one part and $10 too low on another. So, when estimating some specially constructed frame I don't think it safe to find the number of square feet face and multiply by some fraction.

Estimating Stair Work

In estimating stair work find the cost of one rise and run and multiply this amount by the number of rises in the stair. This method will be both accurate and rapid when one becomes familiar with it. The newels and any paneled work should be estimated separately. A very neat style of panel work can be furnished for 40c. per foot in quartered oak and 35c. in plain oak. The cost of newel and angle post depends on the design. A round-corner rise and tread are usually estimated at $5. For installing the regular pattern of platform stairs, $25 is a safe estimate where a good stair builder is employed.

In estimating cased openings I have found that a great deal of time and useless figuring can be saved by figuring the opening complete, but writing the estimate out in itemized form. Should the opening have a number on the blue print, give the estimate the same number. By using this method it is only necessary to estimate one opening, then count the number of openings shown of this size and pattern. When estimating heavily cased openings of some special design I find it a good plan to get the cost of one lineal foot and multiply this amount by the number of lineal feet of this pattern to be made. Circle work is generally figured three times the price of straight work.

Advice to Young Men

My advice to any young man who intends taking up this line of work is: Don't get into the habit of "taking a shot at it," as I have known some estimators to do. Study construction thoroughly, both in the mill and out on the job. Any spare time you may have can be profitably employed in visiting the different departments and getting the foreman to instruct you as to how this or that piece of work is done. Find out, as nearly as possible, the quantity that can be machined in a day on the different machines. If you think it will be of benefit to you, weigh the amount of glue, screws and nails used in some pieces of work, so you can figure accurately. Last, and what I consider the most important part in becoming a successful estimator, is, keep in close touch with the cost clerk, jotting down any notes from time to time that you think will help you in the future.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

A METHOD frequently used by carpenters to strengthen joists and beams is shown in Fig. 47. Two pieces are nailed as indicated, the presumption being that they exert an arching action because the ends butt at the middle of the span and the nails hold the pieces in place when thrust is exerted.

Wood shrinks when it dries so the close contact is lost, and then considerable deflection must take place before the ends again meet, the bending being sufficient to cause failure in many instances. Provided the hoped-for arch action does occur there will be such a pushing against the nails that the wood is bound to split. However, assuming the arch action does take place and the nails do not split the pieces the reinforcement is not effective. For effective arch action there must be substantial abutments provided. If there are no substantial abutments a tie rod is necessary to tie the ends together and take the thrust. There being no tie rod it is evident that the lower part of the joist will have to act as a tie. We know that when a beam is loaded

Fig. 47—A Stiffened Joist

the lower fibers are stressed in tension and the upper fibers are stressed in compression. To increase the tension in the bottom by adding to it the amount required to take care of the thrust in the diagonal reinforcing strips is not helpful. This old-time method is, therefore, based on a fallacy and should be abandoned.

In Fig. 48 is shown another method, the reinforcing being spiked along the top edge to make a beam of T-section. This raises the neutral surface (along the neutral axis) so the increased area in compression is supposed to be offset by an increased area in tension.

Assume a joist 3 in. x 14 in. of wood in which a fiber stress of 1200 lb. per square inch is used. A strip 1 in. x 4 in. is spiked on each side along the top. How much is the strength increased?

The original strength, $M_r = \frac{fbh^2}{6} = \frac{1200 \times 3 \times 14^2}{6}$ = 117,600 in.-lb., the neutral plane being in the middle of the joist. To find the position of the neutral plans in the T-section use the method of moments, taking moments about the lower edge:

The original piece,	$3 \times 14 \times 7$	= 294
One added piece	$1 \times 4 \times 12$	= 48
Second added piece	$1 \times 4 \times 12$	= 48
		390

$$\text{Area} = (3 \times 14) + (2 \times 4) = 50 \qquad \frac{390}{50} = 7.08 \text{ in.}$$

First the area of the beam was multiplied by the distance of the center of gravity above the bottom, the result being 294. Then the area of each added piece was multiplied by the distance of its center of gravity above the bottom of the beam. This was 12 in., being half the depth of the piece added to the difference in depth of the beam and the piece. The products were added together, the sum being 390. Dividing by the total area, 50 sq. in., the distance from the bottom to the center of gravity (center of area in this case) was found to be 7.08 in.

Fig. 48—Another Method of Reinforcing a Joist

The original moment arm = $2/3 \times 14 = 9.333$ in., that is, 9 1/3 in. Before the pieces were added at the top the moment of resistance was equal to the area on one side of the neutral axis multiplied by the average fiber stress times the moment arm, that is:

$$1200/2 \times 3 \times 7 \times 9\tfrac{1}{3} = 117{,}600 \text{ in.-lb.}$$

The strength of the beam is fixed by the fiber stress and the smaller stressed area. In this T-section the smaller area is the portion in tension below the neutral axis and the resisting moment = $1200/2 \times 3 \times 7.08 \times 9\frac{1}{3} = 118{,}944$ in.-lb.

The increase in strength is very small, so the area added above the neutral axis was excessive. Better results would have been obtained by nailing one strip along the bottom and one along the top, thus increasing the area equally in tension and compression, without altering the position of the neutral axis. The proper method to follow is to increase the thickness by adding boards on one or both sides for the full depth. An example will be worked out:

In a mill-constructed building 7 in. x 14 in. white pine beams spaced 5 ft. on centers are used with a span of 20 ft. The allowable maximum fiber stress is 800 lb. per square inch and the beams are to be

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

*Continued from page 29 of the September issue.

strengthened so the total floor load can be increased to 100 lb. per square foot, inclusive of floor, beams and live load.

Testing first the strength of the beams against failure by longitudinal shear on the neutral axis, the unit shear being one-tenth the allowable fiber stress,

$$W = \frac{4 \times 7 \times 14 \times 80}{3} = 10{,}450 \text{ lb.}$$

The total panel load will be $5 \times 20 \times 100 = 10{,}000$ lb., so the beam will carry the additional load without failing in shear.

$M_b = 1.5 \times 10{,}000 \times 20 = 300{,}000$ in.-lb.

$$M_r = \frac{800 \times 7 \times 14^2}{6} = 182{,}933 \text{ in.-lb.}$$

Then the difference between the bending moment and the resisting moment is $300{,}000 - 182{,}933 = 117{,}067$ in.-lb., which difference must be cared for by reinforcement. To secure equal deflection the reinforcement should be the same wood, white pine, but the difference will not be appreciable in this case, and to use yellow pine will give a smaller piece for reinforcement because of the higher allowable fiber stress. The beam is in an old building and quite likely the maximum deflection in the white pine has been reached, and there is a decided permanent set. The reinforcement should be added when the floor is unloaded in order to enable the old beam and the new pieces to deflect together when the live load is added, the difference in deflection between the two kinds of wood being cared for by the deflection due to dead load in the wood having the greatest deflection.

Assuming, therefore, yellow pine with a fiber stress of 1300 lb. per square inch and a depth of 14 in. the thickness is to be computed. Let

$R = 1300 \div 6 = 217$

$$\text{and } b = \frac{M}{Rh^2} = \frac{117{,}067}{217 \times 14^2} = 2.76 \text{ in.}$$

Use two 1¾-in. planks, one on each side. When surfaced the thickness will be practically 2¾ in.

The load is uniformly distributed; the original beam is large enough to carry the required load without a shearing failure; the diagram for bending moment due to a uniformly distributed load is a parabola, therefore the reinforcing planks need not extend the full length of the beam. They would have to extend the full length if there were danger of a longitudinal shearing failure, and the thickness of the reinforcement would also be governed by the requirement for shear.

Dividing; $182{,}933 \div 300{,}000 = 0.61$, which shows that the resisting moment of the beam is 61 per cent of the bending moment created by the load. The ends of the reinforcing planks must extend each side of the middle of the span to the point where the bending moment is 61 per cent of the bending moment at the middle of the span. This may be obtained graphically by constructing a parabola with a base = 20 and a height about equal to this, the height divided decimally to any scale. At a height = 61 on the middle ordinate draw a horizontal line to intersect the parabola. From the point of intersection drop a perpendicular to the base. This defines the point where, theoretically, the reinforcement may end. Practically it should extend a little further.

The lengths of the reinforcing blanks may be calculated by men who can solve a quadratic equation. The bending moment on a uniformly loaded beam at any point distant x from one end is as follows:

$$M_x = \frac{wLx}{2} - \frac{wx^2}{2}$$

Substitute the values for M_x, w, and L and solve for x.

$W = \frac{10{,}450}{20} = 523$ lb. per lineal foot (in even numbers).

$$M_x = \frac{182{,}933}{12} = 15{,}244 \text{ ft.-lb. (in even numbers).}$$

This moment is the resisting moment of the beam without reinforcement.

$$\text{Then } 15{,}244 = \frac{523 \times 20x}{2} - \frac{523x^2}{2}$$

Clearing of fractions:

$2 \times 15{,}244 = 30{,}488 = 523 \times 20x - 523x^2$

Dividing by the coefficient of x^2:

$58.3 = 20x - x^2$

Transposing:

$x^2 - 20x = -58.3$

Extracting the square root:

$$x = +\frac{20}{2} \pm \sqrt{\left(\frac{20}{2}\right)^2 - 58.3} = 3.55 \text{ ft.}$$

The reinforcing planks (theoretically) should have a length of $20 - (2 \times 3.55) = 13.90$ ft. Practically it will be best to make them 15 ft. long, which leaves 2 ft. 6 in. without reinforcement at each end of the beam.

The planks must be attached to the beam by screws or nails, the latter being the cheaper. To get the best results the length must be not less than three times the thickness of the plank, in order that the nail may be embedded in the beam a depth at least twice the thickness of the plank. From a table of sizes of standard steel wire nails and spikes (in the steel manufacturers' hand books) we find a 30d. nail is 4.5 in. long, the length required. There must be enough nails used so the beam and planks will act together and the force to be resisted is shear, for if the beam bends and the planks do not bend there will be a sliding movement between them.

(*To be continued*)

A Revolving House

One of the latest developments in freak construction is a suburban dwelling which is designed to revolve on a pivot. The house for which plans are now being prepared is designed to occupy a plot 100 x 120 ft. and the idea is to so arrange that any side may be turned to the sunlight or shade as may be desired. The scheme is to build a circular concrete well and surround it with a terrace. A concrete platform resting on a huge pivot will revolve within the well something after the same principle as a locomotive turn-table. In fact, the house which is built of stucco and hollow tile will have a turn-table as a foundation.

Elementary Perspective Drawing—VIII

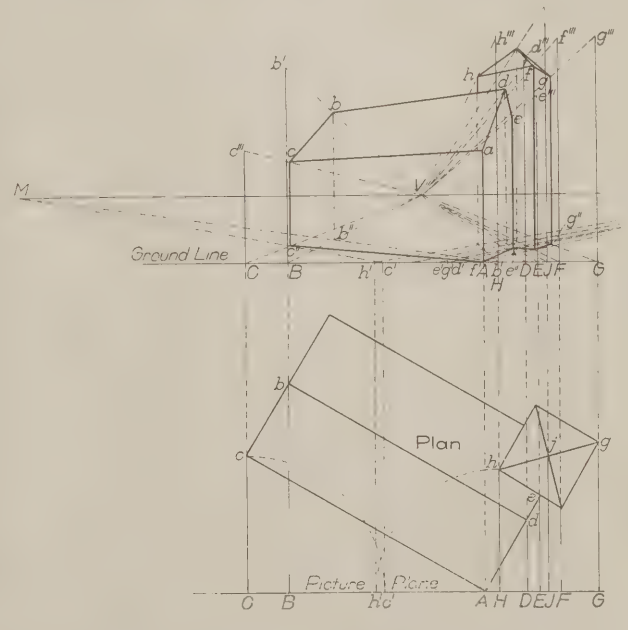
Applying "One Point Perspective" to a Subject Obliquely Placed—A Drawing Board Ready for All Occasions

By George W. Kittredge*

THERE are systems of perspective other than those heretofore explained, which are claimed as such more in respect to matters of detail than to any principle employed. All depend upon the decrease in the size of objects as they recede from the point of sight, as determined by lines beginning in the picture plane and meeting in a point representing the infinity of distance. Prominent among these is a system whose main feature is the same as that shown in Fig. 11. This method, it will be easily seen, can be applied to figures lying in a horizontal plane as well as to those vertically placed. According to this system the plan of the object is first placed in such a position with reference to the picture plane as to give the desired view, as shown in the upper part of Fig. 4, after which lines are dropped vertically from the necessary points of the plan to the picture plane, as shown in the lower part of Fig. 16. This gives a system of parallel lines receding from the picture plane, which can easily be put into one point perspective, as shown by the lines converging at *V*, immediately above the plan. According to the methods of one point perspective, therefore, the measuring point or points may be located at a distance from *V* equal to the desired distance to the point of sight. It will be found convenient to use the measuring point at the left in obtaining distances on the receding lines at the left of *V*, and the one at the right for distances on the lines at the right of *V*. The distance *C c* of the plan is set off from *C* on the ground line, as shown by *C c* and the point *c'* is then carried toward the measuring point locating *c''* in the view. On a vertical line erected at *C* the required height of the point represented by *c* of the plan is set off, as shown by *c'''*, from which point a vanishing line locates the point *c* in the view, on a perpendicular from *c''*. The same course must be pursued in the case of each point, all as shown. By an inspection of Fig. 16 the course of each point can be traced, one letter only being given to each point. The description given of the point *C* can be applied equally well to any other point upon the plan by substituting its letter in the place of *C*, *c*, *c'*, etc.

A still shorter, though less accurate method, consists in dividing the space occupied by the plan into small squares, after the manner of a checker board, then putting the small squares into one point perspective and afterward locating upon them the position of each point or angle of the building in accordance with the squares first drawn upon the plan. A perspective plan being thus obtained, heights are fixed as already explained in Fig. 16. These latter methods are especially available in the case of large drawings wherein it would be inconvenient or impossible to use distant vanishing points.

However simple the theory of perspective may seem or how well it may be understood, its operations necessarily involve extreme care and the use of many construction lines before the desired result is obtained. Perhaps the most dreaded part of the work to some is the "getting ready." The determining of the angle of the view, the finding of the



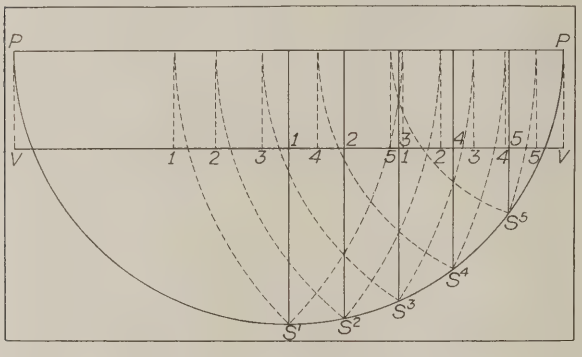
Elementary Perspective Drawing—Fig. 16—*One Point Perspective Applied to a Subject Obliquely Placed*

vanishing points and the preparation of the drawing board, require in some cases such an effort as to deter one not familiar with the work from trying. With those persons of more or less artistic accomplishments, there is a disposition to rely upon the eye rather than to puzzle the brain over what seems like an intricate problem. To those afflicted with mental lassitude and to those desirous of economizing their labor as well as their time to the greatest extent, it should be said that this part of the work can be reduced to a minimum by a little preliminary labor in preparing a drawing board

[*The present series of articles which appeared in these columns some years ago and attracted wide-spread attention by reason of the simple and comprehensive treatment of the subject of elementary perspective drawing, are being republished at the special request of a large number of our readers.—Editor The Building Age.]

especially for perspective work which shall answer for all occasions.

Such a drawing board should be as large as is consistent with available space and the character of the work to be done, that is, of such dimensions as to give as long a horizon line as possible, and should have lines drawn or scribed upon it as shown in Fig. 17. The lines should be of such a character as not to be easily erased. For this purpose a black pencil of the same kind as those made in blue, red and other colors will answer very well. The line nearest the top represents the picture plane and should be far enough away from the lower edge to permit of drawing the complete semicircle shown. The line *V V* below, representing the horizon line, should be near enough to the lower edge of the board for convenience in working and still give room for a plan in perspective below the principal view, and should have the vanishing points *V* and *V* exactly below the points *P* and *P*. Upon the semicircle a number of points can be chosen as viewpoints as indicated by S^1, S^2, S^3, etc. To obtain these it will be well to divide one-half of *P P* into five or more equal spaces and from the



Elementary Perspective Drawing—Fig. 17—Drawing Board So Prepared as To be Ready for Any Occasion

points of division to drop vertical lines to cut the semicircle at the points mentioned. These lines can then be numbered at their crossings of the horizon line, as shown by the figures 1, 2, 3, etc. The two measuring points for each viewpoint can now be easily located in the following manner, and as previously explained: With *P* and *P* as centers, arcs are drawn from each of the chosen viewpoints, S^1, S^2, S^3, etc., to cut line *P P*, as shown, whence they are dropped into the horizon line where they are numbered in small figures below the line, to correspond with the first lines used in locating the several viewpoints, which are numbered above the line. The dotted lines in Fig. 17 are used merely to show how the positions of the several measuring points are obtained and need not remain upon the drawing board after said points have been fixed.

It should be explained that if lines be drawn from any one of the viewpoints to *P* and *P*, such lines will form a right angle at the viewpoint, and will thus represent the visual rays which are parallel to the two sides of the subject to be represented, and which would under ordinary conditions determine the position of the vanishing points. By the arrangement of lines above described upon the drawing board it will be seen that any one of the vertical lines can be used as the center of the field of view and that the measuring points for the chosen line are those bearing the corresponding number.

A choice of either of the vertical lines shown in the figure will, of course, produce a view in which the right side of the object will be foreshortened more than the left side. For obtaining results in which the left side is most foreshortened, it will be necessary to repeat this system of lines and points in the other half of the board, being careful to distinguish between the figures of the two sides in some way, as by using different colored pencils. The angles which the sides of a rectangular object will make with the picture plane for any of the given points of view can easily be estimated, or can be determined exactly by first drawing a horizontal line through said viewpoint, as for instance, S^4, and then drawing lines from S^4 to *P* and *P*.

When such a test has been made for each point of view, one is then prepared to select at once the viewpoint which will give the desired result in a perspective drawing. Instead therefore of having to find the vanishing points and measuring points for each particular case, one can by the use of the drawing board above described, shift the paper to the position which will give the required view and proceed without delay. If, for instance, the line 3 be selected as the position to give the required view, the paper is simply placed so that its center shall be over the crossing of this line with the horizon, when pins are placed at *V* and *V* for the vanishing points, and two others at points marked 3 by the figures below the horizon, which are the measuring points.

In proceeding with the work then, draw first the ground line at a convenient distance below the horizon line for the construction of a plan in perspective, upon which locate the point of contact of the angle of the subject with the picture plane, which point we may call *G*, as shown in Figs. 4, 5 and 7. Erect a perpendicular at this point for a line of heights and draw lines from *G* toward V^l and V^r. Now set off from *G* toward the right and the left the required dimensions of the two sides of the subject, and carry lines from the points so located toward the proper measuring points to cut the lines from *G*, and continue the work all as previously explained in connection with Fig. 5.

In applying the subject matter of these artcles to examples for practce, the student is advised to begin with the representation of simple rectangular subjects, then those of a more complicated plan, as buildings having wings and follow these with arches (circles in a vertical plane), then round towers (circles in a horizontal plane).

Linear perspective, although accomplished by mechanical means, deals with the pictorial aspect of objects and thus forms an intermediary step between mechanical and artistic representation, and is thus closely related to freehand drawing. The practice of linear perspective will be found a valuable aid to freehand drawing, by training the eye to accurately estimate angles as they appear when viewed obliquely, as distinguished from what they really are upon the plan, while facility in the use of the pencil in sketching by eye alone will spare much labor in supplying small details when employing the linear method.

The Bungalow Builder's Dictionary

Some Pertinent "Definitions" Not Found in Webster's But Likely to Be Appreciated by the Rural Dweller

By W. Livingston Larned

Location.—Site for a home, which looks all right before you build, but never does afterward.

Foundation Walls.—Queer stone device surrounding cavity in ground, and used to hold rain water.

Field Stone.—Pieces of a hard substance found in abundance on property belonging to other people. No two shaped to fit exactly.

Surroundings.—Adjoining lots. Where other buildings are usually erected a few minutes after your own bungalow is completed.

Outlook.—Something to show friends when they motor out for a little afternoon visit. Any open stretch between other houses will do.

Southern Exposure.—Familiar trade name. Whenever sun happens to hit at any time.

Servant's Quarters.—Room which turns out to be the most desirable in the Bungalow.

Drainage.—Gully running through middle of flower beds.

Veranda.—A long, open place, costing more to furnish "artistically" than the banquet hall at the White House. When screened. . . . penitentiary for mosquitos.

Laundry.—Where laundress would have worked had you contrived to get one.

Butler's Pantry.—Convenient place to put broom, dust pan, ice-cream dasher and box of empty Mason jars.

Pantry.—(See Roaches.)

Colonial Fireplace.—An affair done in white enamel and seldom used, for fear smoke will soil it. Generally erected in Louis IIIVIX Room.

Jim's Room.—Disorderly, ill-kept, dusty hovel, littered with tobacco ashes and newspapers. Referred to with sentimental endearment to visitors by Wife. . . . called everything and anything else to Jim DIRECT.

Book Case (Built-in.)—Large, roomy space occupied by one set of installment Shakespeare, a broken set of Dickens, Poe's works, Boccaccio and two or three Chambers.

Screens.—Sash Swiss-cheese. Something invented to keep mosquitos from escaping from house.

Open Fireplace.—Why the bungalow is generally filled with smoke in Winter.

Mission Furniture.—Tables, chairs, etc., of uncomfortable design, stained in a careless manner and finished by father during odd Saturday afternoons. Bought or built principally because of lure of the name.

Living Room.—The one room in the bungalow beloved of all. Was right from the start and remains so. Where host carelessly says to friend: "Oh, just throw your things off and make yourself at home. We refuse to look on you as 'company.'"

Guest Bedroom.—The one room never *QUITE* ready for occupancy. Place where rain on roof sounds loudest.

Roof.—That part of a bungalow which is invariably in need of repair. Made leaks possible.

Sideboard.—Professional show-room for all cut-glass received by Bride.

Ice Box.—Stuffy little box in which there is room for one of two things. . . . the ice or edibles.

Window Seat.—Ingenious device for creating backaches. Used extensively for têtes-à-têtes during house parties. That portion of room always filled with bird seed.

Hemlock.—Fancy name given any unknown wood that has sweet-smelling odor.

Forty Feet Frontage.—Thirty-two if measured with a ruler.

Lightning Rod.—Bungalow stick-pin.

Hot-Air Heating System.—Very often comes from the agent's mouth.

Back Porch.—The Ice Man's sun-parlor.

Side-Door Buzzer.—Nine times out of ten a dumb bee.

Garage.—Pigeon-hole for a Ford.

Garden.—Where the scallions and two ears of corn were grown.

Sodding.—Three spears of pale green grass stuck in chunk of dirt. Grows beautifully if left where originally found.

Landscape Gardening.—Three green tubs filled with geraniums and a rustic bench.

Dove Cote.—Where they'd rather NOT live.

Bird House.—Hiding place for Willie's "Diamond Dick, Junior."

Awnings.—Positive, material proof that light and rain will wash the color out of anything.

Fine Old Shade Tree.—What originally stood squarely in the middle of your lot before you built.

Among the building improvements under way in Long Island City, N. Y., is an operation involving the construction of 50 six-family houses. Each will have a street frontage of 27.6 ft. and there will be two apartments on a floor. These buildings are to be a duplicate of the type erected by the same company in the Ridgewood section, where over 500 have been built during the past few years.

A Double House for a 50 Ft. Lot

A Design Providing Six Rooms and Bath for Each Family—Some Details for the Builder

WE have taken for the basis of our colored supplemental plate this month a double or twin house conveniently arranged for occupancy by two families. It is intended to be erected upon a plot of ground having a frontage of 50 ft. with clearance on both sides for a walk to the rear. According to the specifications of the architect the foundation walls are to be of concrete 12 in. thick and consisting of a 1:3:5 mixture. On top of the concrete foundation walls are 8-in. hollow tile walls to be carried to the roof beams. The party wall is to be of 12-in. hollow tile or it may be a brick wall 8 in. thick. The exterior surface is to have a stucco finish and set up with dark red tile decorations over windows, etc. The finish coat is to be "pebble dash."

Some Details of Construction

The roof may be of slate, or of asphalt, asbestos or wooden shingles, according to the preference of the owner. If wooden shingles are used they are to be laid upon shingle lath, exposed 5½ in. to the weather and dipped in stain before laying.

The first floor beams are to be 3 x 10 in.; the second floor beams 3 x 8 in., and the roof beams 2 x 8 in. yellow pine. The interior partitions are to be built of 2 x 4 in. studs placed 16 in. on centers. The floor is to be tongued and grooved maple flooring, blind nailed. The trim is to be plain and of chestnut or other hardwood according to preference. The entrance doors are to be 2-in. oak veneered, on white pine core. All interior doors are to be 1½ in. thick.

The plastering is to be three-coat work on lath for interior partition walls and plastered direct on exterior hollow tile bearing walls. The scratch coat is to be well supplied with goat hair or fiber.

The vestibule floors are to be of tile and the bathrooms are to have tile floors and base.

The Plumbing

The plumbing fixtures for both houses are to be standard porcelain finish. The exposed piping in both bathrooms is to be nickel plated.

In each laundry is to be a two-part soapstone tub. The main lines are to be 4 in. and branches to fixtures 2 in. with 3-in. main vents and 2-in. branch vents. The vent pipes are to extend through the roof.

The heating is to be by hot water and registers are to be placed in all rooms except kitchen and laundry.

The house is to be piped for gas and wired for electricity, the fixtures to be of the combination type with drop pendants in parlors and dining room. There are to be wall outlets for all bedrooms.

The hips, valleys, etc., are to be flashed with tin 10 in. on each side. The gutters are to be carried in adjustable iron hangers and the leaders are to be 3-in. galvanized iron.

All exterior woodwork, trim, shutters, etc., are to receive three coats of oil paint. The interior trim is to be filled and varnished and the cellars are to be whitewashed.

The architect figures the cubical contents of both houses at 44,160 cu. ft. and names a unit price of 18c. per cubic foot.

The twin house shown on the colored supplemental plate and in the plans, elevations and details presented herewith was designed by Frank T. Fellner, architect, 413 Caton Avenue, Brooklyn, N. Y., or care of THE BUILDING AGE, 239 West Thirty-ninth Street, New York City.

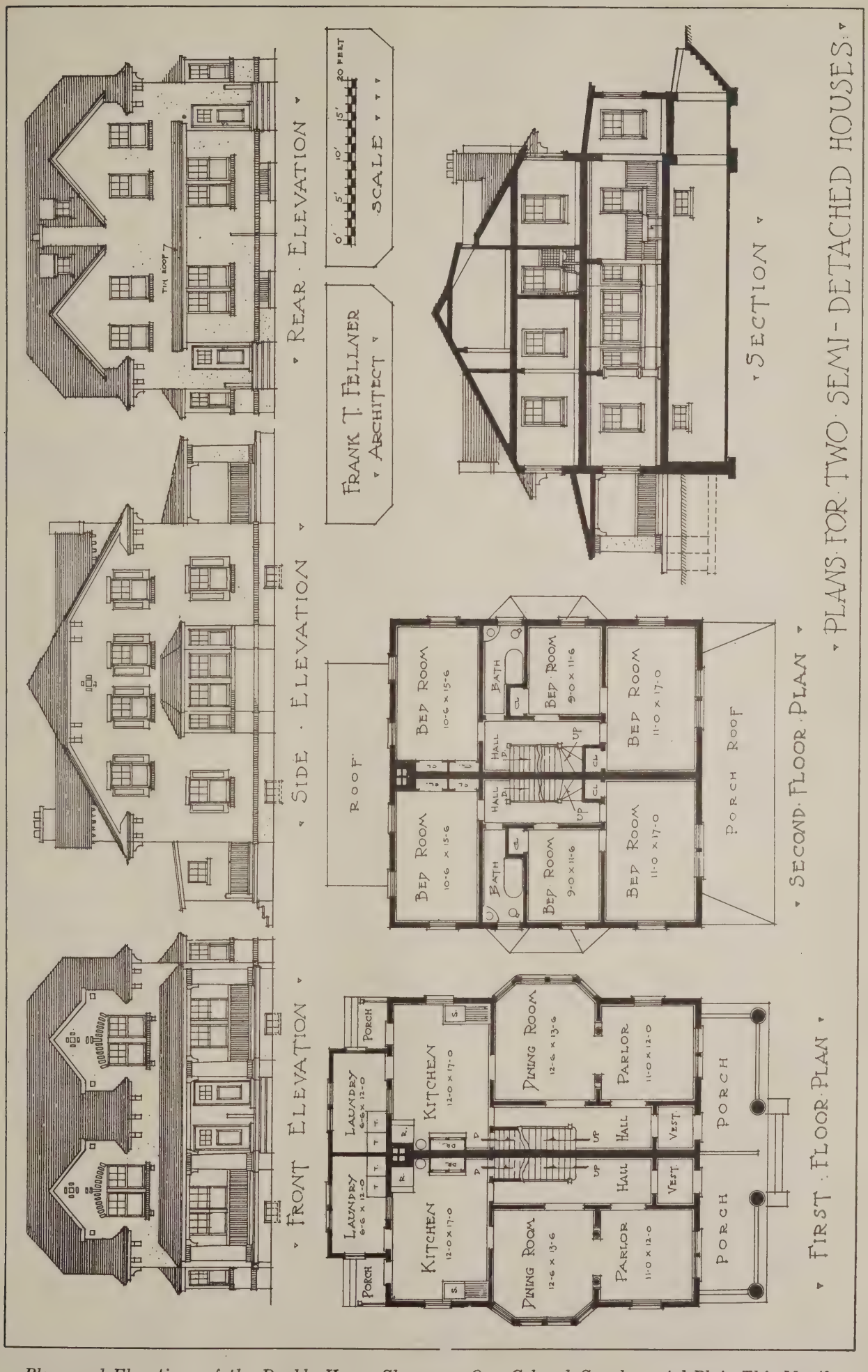
New York's Proposed Building Code

The Committee on City Departments, consisting of representatives of the architectural societies, building trades organizations, consulting engineers and fire underwriters, has approved Article 18 of the proposed new building code, relating to safeguards against spread of fire, with the important exception of the proposed provision for hollow tile construction for fire walls between adjoining buildings where tile is permitted for exterior walls.

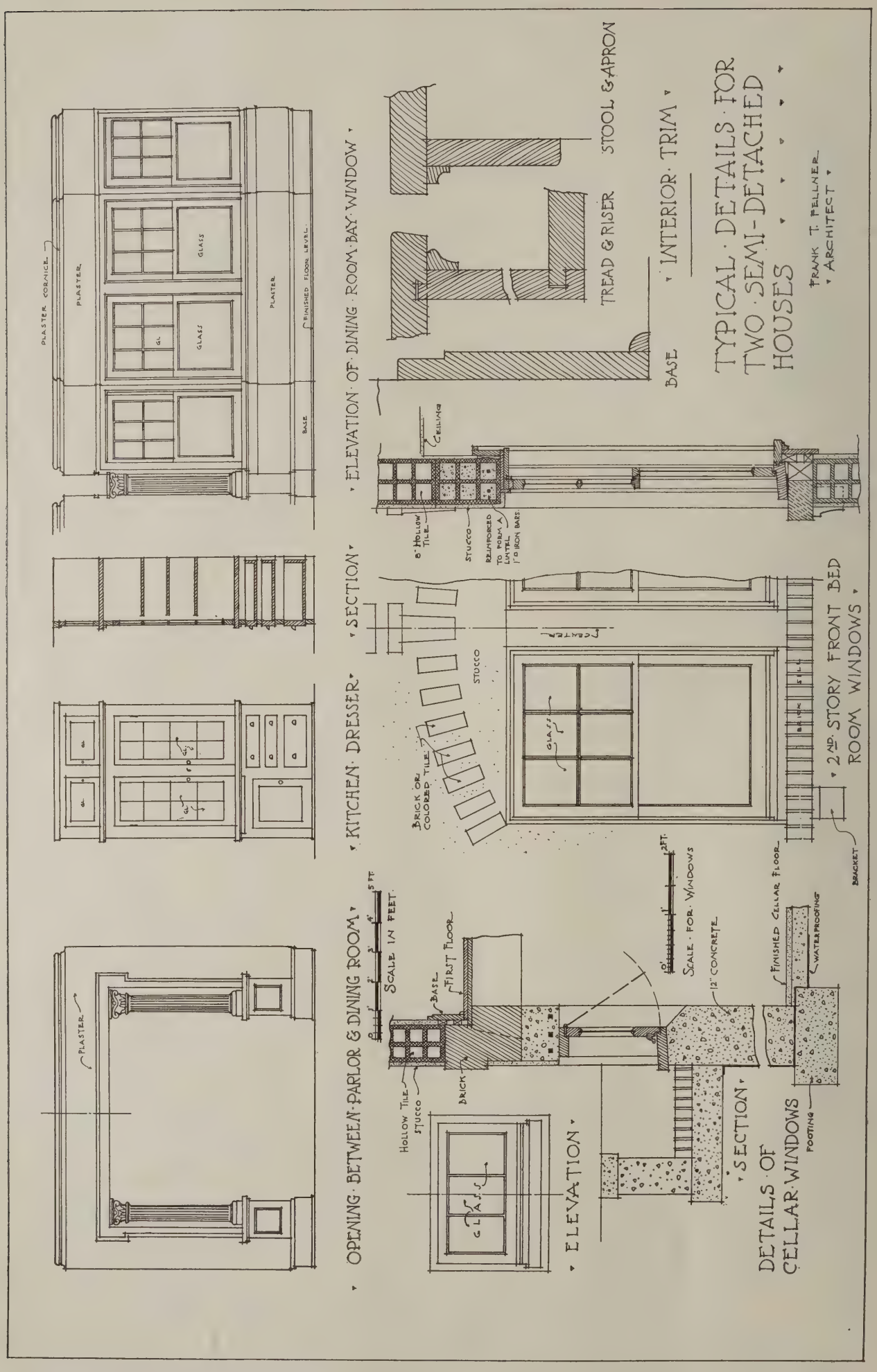
The committee strongly opposes the use of hollow tile or concrete blocks for fire walls between adjoining buildings and has urged that solid masonry, such as brick or concrete, should be provided. The committee also opposes the provision that all elevator doors shall be arranged to be normally self-closing, it being felt that this provision was impracticable. There were other criticisms, but these were of less importance than the objections already mentioned.

A twelve-story loft building estimated by the architects to cost $275,000 is about being erected on the south side of Thirty-ninth Street, 25 ft. west of Eighth Avenue, New York City. It will have a frontage of 125 ft. and a depth of 99 ft., with a façade of brick and limestone.

The State College of Forestry at Syracuse, N. Y., closed the registration for the college year with 274 men, representing fifty-five counties in the State and twelve States outside of New York. Besides the 274 men in the professional courses in the State College there are eighteen men taking the one-year course at the State Ranger School at Wanakena.



Plans and Elevations of the Double House Shown on Our Colored Supplemental Plate This Month



Miscellaneous Constructive Details of the Double House Shown on Our Colored Supplemental Plate

Roof Framing with the Steel Square

An Interesting Discussion of a Well-known Topic by a Practical Man in the Trade

By "G. L. McM."

UNDER the above heading there appeared in the October issue of this paper an article by Mr. Barry which contains some statements to which I wish to take exception, as they are, in my opinion, calculated to mislead the younger or more inexperienced craftsmen.

First, the "work line," which Mr. Barry says should be drawn, is totally unnecessary, and is an obsolete relic handed down to us from the days when the carpenter had to wrestle with hewn timbers and he had to strike a chalk line in order to have a straight line to which to work, and of necessity that line became known as the "work line," from which all his measurements were made. In this day of straight-edged sawed timbers the work line is only confusing to the younger members of the craft, as the straight, sawed edge answers all the purposes of the former chalk line, and is more convenient.

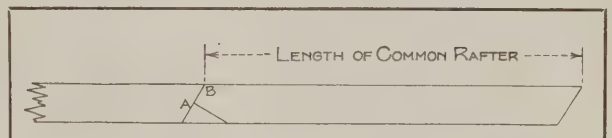


Fig. 1—Obtaining Cuts for the Common Rafter

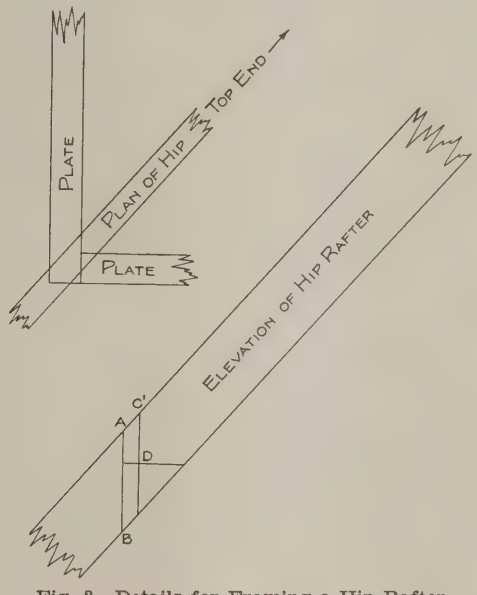


Fig. 2—Details for Framing a Hip Rafter

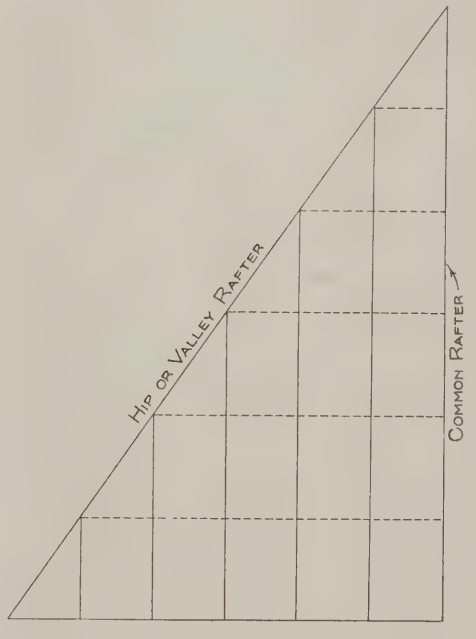


Fig. 3—Obtaining the Lengths of Jack Rafters

Roof Framing with the Steel Square—By "G. L. McM."

Second, Mr. Barry gives the length of his hypothetical rafter as 14 7/16 in. upon the scale. Now every steel square that is fit for a carpenter to own has one side divided into inches and twelfths of inches, which makes a convenient scale, corresponing to feet and inches on a scale of one inch to the foot. Every well-informed workman would use this side for drawing scales and measuring them and the rafter would measure 14 5/12 in., which would correspond to 14 ft. 5 in., and prevent any possibility of reading it 14 ft. 7/16 in. This scale of one inch to the foot can easily be read to quarter inches, which is close enough for all practical purposes except on very large roofs. Incidentally I would advise every inexperienced workman to procure one of the "framing squares," of which there are several makes on the market, giving the lengths and bevels for all roofs of various pitches and which would avoid all necessity for making the various computations shown by Mr. Barry, and which would be always at hand when wanted, instead of being at home, in the library, or forgotten just when wanted most, as is likely to be the case when depending on roof-framing tables.

Mr. Barry's application of the square root principle is, of course, correct and valuable as a test by which to correct scale drawings, but a smooth board, a good steel square and a pocket knife, are all the apparatus that the carpenter needs to draft any ordinary roof to scale, using the one inch to the foot scale.

Now, to go back to the framing proper. Having obtained the length of our common rafter, either from the framing square, by the square root method, or from the scale drawing, select a straight piece of rafter material and mark the plumb cut at one end for the top end of the rafter, then measure the length of the rafter along the top edge of the piece, as in Fig. 1, and from that point make the plumb line for the cut for the bottom end of the rafter. The lengths of all rafters, common, hip, valley and jacks, should always be taken from plumb cut to plumb cut. Having determined the thickness of rafter to be left above the plate, draw the line for the level cut through the plumb line as shown in the sketch. This disposes of the common rafter. I find it convenient and a saving of time and labor to use this pattern rafter for lengths only and make the top and bottom cuts from a board template two or three feet long.

The lengths of hip and valley rafters can be obtained the same way as the lengths of common rafters, by computation, by the use of the framing square or by a scale drawing. Mr. Barry's methods of obtaining the plumb and level cuts for them are all right but his statement that the bevels for hips and valleys against the ridge or against each other are the same as the bevels for jacks is wrong unless, in the case of hips, the rafter is first carefully and accurately backed to the proper angle, which is unnecessary work, and would be impracticable for valleys even if they were grooved to the exact angle. The proper bevel for these rafters is found by taking the length of the rafter on the blade and the run on the tongue, marking by the blade. See good articles on this subject in the May issue by "T. H. A." and "J. M."

The Backing of Hip Rafters

The backing of hips and the grooving of valleys is unnecessary except in very rare and isolated cases. In an experience covering more than forty-five years I have very rarely seen a hip backed and never seen a valley grooved. In framing a hip, however, the point for determining the place for the level cut must be taken on a plumb line half the thickness of the hip back or inside of the line marking the length of the hip, as in Fig. 2, which gives a plan and elevation of the bottom of a hip rafter. It will be seen that the line *c'-d* is at the intersection of the edge of the hip with the edge of the plate, and the distance *c'-d* should be the same as the distance *a-b*, in Fig. 1. On the valley rafter, however, the contrary obtains and the determining point for the level cut should be taken on the plumb line, giving the length of the rafter, but in putting up the roof the jacks for the valleys should be raised so that the top edge of the jacks extended would strike the center of the valley rafter, then the sheathing boards will rest on the valley rafter between the jacks. The distance the jacks need to be raised will be the same as the amount the corresponding hip would need to be backed were it so framed as to need backing.

The lengths of jack rafters can be obtained from the framing square or from a scale drawing like Fig. 3, which represents a plan of one side of the roof adjoining the valley or hip and is practically the same as Mr. Barry's Fig. 3. Another convenient way for obtaining these lengths is to divide the common rafter into as many equal parts as the number of jacks plus one, using the length of the common rafter as shown in Fig. 1. This will perhaps be better understood by reference to the dotted lines in Fig. 3, where the dotted lines are used to illustrate the transfer of the lengths of the jacks from the scale drawing to the line indicating the length of the common rafter. These lengths in either case will be the lengths to the longest point on the jacks measured on the top of the rafter. The lengths of hips and valleys, however, should be taken in the center of the rafter. Allowance must, of course, always be made for one-half the thickness of the ridge board where one is used. Of course the plumb cuts of all jacks both at top and bottom will be the same as the corresponding plumb cut on common rafters.

Weight of Hip Rafters

It is unnecessary to make hip rafters of heavier material than the corresponding common rafters, as both the jacks and the roof boards, when the roof is sheathed will brace the hip, it only being necessary to brace it so as to keep it straight till the boarding is on; after that it cannot sag or get out of line unless some other part of the building becomes displaced. Valleys, on the other hand, unless very short or sustained from below by partitions or other supports, should be made of stronger stuff as they have to carry the weight of the jacks and roof from both sides.

Advice to Young Mechanics

If our young mechanics will use their common sense, keep their eyes open and observe, and use some imagination with which to help themselves, nearly any one of them desirous to improve his skill can become an efficient roof framer, especially if he will take time and pains when he makes a mistake, as most will at first, to study out where he was wrong so that he can avoid the same pitfall the next time. Another thing which too many boys (and men too) fall down on, is in thinking that the mathematics which are taught in school and those used in their work are something different, and therefore take too little interest in their studies when in school and are unable to apply to their daily work the principles they have been taught in school. That is one reason we hear so much about "commercial arithmetic" and similar expressions as if there was some difference between the arithmetic taught in ordinary school text books and the arithmetic used by men in business.

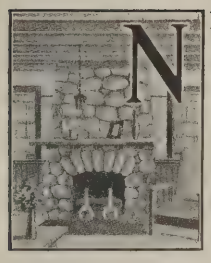
Again, too many of the processes, published in periodicals like THE BUILDING AGE, for finding lengths and bevels for rafters are too complicated and contain too many lines, unnecessary in too many instances, to be easily understood by the ordinary mechanic and therefore they discourage him from undertaking to master these subjects.

Among the plans recently filed in the Borough of Manhattan, New York City, are those for a nine-story fireproof apartment house to cost $130,000, to be erected in Fifty-fifth Street, between Fifth and Sixth Avenues. It will have a frontage of 50 ft., a depth of 85½ ft. and a façade of brick, limestone and terra cotta.

Vogue of the Wood-Burning Fireplace

The Cheer and Comfort of the Open Wood Fire in the Home of the Present Day

By Stanley C. Covert.*



EVER since the Colonial days of this country has the wood-burning fireplace been so popular as to-day. It has again come into its proper place and relation to our home—and has come to stay. We say this with confidence and with sincerity because there is nothing that can give that peculiar touch of cozy comfort and cheer which a few sticks or logs blazing on the hearth can give. The artificial gas log does not give it, and certainly a steam or water-radiator does not give it, but the hearth fire is a magnet which draws and charms one irresistibly and creates that atmosphere of comfort and cheer which makes the distinction between a house and a home. A coal grate is, perhaps, the best substitute for a wood fire, but lacks much of the charm of the blazing oak or hickory stick, and wood has the advantage that it can be kindled and be blazing in two or three minutes and can be allowed to die out and rekindled at will.

Vogue of the Wood Burning Fireplace—Two Interesting Examples with their Cozy Environment

As a ventilator and sweetener of the air in the house the fireplace has no equal, constantly changing the air in the room and drawing in a fresh supply. Where the house is heated by a warm air furnace or indirect radiation the fireplace assists the heater by withdrawing the lower and cooler strata of air from the room and drawing down the warm air which immediately rises to the ceiling, equalizing the temperature to a large extent. A room in which there is a hearth fire will never become stuffy.

The living-room and dining-room should always have a fireplace and they are of great advantage in bedrooms, especially in case of sickness. In the spring and fall months there are many days when it is not necessary to have the heater going, as a small wood fire in the breakfast room will take the morning chill from the air and again in the evening the fireplaces will make the house comfortable.

If you are going to have a fireplace, have a good, honest one designed and constructed for burning wood and have it so designed and constructed that the smoke will go up the flue and not into the room.

We believe in brick for the construction of fireplaces, as burned clay is the material par excellence for this work, being fire-resisting and perfectly adapted for this purpose and therefore thoroughly artistic. Fire-brick or ordinary hard-burned common brick are suitable for lining the fireplace, but on the other hand stone, with the exception of soapstone, will chip and disintegrate under heat, and iron linings will warp and chack.

We believe that splayed or sloped jambs and back give the best results in obtaining the maximum amount of heat and also making the form or line most agreeable to the eye. The slope of the back should be a straight line, not a curved line.

Special attention should be given to the points mentioned below and it is necessary to see to it, not

*In a recent issue of the Philadelphia *Ledger*.

only that the drawings embody these points, but that they are carried out by the builder in the construction of the fireplace and chimney entire. To remedy defects after construction is expensive, troublesome and often impossible without tearing down the chimney. The average builder or mason, with occasional exceptions, is somewhat ignorant on the subject of fireplace construction and should not be trusted in this important matter, although he may insist that he knows all about fireplace construction.

Height and Width

Fireplaces should ordinarily have their height less than their width, and the height should not exceed 2½ ft. unless the fireplace is over 4 ft. wide, in which case the height may be increased in proportion to the increased width of the fireplace. This does not apply to special designs made by architects for extra high fireplaces, in which case the flue must be increased in proportion to the height.

The throat of the fireplace should be contracted by sloping the back of the fireplace toward the front; the actual throat opening should be several inches above the level of the arch. Iron throats give tihs formation, as the actual throat opening is at the top of the valve plate. This form of construction gives the wind-shelf or ledge back of the throat which is important in checking down-drafts, and this ledge or shelf should be 6 in. wide where practicable.

Above the throat of the fireplace the sides of the chamber thus formed should narrow gradually to the point where the flue proper begins. This is a very important part of the construction, as, if this chamber is not properly formed and made smooth, the flow of smoke and gases into the flue is retarded. In order to insure a smooth and properly shaped smoke-chamber a steel form is made which insures the proper shape and absolutely smooth sides, eliminating friction to a large extent and thus increasing the power of the flue at least 25 per cent.

Terra cotta flue linings now are almost universally used, obtaining a smooth flue and giving additional protection against fire. The flue should always be proportioned to the size of the fireplace opening. These flues are based upon fireplaces having ordinary height, but where extra high fireplaces are designed flues should be enlarged in proportion.

Fireplace Should Be Tested

Before the house is accepted and occupied, the fireplace should be thoroughly tested. The most frequent causes of trouble are flues too small or clogged at some point, or badly formed smoke chambers. In building a chimney it is often necessary to offset a flue or to carry it off from its vertical line at some point, and when this is done it frequently happens that mortar is allowed to fall down the flue, and this mortar will lodge at any such offset and form an obstruction; so that if trouble is manifested in the fireplace it will be well to examine the flue at such a point, although this may necessitate cutting through the walls of the chimney and flue.

It also frequently happens that a brick is dropped and lodges at some point in the chimney, and a weight dropped through the flue from the top of the chimney is perhaps the best way to discover such an obstruction and will often bring down the brick with it. If the trouble cannot be discovered by the contractor or the architect, then call in an expert.

If the flue bears the proper proportion to the fireplace opening and is clear and unobstructed through its length entirely, there will be no necessity for chimney pots or any sheet iron contraption to assist the draft. Where large flues are used, however, it is advisable to protect them by a stone slab set upon corner piers or a brick arch in order to exclude water during heavy rain storms.

Our Colored Supplement for December

The subject of our December colored supplemental plate will be a story and a half cottage having an exterior finish of stucco and a roof covering of slate, asbestos, asphalt or wooden shingles, as may be preferred. There are three rooms on the first floor, the main feature being the living room extending nearly the full width of the house. On the second floor are three sleeping rooms and bath room together with ample clothes closets.

The house has been designed for a lot of 40 ft. frontage and with accommodations for a family of five. There is a cellar under the entire house and the heating is by furnace. The architect estimates the cost at a little more than $3,000.

Union Wage Scale in Building Trades

There has just been issued by the Bureau of Labor Statistics of the United States Department of Labor, Washington, D. C., a Bulletin giving the results of an inquiry into the union scale of wages and hours of labor prevailing in May, 1914. The inquiry covers ninety-three of the principal trades in forty-one of the leading cities of the country. It is shown that the average rate of wages per week for all cities taken collectively was higher on May 1, 1914, than on May 1, 1913, seventy-five of the trades reporting.

In the more important trades the increases were: Bricklayers, 2 per cent; carpenters, 1 per cent; sheet metal workers, 3 per cent; builders and gas fitters, 1 per cent; structural iron workers, 2 per cent and painters 4 per cent.

The report states that the highest scales per hour paid in May, 1914, in a few of the principal trades were: Bricklayers, 87.5 cents in Dallas and San Francisco; carpenters, 65 cents in Chicago; painters, 70 cents in Chicago; plumbers and gas-fitters, 75 cents in Chicago, Dallas, Portland, St. Louis, Salt Lake City, San Francisco, and Seattle; sheet-metal workers, 68.8 cents in Chicago and San Francisco and structural-iron workers, 70 cents in Cleveland.

In fifteen trades there was a reduction in hours of labor between May, 1913, and May, 1914; seventy-seven reported no change, and one reported an increase.

Cabinet Work for the Carpenter

Some Interesting Details Relative to the Construction of a Cane Seat Sofa and a Sofa Table

By Paul D. Otter

THOSE who recall the sofa doubtless have in mind that stiff and most formal of rooms, the parlor, where this ample seat, placed rigidly against the wall, accommodated infrequent "duty callers."

Happily, the parlor is not in our planning today, for we are all allured by the light, open homey living room, and while many are still possessed with the lure of the "antique" we acquire and utilize, either the originals, or obtain reproductions,

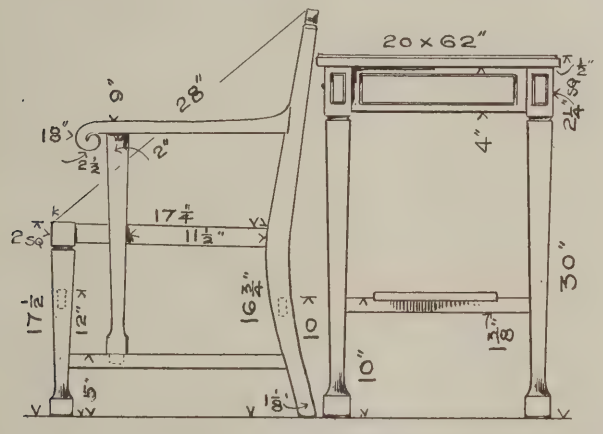


Fig. 1—End Elevations of Sofa and Table

and use them in a different way, deriving the fullest comfort of our rooms and furniture at all times. The recent reproduction of the sofa or settee, and of the davenport table in connection with the sofa is proving to be exceedingly appropriate for the drawing or living room, as well as in large sun rooms of modern homes. There is no error in putting them at different places in the room, but the combination of the two, however—back of sofa to edge of table—with the sofa placed several feet from an open fireplace, or under the central lights makes for the greatest use and most pleasing effect.

This table is built the same length as the back of the sofa and with a width of 18 in. to 22 in. This proportion gives a very serviceable surface for the center lamp, magazines and books, with ample room front and back for the family to gather about the light without eyestrain.

Usually a full lower shelf is located about 10 in. above the floor. Modification, however can be made in the design to provide for two supplementary shelves above the lower shelf. This addition, however, unless built for literary or studious people, tends to invite over-accumulation of current literature and detracts from a certain formality which this center grouping demands.

The combination originally was from the Italian drawing rooms, when it passed through many beautiful interpretations in England, of the Jacobean to Georgian periods.

In an elementary way, they are forms for simple expression within the range of a careful artisan who works with the impelling interest of furnishing his home with just such pieces as will give it distinction.

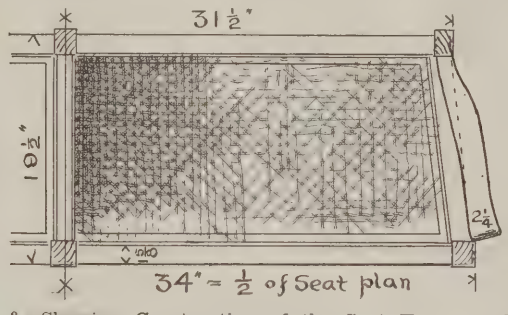


Fig. 3—Showing Construction of the Seat Frame and the Position of the Arm

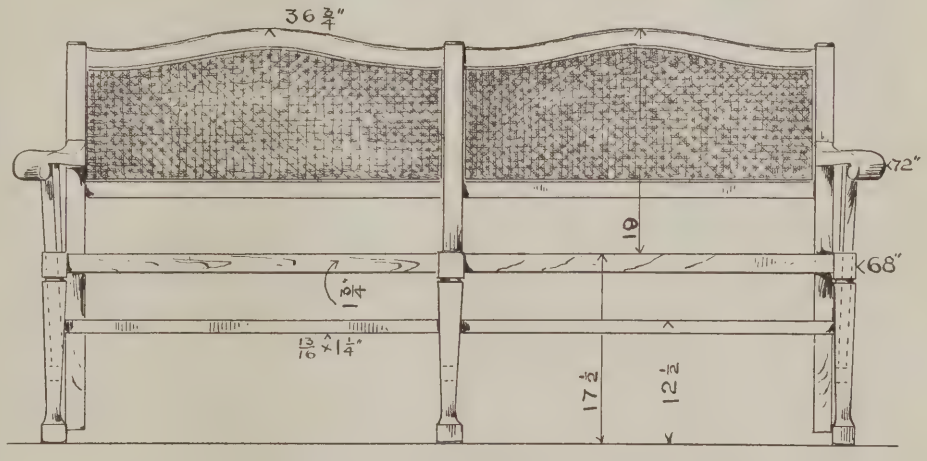


Fig. 2—Sofa with Cane-Filled Back and Seat

Cabinet Work for the Carpenter—Two Interesting Examples

As few home-craftsmen are equipped with a turning lathe, or are practiced in the cutting of spirals as in the old days, we will adopt a form and simple treatment which will not be unlike a rendering of Sheraton or Adam, and confine ourselves to feasible operations.

Referring to the accompanying sketches Fig. 1 shows the relation of table to sofa when used as

joint pieces, as in some large living room. To carry out a simple near-to Adam effect, the posts are tapered, terminating in a spade foot—the same treatment given the three front posts of the sofa. The paneled suggestion to the ends and two side rail aprons of the table may be, with all propriety, a sunken V or U groove line, done with a grooving plane and neatly stopped out with a carver's large veining tool, or close gouge. The exposed squares of the posts are treated with proportionate panels of like grooving, and half an inch below the line of the apron there is cut a deep groove all around the post to clearly define the beginning of the taper. The 4 in. apron, or skirt of table, is fitted to the 2½-in. sq. posts by mortise and tenon—and the posts set back from the corners ½ in. The top should be 13/16 in. thick and top edge treated with a small hollow mold.

As the popularity of cane has been revived in reproductions of English furniture, it will no doubt prove a more desirable material in filling space in an acceptable and attractive manner, than to suggest that the sofa be upholstered, and springs be used in the seat. Cane, under fair usage, is very durable, and when finally broken through can readily be refilled, or the frame upholstered. As the broad at end and shaped like a very blunt cold chisel—gently push or tap the cane well into the groove all around. The spline strips having previously been cut and mitered at the ends to their full length of slot are then set in and driven up with a smooth, broad, blunt end stick of hard wood until they set in level with the face of the wood frame. It may be necessary before finally driving up the corners to trim up the miter to a perfect fit, by using a knife or chisel. Moisten the spline strips to conform more readily to the curved groove of top rails. Do not be concerned about the baggy character of the surface, as in four or five hours it will be as tight as a drum head.

The lower shelf of table, Fig. 5, may be filled with cane web in a similar manner or it may be a plain panel 13/16 in. x 10½ in. x 48 in. molded in keeping with top of table. Naturally, after the splines are set into place there are many loose ends and strands of cane projecting above and on the outside of spline. These remove by drawing a sharp knife blade against them and the spline, or using a broad chisel and gently striking them off. With a wet sponge wipe off any excess glue from cane and frame.

Fig. 6, as well as Fig. 4, will assist in laying out

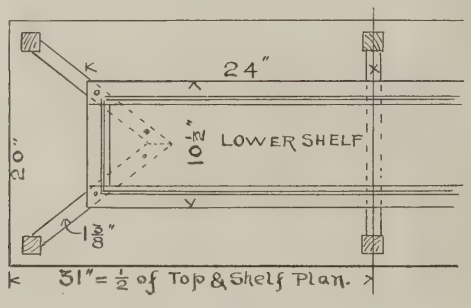


Fig. 5—Plan of Lower Shelf of Table

Fig. 4—Curve of Top Rail Showing Spline Groove

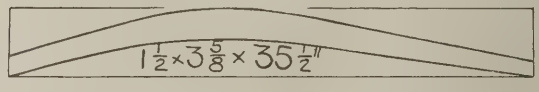


Fig. 6—Shape and Stock of Sofa Post

Cabinet Work for the Carpenter—By Paul D. Otter

cane web can be supplied by leading supply houses carrying a line of tools and upholsterers' supplies, "No. 2 fine open cane web," should be asked for, together with sufficient lengths of either reed or elm spline strips to encompass the work, which can be figured out after one has made the drawing, or completed the frames.

To provide for the spline and inserted cane in the two back panels shown in Fig. 2, and more in detail on one-half seat plan, Fig. 3, it will be necessary to plane out a spline groove ¼ in. wide and ⅜ in. deep on the front of the back rails, and the rails and ends of seat frame before finally gluing together. The spline grooves on the curved top rails, Fig. 4, may be cut by repeated borings with a gage bit and cleaned up with a small chisel. The grooves in all pieces are cut ⅝ of an inch from the inside edge. Provision for similar grooves at ends of cane panels next to posts is by a rabbetted out strip, the width of the slats, which is set against the posts in line with the slats and held by glue and screws.

The manner of applying the cane web is to cut it out about 1 in. larger all around than the exposed surface, then after allowing it to soak in water for a half hour proceed to pour in, or apply glue with a small brush in the groove. Lap the cane over the opening and with a hard maple stick—a drawing for sofa posts and top of back within the width given.

Oak or mahogany are properly the woods to use and when finishing treat the cane also, being careful not to wipe off too quickly on the glazed surface of the cane. Touch it lightly so that there will not be too much high lighting. This will then give the antique effect so much sought.

The sofa may be made doubly attractive by providing loose cushions and back pads filled a little heavier than the usual quilt, the outer face being covered with some of the many patterns of cretonnes, or figured tapestries. This is within the range of any needlewoman and can readily be applied or removed by use of neat tying tapes.

A commission has been appointed in Pittsburgh, Pa., to draft a building code which it is expected will give the city even a greater volume of building operations than it has experienced during the last two or three years.

The "Build Now" movement, which has been developing in various sections of the country, has reached South Windham, Maine, and more structures than ever before in a single year are now in couse of erection.

A Stone Chapel for the Suburbs

The Heating and Ventilating System an Interesting Feature—Some Details of Construction

THERE usually comes a time in most every small community when, either through necessity or a desire for greater prestige, the members of a certain denomination take up the question of erecting a more commodious church along the lines of modern construction and equipment. Investigation will prove that in the majority of cases local talent is employed for the preparation of plans and constructive work, and numerous instances could be cited where this work is accomplished by the man who is competent to style himself architect-builder. He is the individual who, when called upon to discuss the building question, cannot only give the approximate cost of the work, but is able to submit sketches and plans according to his own and his client's ideas. On the other hand, however, circumstances often necessitate the employment of both architect and building contractor. An instance of this kind is the attractive church illustrated herewith, which is located in a Middle Western town of 2500 people, and which was sucessfully completed through the close cooperation of both parties.

A Stone Chapel for the Suburbs—Brydges & Somers, Architects, Chicago, Ill.

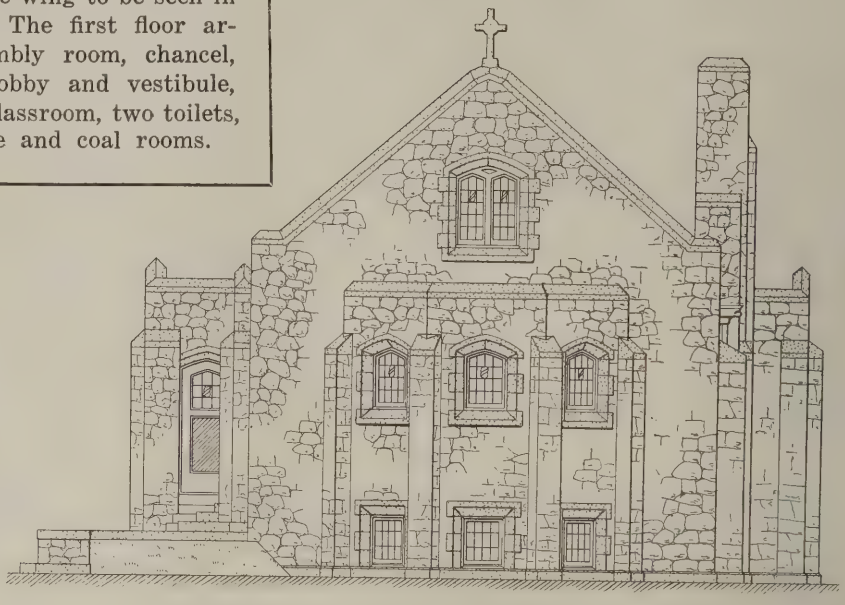
It is no exaggeration to state that in designing buildings required to accommodate from time to time a large number of people architects pay more attention to the heating and ventilating apparatus than to any other part of the equipment, and this is true whether the structure be a church, moving picture theatre, schoolhouse or office building. It was with the idea of showing the possibilities for efficient heating and ventilating of a small church that the acompanying data were collected especially for readers of THE BUILDING AGE. It is also interesting to mention that this equipment represents but 4 per cent of the total investment, or in round figures, a proportion of $400 to $10,000. One of the halftone illustrations shows the installation to include a furnace equipped with a fan. In the summer time this fan is so operated that the congregation may enjoy a constant circulation of fresh air, while in winter the heating engineers have given a written guarantee that the equipment will heat all rooms to a temperature of 70 deg. when the thermometer registers 10 deg. below zero outside. The apparatus was designed to change the

air throughout the building approximately twelve times per hour, or once every five minutes.

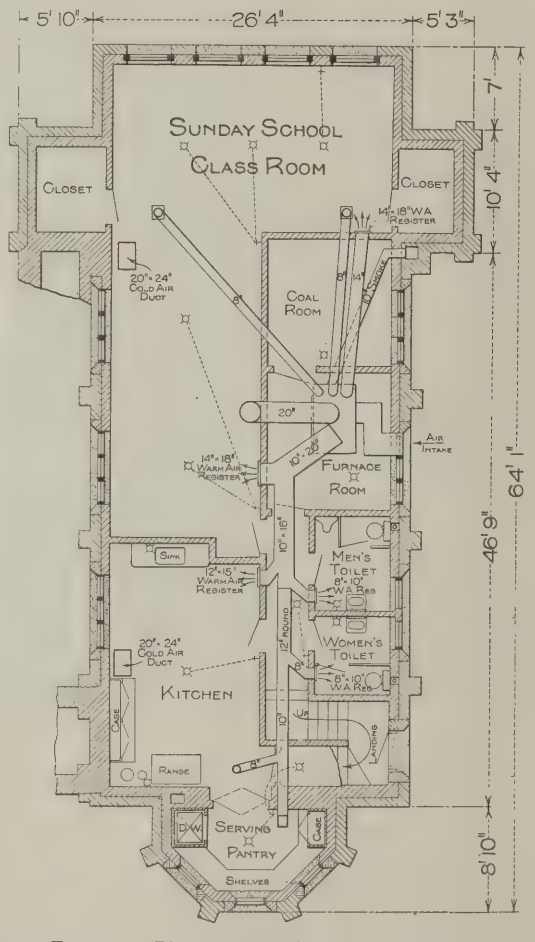
The church is one story and basement in height, having two entrances on its east side, both of which are well brought out in the halftone picture taken from the northeast corner. The wing to be seen in the foreground faces north. The first floor arrangement embodies an assembly room, chancel, sacristy, ante-room, pantry, lobby and vestibule, while basement plan shows a classroom, two toilets, a kitchen and pantry, furnace and coal rooms.

In the exterior treatment it was the architect's endeavor to produce an old-time rubble-stone appearance, and the weathered effect was brought about by the use of stone from Chicago's old court-house. When the materials were purchased, the stones were re-split for new surfaces, the flattest sides being exposed in the construction work, and laid in lime mortar.

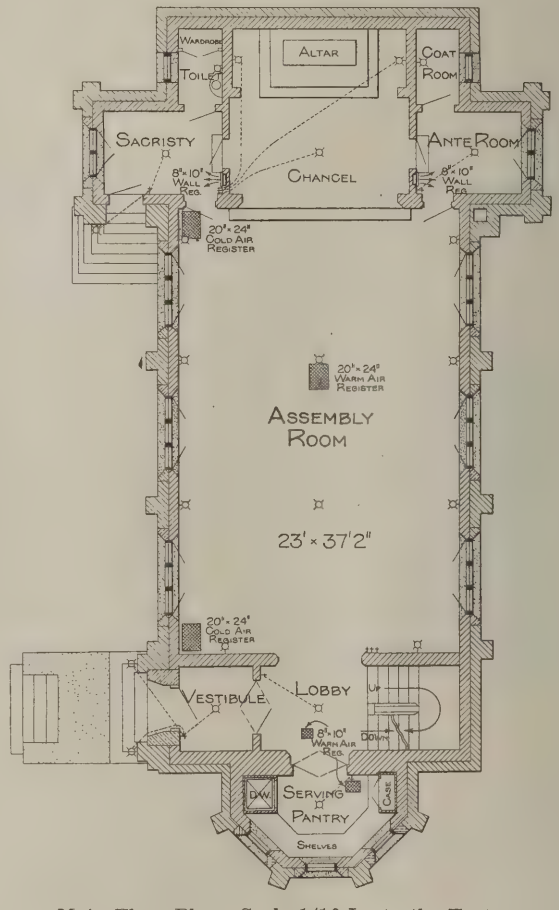
The footings are of concrete, composed of Portland cement, clean sharp torpedo sand and broken stone large enough to pass through a ¾-in. ring, in the proportions of 1:3:5. All outside founda-



The Pantry End Elevation—Scale 3/32 In. to the Foot



Basement Plan—Scale 1/16 In. to the Foot



Main Floor Plan—Scale 1/16 In. to the Foot

A Stone Chapel for the Suburbs—End Elevation and Floor Plans

The building is about 75 ft. by 40 ft. and located approximately 20 ft. from the street, with the long axis running north and south. It is of ordinary construction for the floors and flat roofs, with trusses and partitions supporting the slate roof.

tion walls are of concrete, composed of the above aggregates waterproofed on the surface from footings to grade with a heavy coat of Portland cement plaster with proportions of tar and asphalt. This coat is ½ in. thick and was applied to the wall

within twelve hours of stripping. All stone work above grade is backed up by a common brick wall 8-in. thick. The interior dividing wall, separating the pantry from the main portion of the building, is also built of brick.

The external walls are 10 in. thick. The stones

A Stone Chapel for the Suburbs—A Detail of the Main Entrance

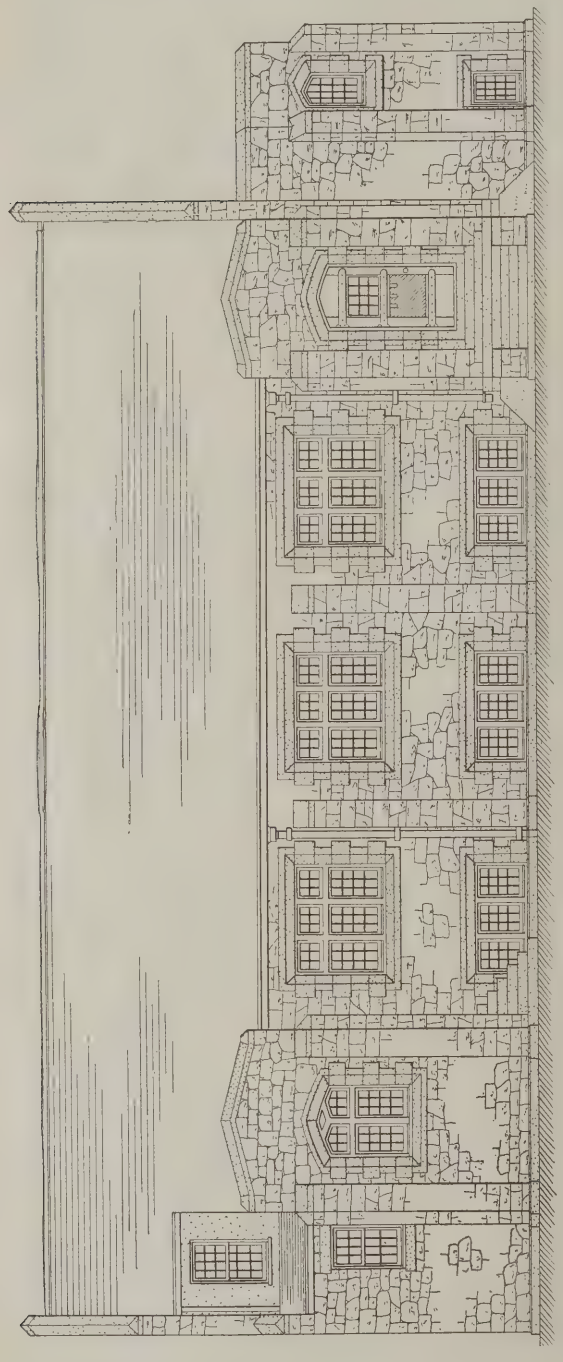
are laid with bed and joints undressed, with projections knocked off and laid at random and interstices filled with spalls and mortar. Rubble stone work is well bonded to the brick backing with metal anchors and bond stones running through the wall to within 4 in. of the interior face for every 5 to 6 sq. ft. of wall surface in order to insure a solid, monolith wall. Stone work is laid up with lime and mortar with ½-in. joints. Each stone is laid in a full bed of mortar on its natural bed so as not to produce settlement or cracks. The mortar for the stone work consisted of one part Portland cement to three parts of lime mortar. The walls were laid in courses about 18 in. high and leveled off at each course.

The chimney is also built of rubble masonry and brick, carried to a height of 2 ft. above the highest point of the roof, and topped with stove caps. It is

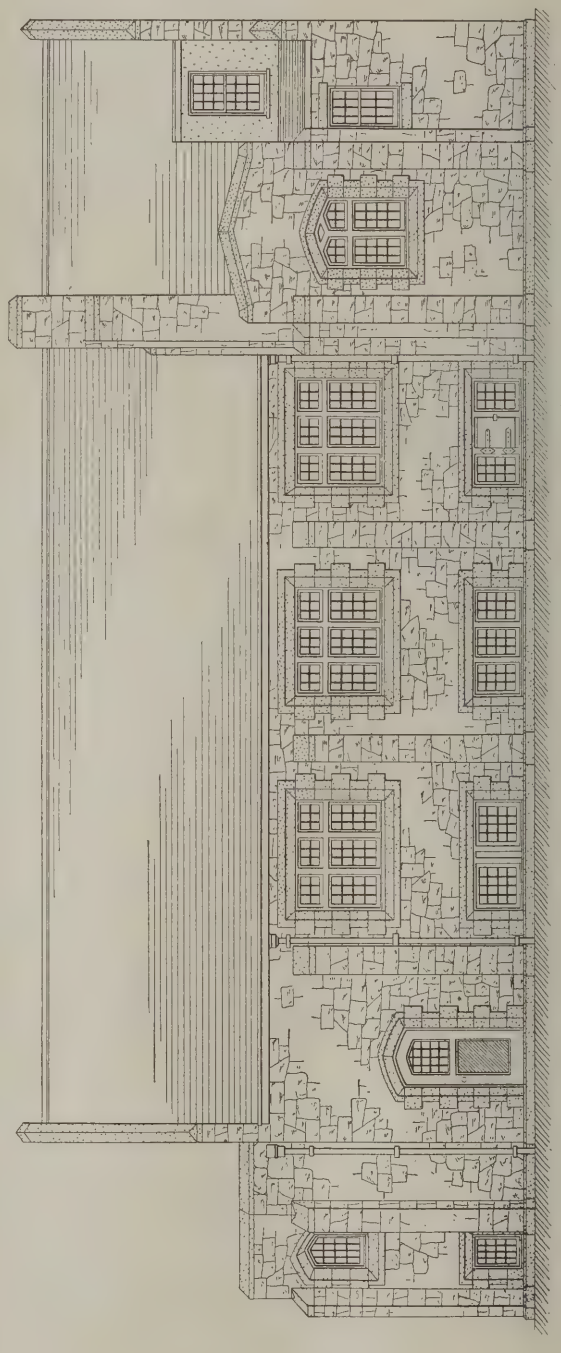
lined continuously with approved fire linings, as is the chimney from the basement kitchen, which terminates just above the roof line of the pantry on the first floor.

The vestibule from the main entrance has a 6 x 6 in. quarry tile floor of variegated color, with ½-in. joints of black mortar. The tile is laid on a 4-in. cinder concrete bed, the latter having embedded in it expanded metal lath.

The entire basement has a 6-in. cinder fill, on



The Front Elevation of the Chapel as Shown in the Photograph



The Rear Elevation Showing General Treatment of the Exterior and the Door Leading to the Kitchen

A Stone Chapel for the Suburbs—The Front and Rear Elevations of the Structure

top of which is a 4-in. bed of concrete of the same proportions and aggregates as the footings. The furnace and coal rooms as well as the toilets have a ½-in. cement finishing coat composed of one part Portland cement to three parts clean sharp torpedo sand, well troweled and pitched to the floor drains.

The rows of posts intermediate between the basement walls carry lines of floor girders, the posts being set without bearing plates on the concrete footings in the partitions and covered with lath and plaster. The posts have wood bolster blocks at the top under the girders, the latter being tied together with wrought iron straps, both sides spiked to each other. Where it was found necessary over window openings wood girders 6 x 6 in. were erected to support the masonry.

The floor joists are 2 x 10 in. yellow pine placed 12 in. on centers and braced with lines of 2 x 3-in. cross bridging for each 6 ft. of span. The floor joists are anchored to the walls with strap and pin anchors on every fifth joist or rafter, and spiked and strapped to adjoining joist where resting on girders. All joists lap each other at least 6 in., and are securely spiked together. Wood purlins on top of the trusses and sheeting for the slate roof are securely anchored into the end walls of the building with strap and pin anchors. The rafters are 2 x 4 in. placed 16 in. on centers.

The floor joists for the balcony are 2 x 10-in. yellow pine, placed 16 in. on centers and are supported on the wood partition between the lobby and assembly room; also on the brick wall between the serving room and the lobby. The ceiling and roof joist over the pantry, sacristy, and anterooms of the first floor are supported on interior wood partitions and exterior masonry walls. All rafters, ceiling joist and stud partitions are thoroughly spiked together, and where necessary over large openings are trussed to insure solid construction. This feature applies particularly to the arches between the chancel and assembly room, between the chancel and altar space, and between the assembly room and lobby, which are solidly built with studs

All mill work is cypress; the door frames for the entrance are of oak; the window frames, except those in and above the toilet rooms on the west wall and in the south wall of the classroom in the basement, are plank frames with transoms above, hinged to swing in, and casement sash below, excepting basement frames which have casement sash only. These frames have staff beads on the outside and a small oak mold on the inside for trim in the first story. Other windows are box frames arranged for double hung sash.

The main entrance door is 2¼ in. thick V-jointed oak, treated with ornamental iron, as shown in the details and illustration. The entrance door to the sacristy and side entrance door to the stairway is

A Stone Chapel for the Suburbs—View of Assembly Room Looking Toward the Chancel

trussed to carry the roof and framed for the arches, as shown in the detail sections.

The studs throughout are 2 x 4-in. and 2 x 6-in. yellow pine, placed 16 in. on centers, set with double plates at floor and head. Joists, rafters and girders are also of yellow pine. Stud partitions are bridged with 2 x 4's every 6 ft. in height.

The wood trusses support 6 x 6-in. yellow pine chamfered purlins run at right angles, on top of which rest the 2 x 4-in. rafters. On the underside of the rafters is set ⅞-in. beaded tongued and grooved ceiling, with wood molding in corners all around each panel.

On top of the first floor joist is laid 1¾ x 4-in. beveled floor strips 16 in. on centers, covered with 15-lb. saturated black felt, well lapped to receive the finish flooring. The balcony has black felt paper applied directly to the underflooring.

2¼-in. solid oak. Interior doors to the anteroom and sacristy from the assembly and doors to serving pantry and vestibule are 1¾ in. thick, built up oak veneered doors with two panels of V-jointed material and 5-in. solid stiles. The remaining interior doors on the first floor are single panel 1¾-in. veneered, excepting the entrance doors to the chancel from the anteroom to the sacristy, which are the same as those from the assembly room to the anteroom and sacristy. The basement interior doors are 5 cross panel, built up doors of 1¾-in. material. Toilet room partition doors are 1⅛-in. paneled pine.

A dumb-waiter, 2 ft. x 2 ft. 6 in. x 3 ft. high, with ⅞ in. x 3¼-in. face pine ceiling partition around with the necessary sliding doors, etc., is set where shown on the plan.

The finish floors in the assembly room, sacristy,

etc., with the exception of the vestibule, are ⅞ x 2¼-in. maple. The balcony floor is finished with the same stock as the landing. All maple floors received one coat of shellac. Oak finish was stained before installation. The backs of all such trim as casings, base, chair and other rails were given one coat of linseed oil. Pine trim was stained and given one coat of linseed oil before being placed.

Basement wood trim is quarter-sawed yellow pine throughout. All finish of the first floor and balcony is straight grained red oak. In the serving room is a shelf around four sides 3 ft. from the floor, with cupboards below having two adjustable shelves in each with dividing partitions. One china case has glass doors and adjustable shelves 4 ft. high. The woodwork of the pantries is quarter-sawed yellow pine. The kitchen case has drawers, cupboards and a flour bin below with a 4-ft. case above with adjustable shelves. The above trim was given one coat of shellac.

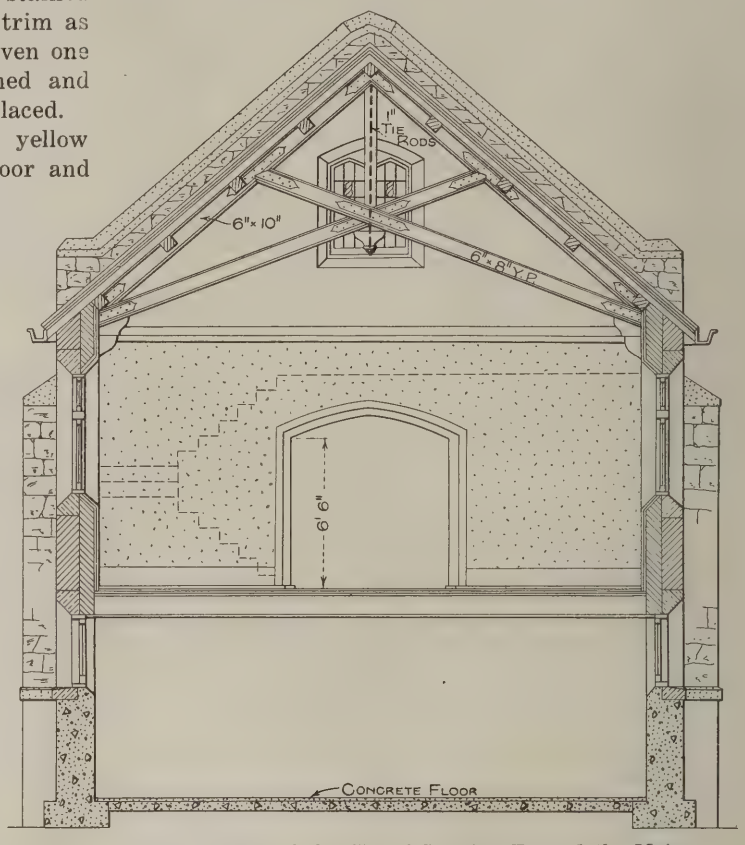
The slate roof is an attractive shade of sea green, the slate being exposed 6 in. to the weather.

Hot water for the building is supplied by a No. 1 "Lion" automatic gas water heater. The range to be seen in the picture of the basement kitchen is of a type made by the Reliable Stove Co., Chicago.

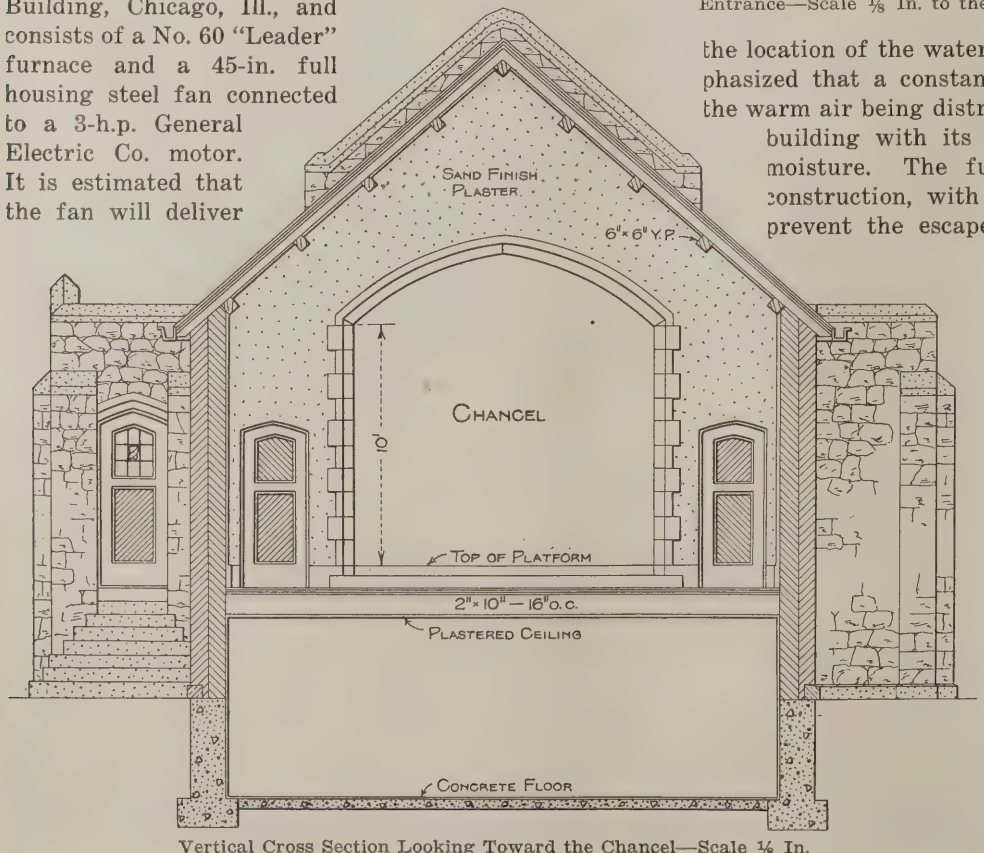
The heating equipment was made and installed by the Hess Warming & Ventilating Co., 1201 Tacoma Building, Chicago, Ill., and consists of a No. 60 "Leader" furnace and a 45-in. full housing steel fan connected to a 3-h.p. General Electric Co. motor. It is estimated that the fan will deliver from 3200 to 3500 c.f.m. when running at a speed of approximately 900 r.p.m.

Directly above the feed door of the furnace will be seen the water pan, while on the left side at the base of the casing two cold air slides have been installed, each being 14 x 30 in. In connection with the location of the water pan, it should be emphasized that a constant evaporation insures the warm air being distributed throughout the building with its proper percentage of moisture. The furnace is of all-steel construction, with welded joints, which prevent the escape of gases or smoke.

When the fan is in operation outside air is drawn through the intake on the west side of the building. The equipment has also been designed for use without the fan, under which conditions all inside air would be returned to the furnace. At points shown on the main floor plan two 20 x 24-in. cold air faces makes connection to vertical galvanized iron ducts which terminate about 18 in. from the basement floor, and are well braced. There are 10 x 16-in. screens built in the schoolroom and kitchen partitions at the floor, so that positive circulation will occur when slides in furnace are left open.



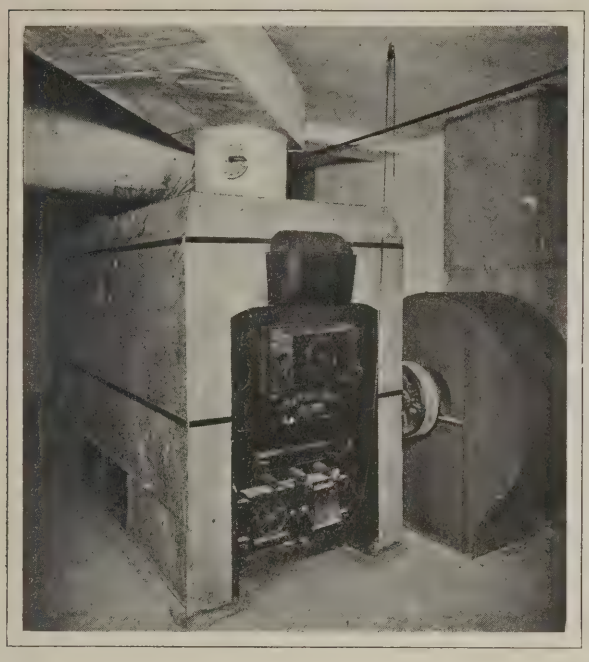
Vertical Cross Section of the Chapel Looking Toward the Main Entrance—Scale ⅛ In. to the Foot



Vertical Cross Section Looking Toward the Chancel—Scale ⅛ In. to the Foot

A Stone Chapel for the Suburbs—Two Cross Sections of the Building

The layout of the heating and ventilating equipment shows five pipes, the largest of which is the commencement of a trunk line system running north along the basement ceiling and from which



A Stone Chapel for the Suburbs—General View of the Heater with Fan at the Right

a number of branches are taken off to serve the various registers.

The anteroom and sacristy on the first floor each has an 8 x 10-in. register at the floor which are served by 8-in. pipes. The south half of the Sunday schoolroom is warmed by a 14-in. pipe which connects with a 14 x 18-in. register located in the wall at the ceiling. The 20-in. pipe taken off the hood has but a short distance to run before reaching the 20 x 24-in. hot air face, located approximately in the center of the assembly room on the first floor. The smoke pipe is of 10-in. diameter.

The trunk line system has six branches, the first of which is a short stub supplying a 14 x 18-in. warm air face on the wall of the Sunday school room at the ceiling. The main is then reduced to 10 x 16 in. until it serves an 8-in. branch for the men's toilet room and a 12-in. branch to the kitchen. These connections are made to 8 x 10-in. and 12 x 15-in. registers respectively. The trunk line is then converted into a 12-in. round pipe. The branch and register for the ladies' toilet is the same as the men's. The main then continues north and is reduced to a 10-in. round pipe, from which an 8-in. branch is taken off to warm the first floor lobby through an 8 x 10-in. floor register. The trunk line terminates in the basement pantry, a stack taking care of 8 x 10-in. registers on both floors for heating the pantries. All galvanized iron work is made from 26-gage material. The main and all branches are covered with asbestos paper.

The church here shown is located on the southwest corner of Kenilworth and Church Streets, Elmhurst, Ill., and the plans and specifications were prepared by Architects Brydges & Somers, 1200 Steinway Hall Building, Chicago, Ill., who place the cost at $10,000. The contract was executed by Charles M. Youngberg of Elmhurst, Ill.

Rushing Construction Work at Night

In the case of a large factory building which was urgently needed for manufacturing purposes it was essential that the work be completed as rapidly as possible and for this purpose it was prosecuted in two shifts, the night work being carried on by the aid of brilliant illumination furnished by means of large clusters of electric lights. The contractors—the Aberthaw Construction Company, Boston, Mass.—state that the lighting from this source was so satisfactory that the work proceeded with the same certainty and precision, and practically with the same speed as in the day time. As a result of this method of construction the owners secured their building several weeks earlier than would have been possible by the regular method of construction.

It is estimated that the goddess on the dome of the Capitol at Washington has been struck at least 100 times by lightning. She is provided with a system of lightning rods—two of them on her shoulders and five more on her helmet. The tips of the

View in the Kitchen in Basement Showing Equipment and at the Right the Cold Air Duct from the First Floor

rods are burned off after a while by fire from the skies, and have to be replaced at intervals by new ones of bronze and platinum. In places the metal of the statue has acuatlly been gouged out by bolts, and now and then patching is required.

CORRESPONDENCE

A Department Where Those Interested Can Discuss
Trade Topics—Every Reader is Invited to Participate

Rustic Furnishings for Mountain Home

From C. A. Byers, Los Angeles, Cal.—If any of the readers of THE BUILDING AGE own a mountain home and want to furnish it in truly rustic fashion, the accompanying picture will no doubt convey an appreciable suggestion. Observe, for instance, the combination writing desk and bookcase. It is constructed entirely of logs, handled in such manner as to provide an excellent table top, as well as a

Rustic Furnishings for a Mountain Home

comfortable seat, with back. The bookcase is also of corresponding rustic construction, the frame being of logs and the shelves of twigs. Also observe the rough character of the inside walls and it will be evident that these items of furniture are in perfect keeping therewith.

Seasoned vs. Kiln Dried Lumber

From Contractor, Clinton Co., N. Y.—I would say in answer to the first question propounded by "G. A. T.," Minneapolis, Minn., in the September issue of the paper that the seasoning of timber is done to remove the moisture and for the removal or alteration of albuminous substances in it. These substances are fermentable and cause decay. Seasoning lumber and timber is done to prepare it for building purposes. Moisture expands lumber, and as it is removed the lumber contracts producing what builders call shrinkage. Temperature also produces the same results, and the drier the lumber the less likely it is to decay.

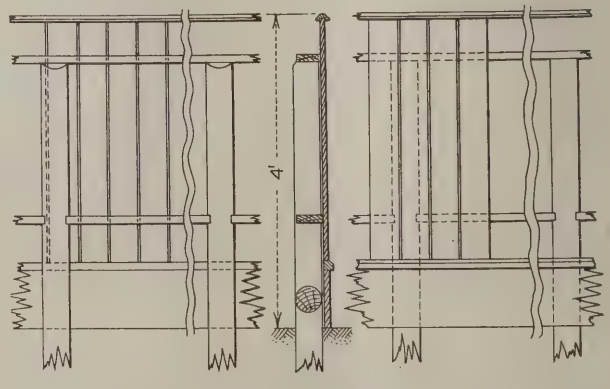
Natural seasoning is the process of exposing lumber, after sawing, to a free circulation of air. The lumber is piled in large masses with narrow strips crossways a few feet from the ground in a dry place free from sun and high winds. At frequent intervals the decayed pieces are removed and the lumber repiled. The time required for thorough seasoning varies from one to four years or more, depending on the kind of wood, its use and size. Kiln drying hastens the removal of moisture and produces an inferior article by causing a rapid drying of the surface and ends with a slow or imperfect drying of the inside. This impairs both the strength and elasticity of the material. The timber is stacked in a dry kiln and hot air forced through it, the degree of heat depending on the kind and size of the stock and varying from 100 to 400 degrees. The time varies from four days to three months. Hard woods are usually dried in air from three to six months, then placed in the drying tank six to ten days. Where timber was well seasoned and kept in a dry place well ventilated, it has been found sound after a thousand years.

Why the Chimney Tops Overhang

From G. W. N., Toledo, Iowa.—I will try and answer the query of "E. A. N.," Rockville, Conn., as to the cause of the chimney tops of which he speaks leaning toward the east to the extent of 2 in. or more in a height of 4 to 5 ft. The cause of such things is that they were not put up plumb. We have just such things here and the work was done by men who call themselves masons. I think it would be more appropriate if they were called "brick pilers."

Designs Wanted for Fences and Gate Posts

From W. M. L., Orange, N. J.—Referring to my fence inquiry on page 54 of the October issue of THE BUILDING AGE, the accompanying sketches rep-



Present Arrangement of "W. M. L.'s" Board Fence

resent the present arrangement of the board fence. I would like to have some of the readers furnish designs which, in their opinion, are neat, attractive and appropriate for the purpose.

Remedy for a Damp Cellar

From G. C., Malden, Mass.—In answer to "A. M.," Yonkers, N. Y., I offer a remedy for a damp cellar which I trust will prove of value to him. When I built my own house the water came through the cellar walls so that it was 12 in. deep in stormy weather. In order to remedy the trouble I cleaned the wall thoroughly, and then with a brush I coated the wall with Portland cement, which I mixed to a thin consistency. Before it became too hard I gave it another coating with the trowel and I have never had any trouble since. Of course this is to be applied on the outside of the wall, provided it is not too late. It should be remembered that no sand is to be used but simply clear cement.

From H. M., Chicago, Ill.—Referring to the trouble described by "A. M.," Yonkers, N. Y., in the October number of the paper, I would advise that the foundation walls in the basement referred to be thoroughly cleaned down with a solution of muriatic acid—one part of acid to ten parts of water. The walls should then be roughened up, if they are at present too smooth, using a chisel for the purpose, care being taken that after the use of the acid wash, it all be thoroughly removed from the wall by washing with clean water. After this has been done apply over the entire surface a plaster coat of cement and sand, the proportions being one part cement to two parts sand. The cement used should be mixed with Medusa waterproofing, or the water used to mix the plaster should have mixed with it 2 lb. of Medusa waterproofing paste to each sack of cement.

The cause of the walls being damp for long continuous periods is due to the fact that the water accumulates back of the walls and seeps through when the pressure becomes great enough. I am quite sure that if the correspondent adopts the process described he will have no further difficulty from damp walls.

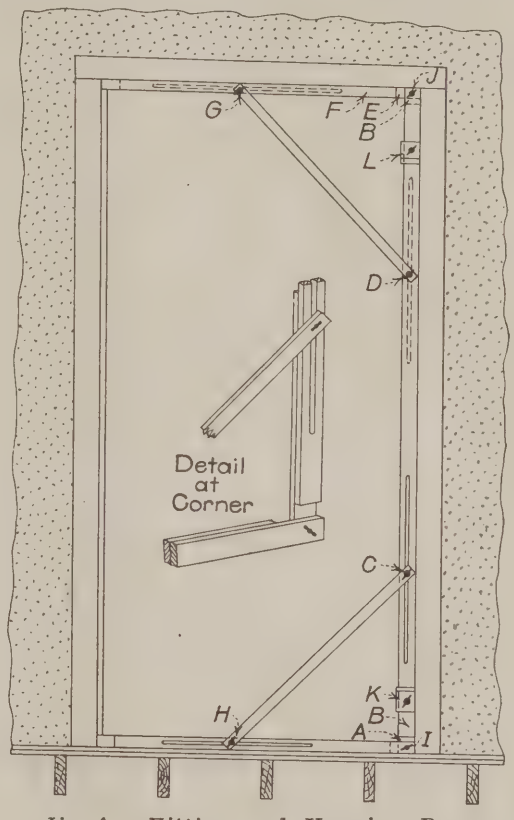
From D. P. B., Redford, N. Y.—In reply to "A. M.," Yonkers, N. Y., I think his safest remedy is to use weeping tile. A pump will have no effect on the dampness of the wall which would have to dry out from the inside. He should dig all the way round the outside of the wall and a foot below the bottom of it, then lay the weeping tile in the bottom of the trench with the outlet to the low side of the building, protecting it so it will not become choked up from the outside. Probably a 4-in. tile will be large enough. The outside of the wall should be well pointed up with cement mortar, especially if it be a rubble wall.

The tile should be well laid and bedded in fine gravel and crushed stone if these can be had. If not obtainable clean cinders may be used. This should continue to the outlet. The trench should then be filled with crushed or other small stone to very nearly the surface of the ground. If it is still possible to do so, two or more lines of tile should be put in the bottom of the cellar and out under the wall on a level with the other tile. This should end the trouble and the man do the work himself.

In this connection it may pay the correspondent to read the article on page 53 of the issue of THE BUILDING AGE for August, 1914, also page 459 of the issue for October, 1913.

Jig for Fitting and Hanging Doors

From James F. Hobart, Indianapolis, Ind.—In watching operations on a large job where there were several hundred doors to be jointed-in and hung I noticed that the usual procedure was to try a door against the place to which it was to be fitted, then the workmen jointed the back and bottom. Sometimes the back was jointed before the door was tried against the opening, but usually the door was tried there before anything was done to it. Occasionally a second and even a third trial was necessary before the back edge and bottom fitted the jamb and floor to suit the workman. After the doors were made to fit the back or hanging edge and the floor, the remaining side and top end were scribed by drawing a lead pencil along the rabbet in the jamb, or against the jamb if the rabbet was formed by a nailed-in stop, then the workman proceeded to joint-in the door, guessing as to the



Jig for Fitting and Hanging Doors

necessary allowance to be made for clearance at top, bottom and front edge of the door.

After working off the wood to these corrected lines the door was tried in place and again jointed where necessary—perhaps two additional trials being made before it suited the workman. After that the door was raised the proper distance above the floor, being held by a thin wedge of wood, or by a chisel and the position of the hinges marked on the door and on the casing, after which the door was taken down and the hinges fitted in place.

Jointing-in and hanging doors is such a task by the usual method that it seems directly in the line of manufacturers of carpenters' tools and appliances to bring out a low cost metal jig which will enable the workman to mark off and joint a door to the proper size and shape without once trying it. The carpenter can make one of these jigs for himself using spruce or some similar light and strong

wood, but it would be far better for a tool manufacturer to build these jigs for the trade, making them of rolled aluminum plate.

In the accompanying sketch is shown a jig which serves an excellent purpose. What may be designated as the "backbone" of it is made in two pieces, each 6 ft. long or less, according to the shortest door upon which it is intended to use the device. The jig shown is for doors ranging from 2 x 6 ft. up to 3 x 8 ft. The "backbone," as stated, is made double and parts *A* and *B* are matched or tongued together so that they cannot move apart sidewise when expanded for fitting a larger size of door.

The pieces *A* and *B* are held together by the bolts and thumb-nuts *C* and *D*, which also hold one end of each of the braces, as shown. The top and bottom arms are also made in two pieces each, same as the back. The pieces *E* and *F* are grooved and tongued together to prevent vertical slip and are held by thumb nuts *G* and *H*, in upper and lower pieces respectively, which are also slotted that they may be extended to fit 3 ft. openings. Two more thumb-nuts, *I* and *J*, hold the ends and back together. The corners are made adjustable to permit movement if doors are fitted to openings which are not perfectly square.

Thumb-nuts and bolts are also provided at *K* and *L* to hold in place two clips which may be made adjustable in length or in the wooden jig, simply cut from thin pieces of wood and fastened to the back-bone of the jig. These pieces represent the location and length of the hinges. The jamb or casing may be marked to these clips for the cut-in of the butts, and the door may be marked in a similar manner, by squaring down across the edge of the door at either end of each clip.

To operate the jig, place it in the opening, with the back against the jamb to which the door is to be hinged; adjust the lower arm by means of the bolts *H* and *C*, until the back and lower end fit the opening accurately, both back and lower end being extended or opened until they fit the door opening from top to bottom and from side to side, minus the amount which is to be left for clearance. The lower brace is placed as required and the thumb-nuts tightened until the jig holds its position in the door opening, after which the upper arm is adjusted and, together with its brace, is fastened by tightening the thumb-nuts *D* and *G*. A bit of wood or metal of the proper thickness, is now slipped underneath the jig, thus raising it above the floor an amount equal to the clearance to be left under the door. The clearance at the top and the front edge of the door is also made right before the jig is removed from opening and placed upon the door.

The careful workman will slip a couple of light handscrews upon jig and door after they have been laid together and the jig placed in position. With the handscrews there is no danger of accidentally moving one portion of the jig while marking along another portion thereof and with the handscrews in place it is easy to slip a short straightedge against the ends of the top and bottom arms and mark the front edge of the door also.

A jig made up as above of spruce or cypress will answer very well, but a jig made of wood will never give the satisfaction to be derived from a well made jig of rolled aluminum, which will not shrink or swell with the weather. Again the metal jig may be made in shorter lengths, with no piece over three feet long. This will give less trouble between jobs than the six-foot strips in the back of the wooden jig.

Plans and Elevation for a Castle

From A. B. N., Washington, D. C.—In the June issue of the paper, page 57, a correspondent from Wilkes-Barre made inquiry for plans and elevations for a castle. In reply, I am sending a design for such a structure, consisting of front elevation and plans for the first and second stories. The accommodations shown are in accordance with the instructions given by the inquirer. The material for the exterior walls may be tapestry brick, with stone or terra-cotta dressings.

The Quantity System of Estimating

From William Barbour, Architect, Dumfermline, Scotland.—I have read some excellent articles in the American professional press by G. Alexander Wright, architect of San Francisco, who has interested himself for so many years urging the adoption of the "Quantity System" in the United States. From practical experience with the Quantity System of Estimating, I am convinced that it merits the support of more architects, contractors and owners than it has hitherto received. It is the proper thing and if once adopted will always be used.

The furnishing of Bills of Quantities to bidders does not add to the cost of the building. On the contrary, it is far more satisfactory than the present "hit and miss" practice with which I became familiar during some years of residence across the water. The latter may be preferred by persons not used to the method of tendering; they may never have used a method so fair or accurate. The estimating basis on which contracts are let in the United States is in need of some change which would undoubtedly be for the better and the Quantity System, when once set going, would be a step in the right direction toward a better and more equitable basis—more in keeping with other forward American methods.

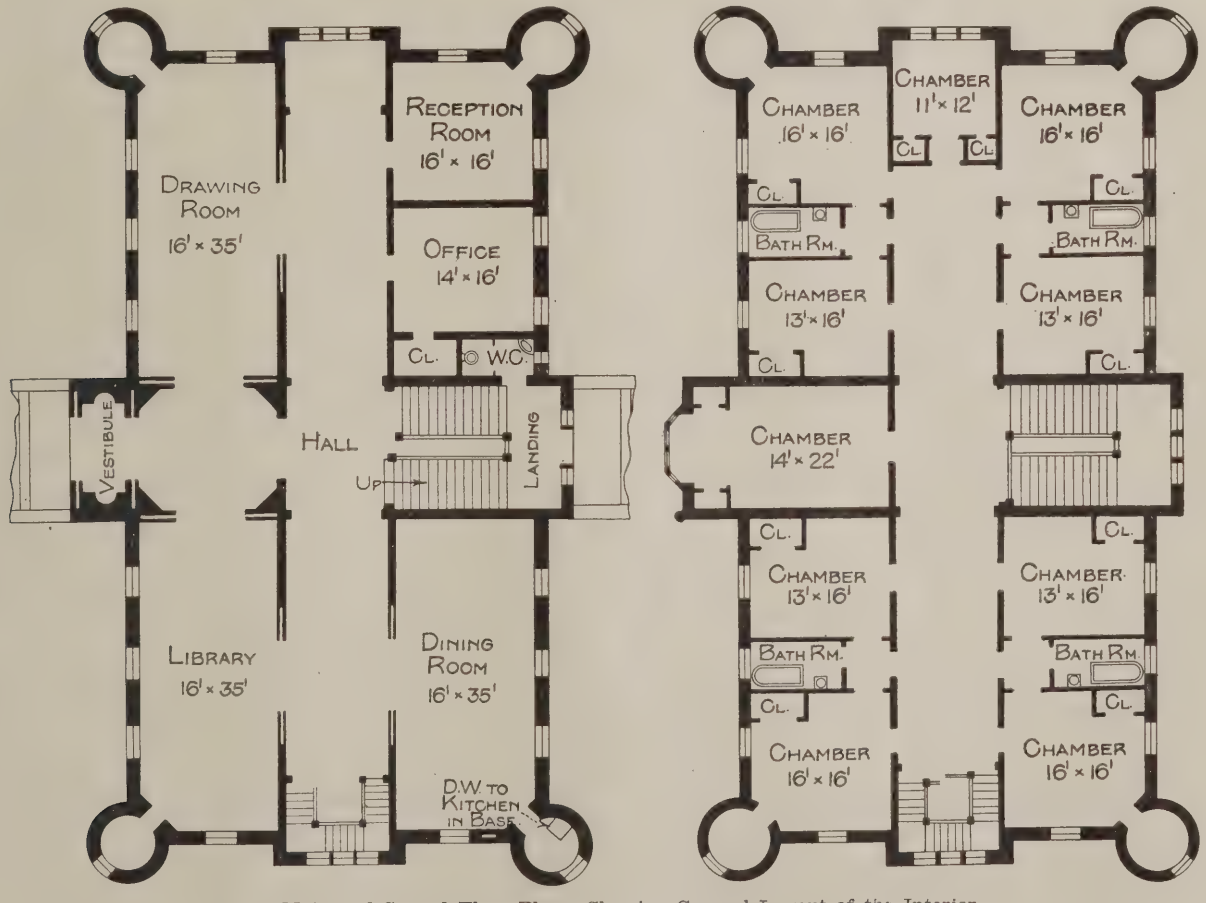
Citing a simple case, I may say every purchaser likes to have a bill or detailed account of small articles for household use. Why then this "pig in a poke" method of buying buildings where thousands of dollars are involved, taking the present lump-sum or blanket price covering everything as exists at present?

The Quantity Surveyor prepares a detailed bill of quantities (from the plans) specifies each article or part of the building, and systematically arranges the different items in their respective order. Each contractor gets an exact duplicate, the quantities, of course, being identical as is also the other information provided and description. The quantities are furnished and the amount of work to be done is decided by them; no more no less. It is not left to each individual officer to decide. It saves endless time and money to the contractor, the architect and the owner, and costs but little in comparison to the great advantages gained by all concerned.

The architects, builders and materialmen in every

trade connected with building should get together and formulate a mode of measurement to suit each locality—a uniform system of measuring the different materials and labor. The Builders' Exchanges of the country could take up this matter, also the architects' associations and representative councils to confer could be formed. Then appoint tects. There would be better work and greater satisfaction to the parties to a contract, but such men must have the proper training and be of an analytical mind as well as possess knowledge of how building work should be properly done. The Quantity Surveyor acts as an independent party showing favors to no one—a sort of arbitrator as far as quanti-

Front Elevation, Showing General Exterior Treatment



The Main and Second Floor Plans, Showing General Layout of the Interior

Plans and Elevation for a Castle—Contributed by "A. B. N.," Washington, D. C.

some faithful person or persons qualified to act as Quantity Surveyors for each and every district.

In the larger cities many men would be required for this work and I may say that this would open up a new and honorable profession with great possibilities for good to contractors, owners and architects are concerned. Additions and deductions to and from a contract are, of course, adjusted at completion and the value of extra work done is based on estimate rules, but where none apply, a fair price would be settled by the architect or it would be between the surveyor and contractor perhaps.

Mr. Wright, with his years of study and practical experience with the Quantity System, can very well be relied upon to put any community on the proper track which wishes to start this new method. He is the pioneer of the Quantity System in the United States and has gone to no end of trouble and expense in bringing this subject before architects and builders by letter, by platform addresses and by the "Quantity Surveyor," which he so successfully edited and published—not for personal profit, but to bring about better conditions. This, I believe, was well understood, as is indicated by the support which his movement has received by the principal building journals of the country.

Design for Carpenter's Workbench

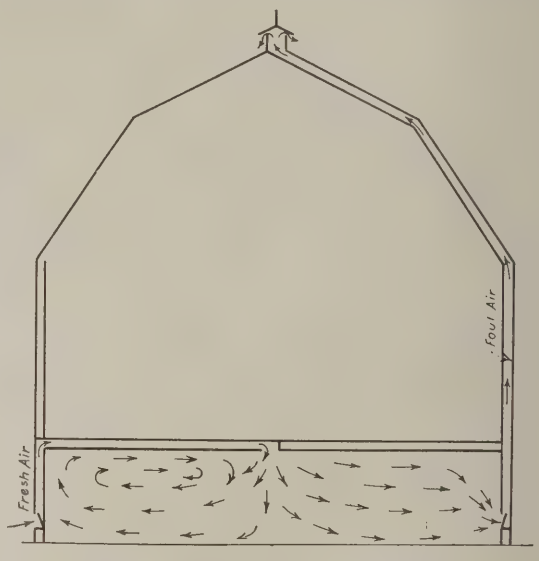
From W. M. L., Orange, N. J.—Will some of the practical readers of the paper furnish, for publication in the Correspondence Department, designs for a house carpenter's workbench and tool holder combined? The cabinet for the tools should contain portable compartments.

Ventilation of Dairy Barns

From John L. Shawver, Bellefontaine, Ohio.—With the increasing inclination of good husbandmen to provide warm and comfortable quarters for their domestic animals the subject of ventilation grows in importance. While conservation of animal heat becomes a matter of economy and even of profit in cold climates it must not be forgotten that this can not be secured at a sacrifice of pure air. While balanced rations have been a subject of close study and scientific investigation and while the necessity of abundance of pure water has become a recognized fact it is also important in the health and development of all classes of animal life that pure air and abundance of sunlight are also important factors in growth, healthfulness and profitable animal husbandry. With sheep and dairy animals this feature of their care becomes one of the most important of factors in the entire management.

Many a farmer has lost money in an attempt to feed sheep in a warm stable which had no means of ventilation. He was perhaps chagrined to find some neighbor who gave his sheep no more shelter than an old open shed covered with straw or fodder, meet with greater success than he himself was doing with a fine new basement barn and a stable closed on all sides with windowless stone walls. The late John M. Jamison of Ross County, Ohio, was long noted as one of the most successful feeders of sheep and lambs for eastern markets. For many years he was compelled to winter his sheep in old barns and in sheds roofed with corn fodder until the time came when he felt able to build a new and convenient barn especially adapted to his purposes. He sent for the writer to visit his farm and assist him in outlining the plans for this new sheep barn and one fact that he continually sought to impress upon my mind was that I should not forget to provide for an abundance of fresh air. In order to meet his requirements we provided that large sections of the side walls should be so arranged that they could be opened upward and inward and secured to the ceiling by means of hooks, and these were never closed except in times of the most severe storms and even then only on the window side of the barn. Mr. Jamison wrote me afterwards that though at first he thought it might be possible we had provided for an unnecessary amount of fresh air ventilation he never had any occasion to regret that fact but that if he were building again and it were found possible to increase the percentage of such openings on the side walls he would surely do it.

In connection with dairy barns we find that in all our northern states an attempt is made to secure warmth by heavy stone walls or by wooden walls with one or two dead air spaces lined with building paper, and in all such cases it becomes



Ventilation of Dairy Barns

necessary to provide some distinct method of ventilation in order to secure the best results. Some years ago we erected a large dairy barn, 40 x 100 ft., for M. E. Parmalee near Grand Rapids, Mich. The walls had two dead air spaces—one of six inches, the other of two inches. In order to provide ventilation we arranged air flues as indicated in the accompanying sketch. There were four fresh air intakes on each side built as indicated on the left side of the sketch where the course of the arrows shows the direction taken by the fresh air taken from the outside about two feet above the foundation walls. A similar number of foul air flues built as indicated on the right side of the sketch which conveyed the foul air up the side walls to the ridge of the roof where it escaped through galvanized vents. The amount of fresh air admitted is regulated by the small traps at the outside openings which were operated by sash cord from the inside. The openings were protected by wire cloth to keep out birds, etc. The system worked to perfect satisfaction.

It is important in providing such a system that all air flues be made as nearly air tight as possible. To this end the best quality of tongued and grooved ceiling boards should be used for building the flues, though with the aid of a good quality of building paper one may use common stock boards or native timber right from the saw mill.

Timely Hints on the Use of Glue

Observations of an Expert Woodworker Regarding This Important Adjunct of the Carpenter Shop

By W. H. Wilkin

THE proper preparation and use of glue is something which every carpenter, cabinet maker or woodworker should thoroughly understand if he expects to do a good job of work. In what follows I shall attempt to describe a method which will enable any one having trouble with glue not holding as it should, to remedy the difficulty on the next job of gluing. It must be understood that it takes practice and experience to obtain the best results and it is also very essential that good glue be used. Poor glue will cause enough trouble and expense to more than pay for the good glue. While the large factories having good dry kilns and glue rooms may possibly get good results by not using the very best of glue, I think the average carpenter and joiner will find it pays to secure good, if not the best glue.

Different Kinds of Glue

There are different kinds of glue; some granulated or pulverized, some in flakes, some very dark, some about the color of amber or resin, while some is a cream color or white. As a rule I think the carpenter will find that clear transparent glue, white in color, is generally good. A good glue is also tough. I have seen amber colored glue so tough that one could take a flake about 3 in. long and bend it nearly double before it would break. As it was bent it would turn white in the bend before breaking. The white glue will not bend so much, but it is good glue, and I cannot say just exactly which is the better. I am using white now.

After the glue has been selected take two pieces of soft or one piece of soft and one of hard wood; joint them, and then glue them together. Let the work stand until it is thoroughly dry, then break it and start a chisel in the joint. If it is good glue and made right and the wood is dry, it will pull the wood out, as it may not follow the joint should the wood be a little cross grain.

Making Good Glue

To make good glue one must have a glue pot or some kind of a heater. If the carpenter or joiner is using only a small amount of glue he can get a pot that can be heated over a coal oil stove or lamp. There must, however, be water around the pot containing the glue, else it will burn.

In my own work I soak the glue in cold water until it becomes soft clear through. Sometimes I soak it overnight. I have never seen any black glue that would soak satisfactorily in much less than two hours. I have used it in less time than that, but it takes longer to cook. I would rather have it well soaked, and then if the water is hot you can set it in, stir it several times and shortly it is ready to use.

The Question of Water

Always have the pot clean when making glue. Some glue takes more water than others. Put in enough water to cover the glue. After you have used the same glue a few times you can tell just about the amount of water it requires. If too thick to use, a little hot water may be added after cooking and also from time to time so as to keep it to the proper consistency. Do not mix old glue with new, as the longer glue is cooked, the weaker it becomes. Use the old glue by itself or throw it out. I seldom allow the water in the heater to come to a boil, but have it good and hot till the glue is cooked, then if I am not using it immediately I allow the water to cool down some or set the glue out.

Do not make too much at a time. I prefer to make it fresh every day or two, still there have been times when I did not get time to do my gluing, and I set the glue out and kept it four or five days with no very bad effects. After it has set that length of time, however, it is best to test it on something before using it on the work to be done.

The room must be warm and in winter it must be heated. In summer the windows must be kept closed for a draft, even if it is warm, will cool the glue and cause it to set before the work can be clamped up. It is not necessary to have the glue boiling hot—just have the water good and hot and set the glue pot back in it as often as necessary so as not to allow it to become cold. This is better than to have it boiling hot at first and then keep it out until it gets cold and so thick you can hardly spread it. It should not be too thick, but just soft enough so that it spreads nicely.

Soft vs. Hard Woods

Soft wood will take thicker glue than hardwood; at least this is my impression, as the soft wood will absorb the glue better. The wood to be glued should be both dry and warm—not too hot, for this will dry up the glue too quickly. To hold well the glue must become dry and hard. If the timber is not dry this will tend to keep the glue moist to a certain extent and then again it may check if not dry. The length of time it takes glue to dry varies according to the glue, the weather, the timber, etc. I have run boards through a planer within an hour or less from the time they were glued up, and then

other times after the work has been glued up four or five hours and the glue seemed dry on the outside, I have taken off the clamps and pulled the boards apart and found the glue soft in the joint owing to the moisture in the wood.

All of the water must be evaporated from the glue before it reaches its full strength. The wood to be glued must be clean, as oil or grease will keep the glue from holding. A piece of pine full of resin will not hold at all satisfactorily. If soft boards are to be glued together in order to build up a thick piece of timber and you want to be sure and get a good joint, run them through the planer or clean them in some other way if they have been lying around the shop and look dirty. While they may hold, you can never feel quite sure of it unless they are clean when the glue is applied.

Spread the glue on both pieces to be glued and brush it enough so that there are no dry spots. Brushing it well works the glue into the timber while it is warm. In veneering it may take 15 or 20 minutes to get the work in the press and if the glue is spread only on one piece it may set so much by the time you get the pressure on it that it may not take hold of the other piece as it should. If, however, the glue is spread on both pieces and will work in, it can lie for some time and still a good job will result.

There are many large factories and mills that use a glue spreader and only spread the glue on one piece, and while they have obtained good results I have seen some very poor jobs. The quality of the glue, of course, has much to do with it. I have taken large flat 3-ply panels out because they were blistered and cracked, and I think it was largely on account of poor gluing.

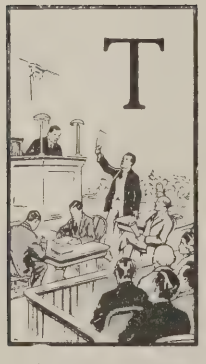
There are several things to remember in gluing: buy good glue, have it made clean and fresh and do your gluing in a warm room. Have the wood to be glued dry, clean and warm, spread the glue well on both pieces and get them into the clamps as soon as possible.

You must have a good joint, that is, so that it comes together the full length. If the wood is the same color you should not be able to see the joint after it is planed off. The glue must either go into the wood or be squeezed out. It is not how much, but how little glue you leave in the joint that makes a good job. I have glued different kinds of pine, oak, birch, gum, cedar, poplar, cypress, chestnut, walnut, cherry, etc., and hardly ever had any trouble in making a good job.

Architects as Independent Contractors

Liability to Third Persons—Control of Work Decisive--Some Interesting Court Decisions

BY A. L. H. STREET



THE rule of law that a builder who undertakes the erection of a structure under an ordinary building contract, binding him to furnish all the labor, is an "independent contractor," for whose negligence in doing the work the owner is not liable to a third person who may be injured in consequence of such negligence, unless the negligent act was called for by some provision of the contract, is well established by court decisions in most States. The injured person, therefore, must seek recovery of damages from the builder, and not from the owner on the theory that the former was the representative of the latter. The reasoning upon which this rule proceeds is that the owner has no control over the builder as to details of performance of the contract, the contractor being merely responsible to the owner for the result of the work.

Does the rule apply to architects? This question has been answered in the affirmative in several interesting appellate court opinions.

In the leading case of Burke vs. Ireland, 59 Northeastern Reporter 914, which was passed upon by the New York Court of Appeals, an owner of a building was held not to have been responsible in damages for death of a plasterer who was employed by a sub-contractor, while at work in a partially completed building, due to collapse of the structure. The court finds that the accident was caused by insufficient construction of a foundation wall by the principal contractor, and by the supervising architect's negligent failure to inspect that part of the work, all in violation of the contracts under which the builder and the architect were respectively employed. The owner was exonerated from liability on the ground that the accident was not attributable to any negligence on his part, but rather to the combined negligence of the builder and the architect, and that they were independent contractors. The reasoning of the decisions is as follows:

"In this case, the owner was not competent himself to plan the building. He was not competent to construct or superintend the construction. * * * It was his duty to devolve these things upon persons possessing sufficient knowledge and skill to accomplish the result intended, with safety to the workmen and the public. Accordingly, he employed a competent architect to draw the plans and specifications for the building. * * * It cannot be said that he interfered with the plans,

or reserved or exercised any right to change them. In other words, he committed the whole matter to a competent expert. The work of constructing the building, including the foundation, he also committed to a competent contractor, but whose foreman made the mistake of placing the central columns, which supported the upper part of the building, upon an insecure foundation. This mistake was the direct or proximate cause of the accident. * * * If it be true that the owner was bound, at his peril, to see to it that the foundation of the iron columns was laid upon solid ground, then it would be difficult to avoid the conclusion that the result of the accident could be attributed to the omission of the defendant (the owner) in that respect. But we think that this was an obligation which the owner could devolve upon an independent contractor, and it requires only a fair construction of the contract to show that it was placed upon the builder, for whose omissions or mistakes the defendant is not responsible. There is no proof in the case from which the jury could find that the accident resulted from any defect in the plan. * * * If the architect, who had general supervision, had insisted upon a careful inspection of every detail of the work, and had been present when the concrete was about to be laid upon the disturbed ground outside the old cistern wall, he might have discovered the departure from the terms of the contract in that respect, and prevented it. But the architect was not the agent or servant of the owner. He was in the exercise of an independent calling, and held the same legal relations to the defendant the builder did, and for omissions of either in the execution of the plans personal negligence cannot be imputed to the defendant."

Responsibility for Defective Plans

The Texas Court of Civil Appeals has gone a step farther than the New York decision by holding that an owner is not only not responsible for defective execution of plans and specifications prepared by his architect, but is not liable to third persons for injury resulting from a defect in the plans, if he used a reasonable degree of care to select an architect and a builder who were competent to do the work, and if he was not negligent in failing to discover the defect. (White vs. Green, 82 Southwestern Reporter 329.) This was a case in which plaintiff sued for injury to adjoining property, caused by fall of a brick building, due to defective plans. The Texas court, in absolving the defendant from liability, followed the reasoning adopted in the New York case mentioned above, and held that the architect was an "independent contractor" for whose negligence the owner could not be deemed to be responsible, in the absence of any showing that the owner was put on inquiry as to the skill of the architect to draw plans or as to the sufficiency of the plans adopted.

In the case of Lottman vs. Barnett, 62 Mo. Sup. Ct. Rep. 159, it was held that one who had general charge and superintendence of the construction of a building was responsible for the killing of a workman, caused by the fall of a wall, resulting from giving away of supports on which it rested, under the working of a jackscrew, although the appliance was put to work under the immediate direction of another person employed by the owner of the building, and while the architect was absent, where it appeared that the manager of the jackscrew was employed under the advice of the architect, and was subject to his direction, and that he knew and approved of the method adopted in raising the wall. The court finds that whether the wall fell because the plan for raising it was a bad one, or because the supports were inadequate, in either case the accident was attributable to negligence on the architect's part, for which he was responsible not merely to his employer, but to those injured in consequence.

When the Owner is Responsible

But in the case of Pitcher vs. Lennon, 42 New Supplement 156, the Appellate Division of the New York Supreme Court held an owner responsible for a fatal accident caused by fall of part of a building, in imposing more weight on a sub-wall than was permitted by statute. In this case it appeared that the erection of the building was superintended by the owner. He attempted to avoid liability on the ground that the architect held the position of an independent contractor; that the owner, in employing him, was not bound, at his peril, to ascertain whether any vice inhered in the plans, and that, if he employed a competent architect, and directed him to prepare safe and suitable plans and specifications, he had fulfilled the duty resting upon him. In overruling this contention the court said that, as an abstract proposition, this may be true, but that the rule was inapplicable here because the owner did not occupy the position of one who had employed an architect, with proper instructions, leaving the whole matter in his hands. "For all that appears," adds the court, "the defendant may have known, in the first place, that the plans contained an illegal feature or even directed it. * * * It was the owner, Lennon, who took the plans and gave them to the builder, and superintended the construction. He thus learned, or should have learned, that the building was being erected in an illegal manner, and this, as has been said, renders him liable."

That the rules of law here discussed are of early origin is indicated by the fact that in 1857 the California Supreme Court held that architects alone were responsible for injuries caused by breaking of a dam, they having been employed to design a dam which would resist such floods as caused the break. (Boswell vs. Laird, 8 Cal. Sup. Ct. Rep. 469.)

Prof. Brown Visits the Lumber Regions

Nelson C. Brown, professor of Forest Utilization in the State College of Forestry at Syracuse, N. Y., has just returned from a 6000-mile trip through the National Forests of the Rockies and Cascades. He left Syracuse in June going directly to New Mexico, where he studied methods of utilizing and protecting timber in the Southern Rocky Mountains. He then went up through California visiting the redwood lumbering districts on the north and east of San Francisco to the Puget Sound country. There he visited some of the largest sawmills in the world, and not only studied the methods of utilization and manufacture but carefully investigated the methods used by the Western lumbermen in supplying the Eastern markets. He also visited the white pine section of northeast Minnesota from whence come much of the best white pine.

Furnishing Details by Architects

A Few Comments on the Subject "Should Details Be Furnished Before a Contract Is Signed?"

By G. Alexander Wright

THE difficulty of obtaining full detailed information of what is really wanted when bidding upon work is one of the serious problems which confronts the building contractor to-day, for it is largely the "detail" which determines what work is really worth.

Ordinary small scale drawings and specifications which are sometimes lacking in information certainly do not sufficiently disclose what may possibly be insisted upon, in detail, after a bidder has signed a contract—some owners imagine they do, and that they tell a bidder all that is necessary. Others are indifferent. It's up to the contractors they think; while still others may secretly hope that some things may slip through without being noticed. This is the type of owner who is ever ready to profit by a bidder's error.

Of late years, however, there has developed among contractors a strong desire, arising partly from numerous sad experiences, to know more of what is required "before" a contract is signed, rather than be obliged to await the details afterwards, as so often happens. In common fairness there should be some way of disclosing the details beforehand, or at least as far as may be possible so that all bidders may receive reliable and identical data to figure upon. Not only that, but if for any reason the character of any of the details should be simplified, after a contract is let, it would be more likely to serve to check against any possible unfairness.

In estimating cost of building work, the writer knows of no legitimate reason why all the cards should not be laid upon the table face side up.

The Square Deal

Fortunately for the building industry there are many architects who give as well as expect a square deal. These gentlemen are well known by bidders and they are very properly honored and respected as men and as members of an honorable profession. But it seems to be now very generally understood that there are others, and it is from the offices of this latter class principally that the contractors obtain a more accurate idea of what is wanted, "after" the contract is signed, than it is possible for them to get before. Then it is too late. Many a contractor has been caused financial difficulty because of the, shall we say peculiar temperament (?) or business viewpoint (?) such architects display, not provided for of course by any clause in the contract. These men are well known and scheduled in the contractors' mind just where they belong. The better type of contractors avoid such offices, or when invited to figure, they discreetly raise their bids high enough to cover possible contingencies, and in the long run somebody suffers.

But the point under consideration is, whether details should be furnished before or after a contract is let? To fair-minded men it is obvious there can be only one answer to this question. If details are not ready when the job is being figured they should certainly be in the hands of the contractor before he is called upon to sign up. It would surely be a more equitable way of letting a contract. Now as details must be prepared and furnished at some time, is there any logical reason why this should not be done at a time when such information would be of the greatest value to the bidder? *i.e.*, when he is making up his prices. Why this keeping back of vital information at that time? It is not to the bidder's advantage of course. Who is it that benefits? Is it the owner? Or is it for the greater convenience of the architect? But whatever the reason, can it be regarded as fair to the bidder? It is obvious that an individual bidder is helpless. He cannot force the issue himself in any particular instance. But collectively through their organizations, contractors might make reasonable and proper representations of these facts to local architects with a view to betterment of the conditions named.

Advantages of the Quantity System

Certain remedies have been suggested from time to time. One is the quantity system which would go a long way toward determining all details beforehand, but pending the general adoption of this modern method of inviting bids, some other remedy is necessary. One that would seem to afford desired relief without causing hardship to anyone would be the passage of a city ordinance providing that applications for building permits, for work above a certain estimated cost, should be accompanied, not only by the usual plans and specifications, but by details to a scale of say, not less than 1½ in. to the foot, or sufficient to indicate the character of the work to be performed in detail.

It takes no longer to study the details of a structure before a contract is entered into than afterward. It has to be done some time. The owner who is now so often unduly impatient to see his building started, would soon learn to adapt himself to the new condition if he realized his architect was simply conforming to the law. There would be just as many buildings erected, and bidders would understand more clearly upon what they were bidding.

A Bandstand and Comfort Station

A Combination Affair Designed for Summer Use —Some Details of Its Arrangement and Plumbing

IN the halftone picture and floor plan here shown we present a combination public comfort station and bandstand recently erected in what is known as Oakwood Park in the city of Lorain, Ohio. It represents a rather novel treatment of the problem and one which in its architecture is both attractive and practical. The exterior is of pressed brick with struck joints, the roof is of Spanish tile and the interior of the toilet rooms is lined with enamel brick, with granolithic tile floors.

Obviously the predominant feature is the plumbing installation and the particulars which follow cannot fail to interest the architect and the builder as well as the plumbing contractor.

The upper part of the structure used for band concerts or other purposes requiring a raised platform, has a cement floor with drain in the center, below which is the comfort station, a floor plan of which is shown on the following page.

General View of the Combination Comfort Station and Bandstand

As will be seen from inspection the floor is divided into three main sections consisting of the women's toilet, the men's toilet, and the refreshment booth. In addition there are two small storerooms. In the women's toilet are three water closets and three lavatories, a floor drain being located approximately in the center of the room.

The men's toilet contains two water closets, four urinals and three lavatories with a similar drain. A sink is provided in the refreshment booth.

Ventilation is secured by vent spaces back of the water closets and urinals, both of these spaces being connected with a vent chimney at one end, which is carried above the roof.

The fixtures discharge into a 4-in. cast-iron drain which is carried 3 ft. beyond the foundation wall. Here it changes to 6-in. terra cotta which is carried out to the sewer. The soil and vent pipes are carried on the inside of the exhaust flue to a point 3 ft. above the roof. The floor drains are nickel-plated brass shower strainers for concrete floor with removable faces. The leaders are brought down the outside of the building and are connected to the sewer through traps, while the horizontal leader lines are carried around the building outside the foundation wall and connected to the sewer, approximately 6 ft. beyond the point where it leaves the building. Loose tile footing drains of 4-in. terra cotta pipe with open joints are laid around the bottom of the foundation walls and discharge into the sewer.

The water supply is brought through a 2-in. galvanized iron connection which supplies all fixtures, and two sill cocks with stop cocks in the toilet rooms. Stop and waste cocks are installed on the main water supply line just inside the building wall. No provision for hot water is made in this comfort station as it is located in a park where its use will be confined almost exclusively to the summer season.

The water closets used are those made by the Standard Sanitary Mfg. Co., with special closet bowls. The water closet compartments are of Italian marble 6 ft. 6 in. high, and are made 4 ft. 6 in. deep. The partitions are set 12 in. above the floor and are supported on nickel-plated brass standards with doors.

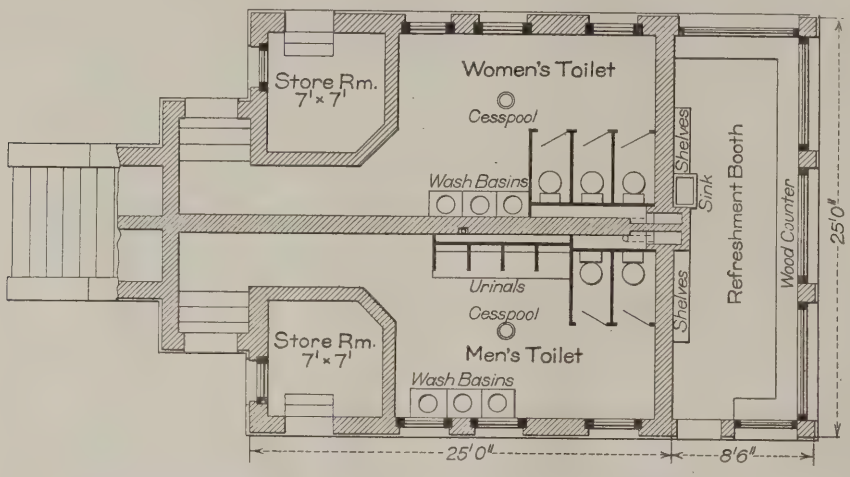
The urinals consist of "Ideal" porcelain "Hinsdale" stall urinals made by the Trenton Potteries Co., Trenton, N. J., with the exception that the vitreous china tank and flush pipe are substituted for the push buttons and self-closing valve.

The lavatories consist of "Standard" 24 in. by 20 in. vitreous china sections with integral back, china index self-closing "Boston" basin cocks for cold water only. These are supplied through ⅜-in.

nickel-plated supplies to wall with wheel handle angle stop valves of compression type. The hole in the lavatory for the hot-water faucet is closed with a nickel-plated cover.

A similar comfort station which has also been erected in Washington Park is like the one described, but contains in addition two drinking fountains of vitreous china, with vitreous china bubbling cups.

The heating of this comfort station in cold weather is taken care of by gas stoves, and gas outlets for both heat and light are provided in each compartment. On all gas stoves 3-in. iron pipe vents are provided to carry off the fumes. Electric lighting throughout is also installed.



A Bandstand and Comfort Station—Floor Plan Showing General Arrangement of the Plumbing Fixtures

The comfort station was designed by Hamilton E. Ford, architect, of Lorain, Ohio, and was erected for the Department of Public Service, City of Lorain. The plumbing work was done by Thomas Butler, 547 Broadway, Lorain, Ohio.

Hardwood Floors in Fireproof Buildings

In discussing floor surfaces in fireproof buildings in a paper read before the American Society of Mechanical Engineers, Sanford E. Thompson pointed out the kinds of hardwood floors best adapted for the purpose and also the method of laying them. We present the following extracts as likely to prove of interest:

Floors of maple, birch, beech, oak, or long leafed southern pine are used most largely for offices, classrooms, or lecture-rooms, and in many of the older colleges for laboratories and halls. A wood surface, however, is not usually considered entirely satisfactory either in general appearance or in wearing qualities. If one passes from a corridor with a granolithic, terrazzo, or tile floor, into a room or auditorium having a wood floor, there is a marked effect of inferiority and cheapness.

There is just as much danger of poor materials and workmanship with wood as with other kinds of floors. Unless the greatest care is taken in selection of materials and workmanship, they are liable to shrink or swell and sometimes to squeak under foot. It at all hollow underneath, they are more noisy than a concrete surface.

For corridors, wood is being largely superseded by granolithic, terrazzo, or tile. For laboratories other materials are being substituted for wood in most of the newer structures, although wood is occasionally preferred, especially for physical laboratories and for laboratories where men stand for long periods. The linoleum on concrete will overcome practically all the objections that are made to wood floors, with a cost substantially the same.

There are various methods of laying hardwood floors. For classrooms a single thickness of maple or birch nailed to sleepers with cinder concrete between should be satisfactory. Another type of construction is to use patented metal screeds embedded in the base concrete, and nail the floor boards to splines in the screeds. For rooms subjected to heavy traffic, 2-in. or 2½-in. plank may be placed underneath the hardwood floor.

Of all the different materials, oak is the most expensive and the finest in appearance at the beginning, but under heavy traffic is more liable to splinter than the finer grained woods. Georgia pine, if of best quality, makes a durable floor, and is preferable to the finer grained woods in wet places, as it does not swell and warp so badly. It is less durable, however, and therefore not recommended for the greatest permanence in rooms such as class and lecture-rooms. Maple, birch, and beech all make good floor material. These are usually laid in strips ⅞ in. thick by 2¼ in. wide.

Concrete for Churches

Reinforced concrete is often used to advantage in church construction, and in some parts of Europe there are even examples of entire buildings being erected, such as the Cathedral of Poti in Russia. Another use is for adding towers or spires in order to complete the unfinished church. It often happens that a church remains a long time without towers or belfries, and these are built at a later date.

In order not to add an unduly heavy load on the already existing foundation, reinforced concrete has an advantage over stone work, and is besides less expensive. A good example is found in the Cathedral of Tunis, which was recently completed by putting on two high belfries in reinforced concrete, and these make up a good architectural ensemble with the former stone work.

A plant for the manufacture of building material and metal furniture is in course of erection at Keene, N. H., for the Imperial Metal Products Corporation. The main building will be four stories in height and cover an area 61 by 255 ft., with an annex 18 by 60 ft. and also four stories in height. The buildings will be of brick and steel construction. The equipment will be electrically operated, the current being obtained from a hydroelectric plant in the vicinity.

Concrete Posts for Grape Trellis

One of the Many Uses on the Modern Farm for Which Concrete May Be Utilized to Good Advantage

THE advantages of strong, durable posts for whatever purpose they may be used about the farm or elsewhere are altogether too obvious to admit of argument, and in casting about for a material to meet the requirements of the case concrete has been found well adapted to fill the bill. Its uses are multifarious and one of them is shown in the halftone picture, Fig. 1, on this page, which represents a portion of a grape trellis erected more than a year ago on a farm near Chalfonte, Pa. The posts used are economical, rigid and strong and can be placed farther apart than is customary with wooden ones, hence a less number is necessary for any given purpose.

The posts are made of concrete consisting of 1 part Portland cement, 1½ parts sand and 3 parts small stone. They are reinforced by placing in the corners of each post, about 1 in. in from the surface, a 5/16-in. square twisted rod. Three-eighths inch round rods could be used in place of square rods. The posts are 10 ft. long, of which 4 ft. is beneath the ground and 6 ft. above the ground. They are 6 in. square at the lower end, tapering to 4 in. square at the top. Through each post five holes are provided to receive the wires, upon which the vines are trained. At the end posts the wires are fastened to eye bolts, ⅜ in. in diameter, and about 12 in. long. These bolts extend through the end post and are threaded with a nut for tightening the wire. The bolts and fastenings are shown in the cut.

In the construction of the Chalfonte trellis, the slanting brace for the end post was cast in place. A notch was left in the post and the form for the brace was set up. The reinforcement of the brace projected beyond the end of the form and into the notch, the end of the form merely fitting up against the post. At the ground end of the brace an excavation was made. When the concrete was placed this excavation was also filled, thus forming a bulb or enlarged end, which answered the purpose of an anchor. The brace "form" was then filled with concrete, which was worked into the notch, entirely surrounding the ends of the reinforcing rods, the latter being curved at the ends to firmly anchor them. It would be feasible, however, to precast the brace, merely providing for it a notch in the post. The notch could be easily formed by nailing a triangular block to the side of the form. The post end of the brace should be set in cement mortar.

The "form" for casting the posts and shown in Fig. 2 is very simple. It consists of three boards, which form a trough the exact size of the finished post. The side boards are attached to the bottom piece by hinges so that they can be readily swung down when the post is removed from the mold. The wire holes are established by placing at the proper points short pieces of ½-in. gas-pipe cut so as to fit between the side boards of the "form." Through these short lengths of pipe, which are left in the concrete, are placed temporarily ⅜-in. bolts. These bolts, which also go through the side "forms," serve to clamp the "forms" together while the pipe spaces them at the exact distance. This method of fastening is shown in Fig. 2. The mold should be oiled with a heavy lubricating oil before casting each post. This permits easy removal of the finished post.

Fig. 1—General View of the Posts in Position

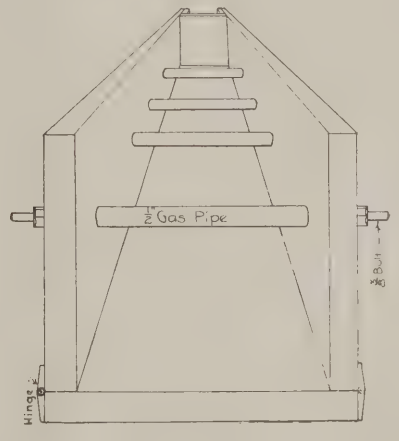


Fig. 2—View of the "Form" for Casting the Posts

Making Concrete Posts for a Grape Trellis

It is stated that there is more work in actual construction just now in Omaha, Neb., than ever before in the history of the city. The Builders' Exchange has issued a list of the jobs on which work is now in progress, or contracts awarded, and it shows the total of building operations now in sight to be nearly $4,000,000.

New Publications

Stability of Masonry. By E. H. Sprague. 180 pages. Size 4¾ by 7¼ in.; 92 illustrated and three folding plates. Bound in cloth. Published by Scott Greenwood & Son of London; D. Van Nostrand Company, American agents. Price $1.50.

This is a new edition of one of the Broadway series of engineering handbooks, and in its pages the author has endeavored to present the subject of earth and water pressure on walls and other structures both from the graphical and mathematical points of view. The present work is based upon lectures given by the author at University College and at the Westminster Technical Institute, London, where some of the methods described and now common to the latest text books were given before these appeared in England.

The matter is comprised in nine chapters, one of which deals wlth the stability of the wall; another with the form and construction of the wall; a third has to do with dams and chimneys and another with foundations. The treatment of the hydrostatic and geostatic arch in chapter nine is based upon Rankine's work.

Filling for Cracks in Old Floors

In the case of a painter in Maine who had some old floors to re-finish, the boards having warped and the joints opened to some extent, he wrote to the *Painter's Magazine* for information and in reply they suggested the following method of procedure:

"If the floor boards are badly warped in some places a good job cannot be made by simply filling cracks or open joints, as that would still leave the floor uneven. Wherever the edges of the boards are turned up some it is absolutely necessary to have them planed to a level with the rest of the floor. To fill the joints or wide cracks first coat the edges of them with boiled linseed oil, which allow to become dry; then fill in with a putty made by soaking a lot of blotting or lining paper in water; squeeze out the water and mix with whiting and glue size to a fairly stiff mass, similar to glazing putty. Stain it with dry color to match color of the floor and press firmly into joints or cracks with a flexible putty knife. Allow mass to harden and finally remove surplus with very coarse sandpaper.

For cracks or joints ⅛ in. or less in width a filler may be made by mixing good whiting and linseed oil putty with a small portion of dry white lead, well kneading the mass and coloring it to match the floor; then, after brushing boiled linseed oil on the edges of joints or cracks, the putty is firmly pressed in and permitted to harden. To level off the putty on top of joint or crack wet the putty knife by dipping in turpentine. When the filling has become hard even it up with the floor by going over it with sandpaper. Before filling joints, whether close or wide open, clean out dust or dirt, otherwise the filling will not be perfect.

There are crack fillers on the market for the purpose, but these will hardly suit your work, as they are not intended for very open joints, aside from being high priced.

Faience Tile for Color Work

It has been pointed out that each year witnesses a steady increase in the use of faience tile, both in colored matte glazes and in bright Moorish designs, says a recent issue of the *Architect.*

The range of effects secured by the use of faience is practically unlimited, extending from the most severe and unrestrained classic to the almost barbarically gorgeous in color and form. Faience tile possesses the capability of suggesting or echoing, by arrangement and shape of the units employed, that particular type of architecture characterizing the building in which it is employed. Thus the architect has form as well as color at his disposal in the use of this material, and may, with equal facility, suggest the ordered jointing of the Grecian Temple or the cyclopean masonry of barbaric races. If he also makes use of moulded faience in low relief for decorative borders, caps and mouldings, he may fix his period almost to a day and stamp the whole as Aztec, Egyptian, Pompeian, Rococo, or what he will.

At the San Diego Exposition the color work has been most satisfying, being absolutely suited to environment and climate. Colored glazed tile was used for this purpose. In the true Spanish Colonial style, Moorish designs in high glazes have been used lavishly. It is not too much to say that, whatever visitors to San Diego may forget, they will never forget their first view of the California State Building, with its resplendent glazed tile dome and its tile ornamented massive tower.

Responding Electric Push Button

A consular report states that an electric push button devised to indicate a return signal has been invented by a Norwegian electrician. The apparatus is a very simple contrivance which can be attached at a slight cost to any push button connected with an electric bell.

By means of an electric magnet, directly behind the signal button, a dull buzzing sound makes known whether the person called is present. Besides assuring the one signaling that he has been heard, it will save the one called the annoyance of listening to repeated ringings. The appliance can be used in connection with call buttons in hotels, shops or other places where the employee called cannot always immediately respond by his presence.

The University of Texas, at Austin, has just issued its Architectural Year Book containing much interesting information regarding the courses of study and carrying illustrations showing some of the work of the students. The requirements for admission are given; also a list of the faculty.

William Herod, who has constructed more than 500 homes in Brooklyn, N. Y., died Sept. 28 at Los Angeles, where he had been visiting on his trip to the Panama Exposition. He was sixty-eight years old and resided in Flatbush, Brooklyn.

Current News of Builders' Exchanges

Reports of Some of the Late "Outings"— New Officials and Other Items of Interest

Outing of Pittsburgh Builders' Exchange

OLD SOL never shined on a more delightful day than that of Wednesday, Sept. 15, when the Pittsburgh Builders' Exchange held their builders' outing in the form of a field day, corn roast and dance. On Mr. Craig's kind invitation "Bellwood Farm," near Ingomar Station, was selected for the outing, and a more glorious time never was had.

The guests began to arrive at 2 o'clock by electric car and auto, and by 3 o'clock there were about 250 people on the grounds.

Japanese lanterns were strung in profusion around the lawn and every tree was illuminated by the beautiful mellow lights, while the Craig residence was tastefully decorated with bunting, flags, electric lights and Japanese lanterns.

First on the day's program was the ball game between teams composed of builders and building material dealers. Manager John Schreiner and Captain John Richmond of the builders, after much deliberation, led a very carefully selected team on the field.

Manager George Heppenstall and Captain Warner Olsen of the material dealers, after having practised with their team every day for two weeks, walked proudly on the field at the tap of the gong with the spirit of conquerors.

The "spirit" was there, but the way they played ball indicated that they may have been conquerors in the seventeenth century, but not in the present day, as the score after six innings stood 15 to 8 in favor of the builders.

The tug of war was then arranged and it also resulted in a victory for the builders. Walter Shenk was captain for the victors and C. H. Stolzenbaugh for the vanquished.

At 6 o'clock supper was announced, and it did not take any coaxing to get every chair at the long table occupied. All the ladies were seated at the first table and the men gallantly waited for the second table to satisfy their appetites, which, after the very strenuous afternoon, were keen. The sumptuous meal consisted of roast corn, roasted potatoes, sliced tomatoes, fried chicken, rolls, ice cream and coffee and was so well enjoyed that one could hear the smacking of lips almost a mile away.

After supper dancing was indulged in, Mr. Craig having thrown open the beautiful living room of his spacious residence for that purpose, and a good time was had until 11 o'clock, when the party broke up and the last auto pulled out of the grounds. The day was enjoyed immensely by all who participated and the entertainment committee covered themselves with glory.

Some Notes on the Outing

H. H. Gilmore lives on the next farm to Mr. Craig, and it was Gil who furnished the cider. When he was informed that the crowd would be large he remained up all of Tuesday night pressing apples. Besides the cider there were twenty gallons of buttermilk and cream (50-50), which was consumed with much gusto. Pounds and pounds of caramels were passed around to the ladies during the afternoon and evening, while the men took pleasure in smoking cigars and tobies which were furnished for their enjoyment.

Mr. Craig added to his many generous indulgences by gathering two half-bushel baskets full of fine peaches, each one as large as a baseball, and had them passed around to the guests.

Mrs. Craig proved herself an ideal hostess and entertained the ladies in a delightful manner. Her kindness in throwing her entire house open to the visitors was greatly appreciated.

Bill Goldman certainly made a hit with the ladies, especially when he was passing around the peaches.

George Hogg and Howard Hager proved to be the champion quoit pitchers, and have issued a challenge to all comers for the next outing.

President Trimble kept his eye on everybody to see that all had a good time. He was one of the chief rooters for the builders at the ball game.

A New Wisconsin Builders' Association

The local branch of the Master Builders' Association of Wisconsin was organized in Madison, Wis., on Sept. 22, when officers for the ensuing year were elected as follows:

President.....George C. Cnare
Vice-President.....L. L. Parr
Secretary.....L. W. Burch
Treasurer.....H. C. Horstmeyer

A committee on bylaws was appointed, consisting of B. F. Mautz, Carl B. Fritz and C. A. Hooper.

A committee consisting of G. L. Cnare, L. L. Parr and John T. Findorff was appointed to examine the proposed Building Code prepared by a committee of the Board of Commerce and report its findings to the association.

The meeting was addressed by Edward M. McMahon, secretary of the Board of Commerce, who talked on "Co-operation," and by O. H. Ulbricht of Milwaukee, secretary of the State Association, who spoke on the benefits of the organization.

New Assistant Secretary of Grand Rapids Exchange

We are advised that A. R. Tibbitts, for the past three years assistant secretary of the Builders' and Traders' Exchange at Grand Rapids, Mich., has resigned his office and accepted a position with the trade paper known as "Michigan Motor." He will have his headquarters in Detroit and will cover that city as well as Toledo, Flint and Cleveland. He is succeeded as assistant secretary by Mrs. Cassie Leonard.

Outing of Louisville Builders' Exchange

Members of the Builders' Exchange of Louisville, Ky., had their annual outing at Hike's Point on Labor Day. The committee in charge consisted of C. C. Childers, president; Fred Schupp, Guy Warren, Thomas Wintersmith, William Dehler and Gus Albrecht, Jr.

New Secretary of the Duluth Builders' Exchange

Hobart W. Brown has just been elected secretary of the Builders' Exchange at Duluth, Minn., to fill the vacancy brought about by the resignation of J. H. Cook, who has gone to Omaha, Neb., to engage in business.

Jacksonville Exchange Entertains Visitors

The Builders' and Traders' Exchange at Jacksonville, Fla., acted as host in entertaining on the evening of Oct. 15 the visiting newspaper men who attended the Press Association convention held in that city during that week. The program was of a most appropriate nature and the visitors were loud in their praises of the hospitality extended.

Brief Review of the Building Situation

Figures Showing Building Activities in Various Sections of the Country in September, 1915, and September, 1914

THE reports of building operations in leading cities of the country for the month of September make a most gratifying showing when contrasted with the figures for the corresponding month of last year. The improving tendency seems to have been pretty general throughout the country with the exception of the western section and the Pacific Slope. The figures which we present herewith covering eighty cities show increases to have occurred in sixty, while in twenty there was decreased activity, as compared with September, 1914. The result is a gain for the entire country of 27.83 per cent.

In dividing the country into four zones and considering the important cities of the Eastern States we find the improvement as contrasted with 1914 to have been a trifle more than 30 per cent. This is traceable to important gains in Boston, Bridgeport, Buffalo, Hartford, Newark, New Haven, Philadelphia, Pittsburgh, Troy and Worcester. It is to be observed that in most of the cities mentioned in the New England States, the increases are quite marked, this being undoubtedly due to the heavy enlargement of manufacturing plants additions, etc., for turning out munitions of various kinds. In Greater New York, the Borough of Manhattan shows a slight falling off as compared with last year as does also Brooklyn, but the other three boroughs show increased activity. The accompanying table gives the figures for the respective cities.

CITIES OF EASTERN STATES

	September, 1915	September, 1914
Albany	$340,965	$267,325
Allentown	172,675	81,080
Binghamton	115,534	100,260
Boston	2,582,417	766,017
Bridgeport	720,260	314,890
Buffalo	987,000	761,000
East Orange	89,233	91,334
Harrisburg	62,175	105,450
Hartford	349,250	129,910
Haverhill, Mass.	101,850	43,500
Jersey City	244,112	193,822
Manchester	120,302	77,037
Newark, N. J.	662,458	231,660
New Haven	1,478,499	431,610
New York:		
Manhattan	4,348,267	5,475,220
Bronx	1,311,589	1,239,801
Brooklyn	3,495,913	3,522,290
Queens	1,413,661	1,272,047
Richmond	244,300	109,821
Paterson	120,581	72,783
Philadelphia	4,731,670	1,808,155
Pittsburgh	2,260,930	880,649
Portland, Me.	118,000	25,020
Rochester	564,845	666,554
Schenectady	96,830	91,529
Syracuse	302,315	262,325
Troy	261,405	71,104
Utica	78,565	215,525
Wilkes-Barre	118,002	84,030
Worcester	592,735	254,160

Taking the cities of what may be designated as the Middle States, out of twenty-seven reporting twenty-three show increases and four decreases with a resultant gain of 28.14 per cent. Since the labor troubles in Chicago were settled increased activity has been a feature of its building operations and the gain over September a year ago is decidedly marked. Cincinnati, Cleveland, Indianapolis, Kansas City, Milwaukee and Toledo also show appreciable gains over last year.

CITIES IN MIDDLE STATES

	September, 1915	September, 1914
Akron	$381,925	$286,375
Cedar Rapids	129,000	86,000
Canton	340,525	102,200
Chicago	8,569,600	4,925,900
Cincinnati	1,264,444	665,608
Cleveland	2,356,620	2,132,970

CITIES IN MIDDLE STATES—(*Continued*)

	September, 1915	September, 1914
Columbus	504,710	491,725
Dayton	191,975	42,785
Des Moines	218,470	380,650
Duluth	285,321	187,829
Fort Wayne	155,245	122,860
Grand Rapids	205,813	427,624
Indianapolis	1,255,792	411,723
Kansas City, Mo.	778,425	565,035
Lincoln	125,713	93,650
Milwaukee	2,961,938	1,207,087
Minneapolis	945,730	881,275
Omaha	359,055	312,360
Peoria	266,140	136,750
St. Joseph	99,035	26,172
St. Louis	800,185	669,032
St. Paul	1,038,229	2,297,675
Sioux City	171,950	84,050
Sprinffield	70,640	139,230
Toledo	701,648	360,358
Topeka	59,897	41,575
Youngstown	164,430	459,025

In the southern section of the country the cities reporting, indicate a gain as compared with September last year of 53 per cent, this being largely due to the greater amount of new work projected in Atlanta, Baltimore, Louisville, New Orleans, Washington and Richmond, Va.

CITIES IN SOUTHERN STATES

	September, 1915	September, 1914
Atlanta	$677,745	$177,804
Baltimore	595,393	390,811
Birmingham	157,934	162,315
Chattanooga	51,165	128,810
Louisville	506,110	236,430
Memphis	209,535	132,160
Nashville	84,286	77,505
New Orleans	315,819	159,277
Norfolk, Va.	132,432	58,731
Oklahoma	132,745	29,450
Richmond	242,763	136,799
San Antonio	164,535	188,125
Shreveport	47,389	58,077
Tampa	111,975	153,975
Washington	1,850,442	390,511

As intimated above the only section of the country showing decreased activity is the extreme west where the loss reported is 24.27 per cent. The heaviest shrinkages are found in Denver, Los Angeles, Salt Lake City and Sacramento, while the marked increases are San Francisco and Spokane.

CITIES IN WESTERN STATES

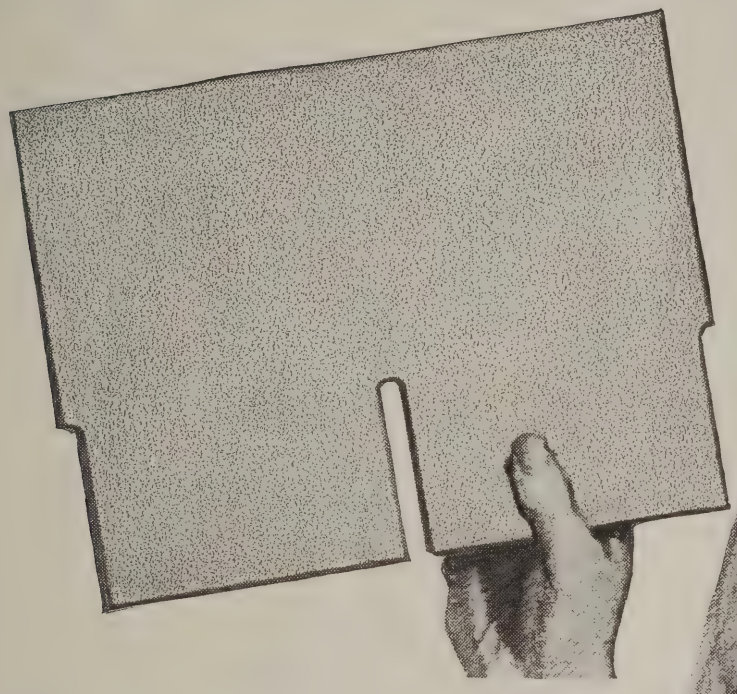
	September, 1915	September, 1914
Denver	$194,260	$1,007,130
Los Angeles	828,758	1,106,064
Portland, Ore.	303,570	309,140
Sacramento	67,923	132,766
Salt Lake City	284,309	481,850
San Francisco	1,086,912	830,081
Seattle	471,615	556,560
Spokane	143,120	40,690

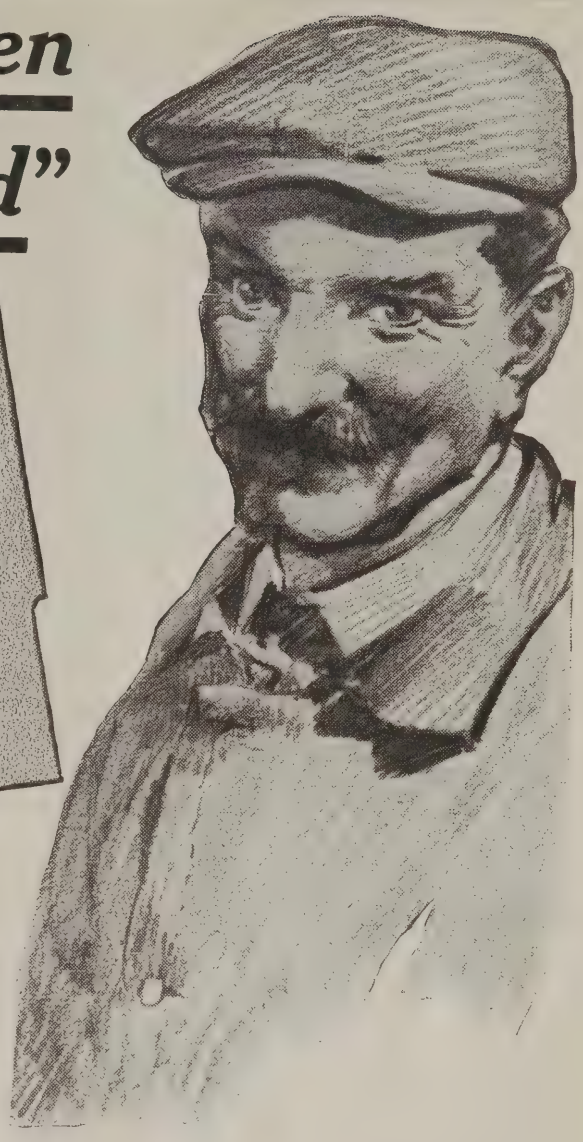
For the nine months of the current year the cities reporting indicate a loss of about 5 per cent, which, all things considered, is encouraging.

Among the building improvements just completed in Jersey City, N. J., is a mammoth warehouse for Joseph T. Ryerson & Son, covering a ground area 350 x 250 ft. It is of skeleton steel construction covered with corrugated steel siding and has a cement tile roof with large skylight area let-in so as to provide adequate lighting facilities. The building is divided into four open spans each 250 ft. long.

Two of these spans are 100 ft. in width and two of them are 75 ft. each in width.

"My Sale of *Wooden* Shingles *Increased*"





"When I first took on the NEPONSET Shingle I expected it would cut into my wooden shingle business. Instead, NEPONSET shingles advertised *me* and *my business*, and *increased* my wooden shingle sales.

NEPONSET Shingles

PATENTED

are not ordinary composition shingles. They are built up *individually*. Made in pairs to reduce laying-costs.

"The greatest roofing development of the 20th century. Any carpenter would be foolish to overlook this new *yet time-tested* product."

The same materials are used in **Neponset** Shingles as in the well-known **PAROID** Roofing, also used in **Neponset** Proslate, the highest grade colored ready roofing ever made. **Neponset** Wall Board, **Neponset** Waterproof Building Paper and **Neponset** Floor Covering are other well-known **Neponset** products.

COUPON

BIRD & SON, Dept. B, East Walpole, Mass.

Please send me information regarding the NEPONSET Shingle. This does not obligate me *in any way* whatever. Also send copy of your booklet "Repairing and Building."

Name.....

Address.....

COUPON

Our Factory, Canton, Ohio

Berger's Metal Lumber passed test presented by New York City Bldg. Dept.

Test house during the fire. Note presence of excessive moisture

Why Berger's Metal Lumber Pressed Steel Floor Construction Stands the Test.

OFFICIALLY TESTED FIREPROOF — BERGER'S METAL LUMBER — PRESSED STEEL FLOOR CONSTRUCTION (Patented)

There exist very good scientific reasons for the results obtained in the severe fire, water and load tests to which Berger's Metal Lumber Pressed Steel Sections have been subjected.

The sections are made from a special analysis, double grained steel, designed to resist great heat and still retain its full strength.

Berger's Metal Lumber is an economical, practical, fireproof construction for all classes of buildings. Easy to install. Goes in like wood.

Our many years of actual manufacturing practice have given us the knowledge and experience absolutely essential to obtain a construction which has the

Proper Analysis of Steel *and*

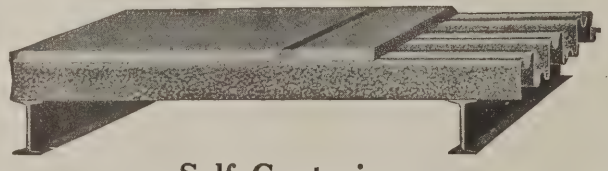
Proper Rolling with a double grain
" Heat treatment
" Method of producing the section
" Form of section
" Relation of flanges to web
" Weight and dimensions of section

Proper Spacing of joists in construction
" Bridging and location of same
" Paint for the product
" Method of installation
" Mixture and application of concrete

Write for Complete Report L.B. of Fire, Water and Load Tests of Berger's Metal Lumber Pressed Steel Floor Construction.

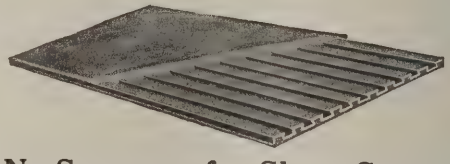
Reinforcing and Metal Building Materials That Save Money

Removable or Permanent



Self-Centering

Berger's Multiplex Steel Plates save concrete and minimize dead load in heavy service floor, roof, bridge and sidewalk construction. Easily installed with unskilled labor. Particularly desirable where no plaster ceilings are wanted or required, or where the underside cannot be readily plastered. 16 to 24 gauge sheet metal; lengths up to 10 ft.



No Supports for Short Spans

Berger's Ferro-Lithic Reinforcing Plates are used extensively for reinforcing and centering concrete slabs for flat or arched roofs and floors, sidings of buildings, sidewalks, etc. Made of a series of dovetailed members running full length of the sheet, which stiffen the plate and furnish a key for bonding the concrete and plaster.

The Following Berger Products Will Save You Money Also:

Pressed Steel Cores, for displacing concrete and forming concrete joists in light and heavy floor construction designed for long spans; *Rib-Trus Reinforcing and Furring Plates,* for reinforcing thin concrete slabs for roofs, sidewalls, partitions and floors; *Expanded Metal Lath,* for stucco walls, partitions, ceilings and every other kind of work requiring plaster; *Corner Beads,* for protecting exposed corners of plastered walls. *Write for full information.*

See Sweet's, pages 210 and 220-224. Write for further information about the products that interest you, and send for our Special Catalog F. B.

The Berger Mfg. Co., Canton, Ohio

Address Our Nearest Branch for Best Service:

Boston New York Philadelphia Chicago St. Louis Minneapolis San Francisco

Export Department: Berger Building, New York City, U. S. A.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

A Crack-Proof Lathing Material

One of the very latest candidates for popular favor in the way of a lathing material is that which we illustrate in Fig. 1 of the engravings. It is known as sheet lathing and comes in rolls of 25 sq. yd. a roll, weighing less than 60 lb. The material is cut from the

Fig. 1—Showing Method of Applying the Crack-Proof Lathing Material

roll into sheets the full length of the studs and beams to be covered, thus allowing it to be applied in large units. The edges of all sheets are lapped 2 in., thus giving an undivided plastering surface and avoiding the "joint cracks" often seen in plastered walls and ceilings. This new surface for plastering is being introduced to the attention of mechanics and builders by the Sheet Lathing Corporation, 2532 East 177th Street, New York City, and the statement is made that by reason of its light weight and handy form a very large saving is effected by its use on a lathing job. The claim is also made that it is economical as to the amount of plaster required. Builders and plasterers who have used the material in houses erected three and four years ago have reported to the manufacturers that it has given excellent results and the plaster finish to-day is in fine condition and without cracks. This sheet lathing was originated by Frederick L. Kane, who drew upon many years experience in the manufacture of plaster board for his ideas, the chief purpose being to produce a surface or base for hard wall plaster that would be correct in principle without the drawbacks of the old style forms of lathing, while at the same time permitting better plastering of walls and ceilings at reduced cost and in less time. The Sheet Lathing Corporation is distributing circulars giving full directions for applying this material, the directions covering those for the lather as well as for the plasterer.

All-Metal Weather Strips

The All-Metal Weather Strip Company, 226 West Madison street, Chicago, Ill., is distributing a circular calling attention to the metal weather strips which it is offering and for which strong claims are made. The modern way of selling by mail has placed metal weather strips within the reach of all, and the company promises a thorough course of training on the installation of the equipment without charge. These weather strips are made entirely of zinc or bronze and are installed in such a way that they do not wear out. They are invisible when the window or door is closed and do not disfigure the woodwork of the finest houses. Satisfactory results for the equipment are guaranteed in every case by J. D. Pierce, president of the All-Metal Weather Strip Company, provided in the installation the mechanic follows the complete instructions which are furnished. A profitable business is available for the builder, the carpenter, or builders' supply man in towns not already covered, by taking contracts for the equipment of doors and windows.

Berger's "Classik" Steel Ceiling

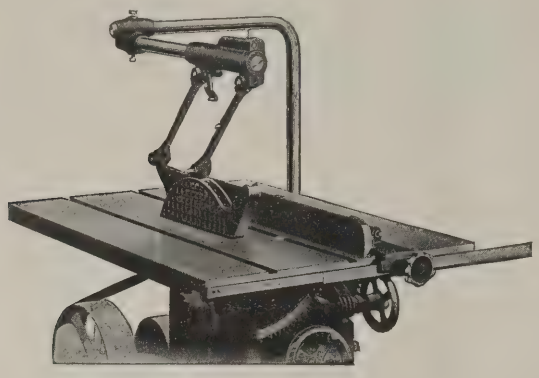
An exceedingly attractive example of the use of ornamental steel ceiling in a lodge room is illustrated in Fig. 2, the picture representing the interior of the I. O. O. F. lodge room at Des Moines, Iowa. The deep and clean-cut embossing is particularly noticeable and pleasing to those who appreciate beauty in structural designs, and realize the skillful artisanship which has entered into its production. The ceiling shown in the picture is the "Classik" steel ceiling made by the Berger Mfg. Company, Canton, Ohio. The company has

Fig. 2—Interior View of Lodge Room in Des Moines, Showing Berger's "Classik" Steel Ceiling

recently issued a monograph entitled, "Decorative Suggestions" which, in simple comprehensive manner, advises the best color schemes to be used in decorating ceilings. This monograph is mailed free to any reader of the paper who may be interested in steel ceilings.

New Guard for Saw Tables

Now that the "Safety First" slogan is so rapidly spreading over the country it is interesting to note a new safety guard for saw tables which has just been



New Guard for Saw Tables—Fig. 3—The Guard in Place for Work

placed upon the market by the Crescent Machine Company, 206 Main Street, Leetonia, Ohio, and views of which are presented herewith. This guard is readily adaptable for use on any make of saw table, its construction being such that the guard will automatically return to the table after lumber has been passed through

Fig. 4—The Guard Raised Above the Table

the machine, as shown in Fig. 3. If, for any reason, it is desirable to have the guard held up out of the way, as in Fig. 4, this may be accomplished by means of a latch which holds it suspended above the table while the pressure of the finger on the latch instantly releases it so that it returns again to the protected position without further attention on the part of the operator. When, for any reason, it may be necessary

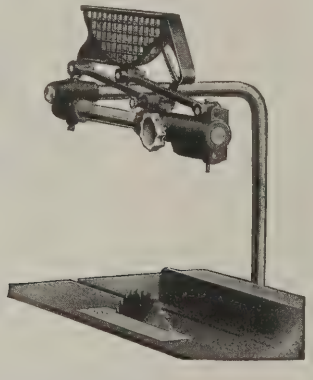


Fig. 5—The Guard Swung Entirely Out of Position

or desirable to swing the guard entirely out of position, as indicated in Fig. 5, this is accomplished by loosening the hand wheel on the main shaft that holds the guard.

Architectural Sheet Metal Work

We have received from Miller & Doing, 83 Washington Street, Brooklyn, N. Y., a copy of an exceedingly attractive catalog illustrating a great variety of architectural sheet metal ornaments and statuary turned out by this enterprising concern. The illustrations presented are halftone engravings made from photographs of the finished goods so that the architect, contractor and builder may be able to gain an excellent idea of the appearance of the different styles. The goods include among others modillions and brackets, rosettes of various kinds, moldings, scroll enrichments, garlands and festoons, shields, finials, capitals, crestings, balusters, urns, etc.

Swan Tools at Panama Exposition

From the standpoint of the building mechanic, one of the most attractive and interesting exhibits at the Panama-Pacific Exposition in San Francisco is that of the James Swan Company, Seymour, Conn. This display, a general view of which is shown in Fig. 6, is composed of ten boards 40 in. high and 21 in. wide. They are placed in holders that are made to reverse, while the trade mark—a large white swan, clearly indi-

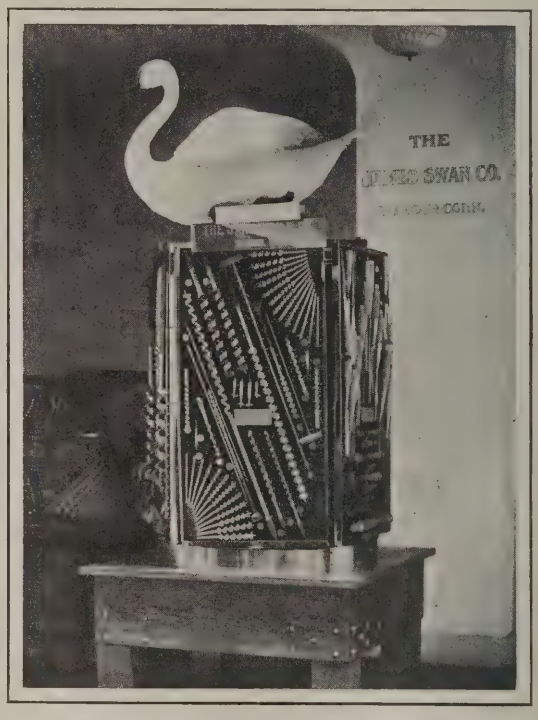


Fig. 6—View of the Swan Tool Exhibit at the Panama Exposition

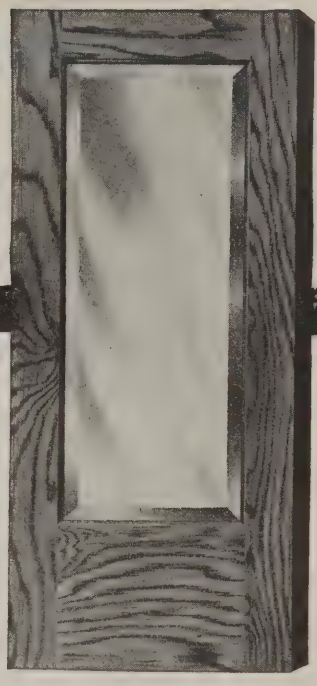
cated in the picture—makes a complete circle. The holders are driven by a motor, and on the swan's arrival to the front, it acts as trade mark over each board as the board reverses, thus showing the inner side of the holder. The display always shows five boards, but a change at each turn of the trade mark overhead requires ten turns in order to make a complete showing of each tool at the front. We understand that the goods of the company has been awarded two gold medals for merit and quality.

How Carpenters and Builders May Increase Their Winter Business

The movement toward providing winter work for carpenters has in the past few years worked a noticeable change in the building trades. The live builder is making himself busy twelve months a year, making a profit every day instead of living all winter on his summer earnings and starting out in the spring no further ahead than the year before. One danger seems to be in embracing outside work that is foreign to the regular building line. Extra work in winter that has to do with the building business in some way is always desirable. The builder remains in his own element, working in a familiar line, with his same old customers as patrons. One of the opportunities offered is linked

(*Continued on page* 78)

Buy Your Doors Wholesale From America's Biggest Door Stock! Get The Gordon-Van Tine Prices!



WE CARRY one of the **largest, best assorted** and **most up-to-date door stocks** in the entire world. Page after page in our big catalog is devoted **entirely** to

Inside and Front Doors in Every Size and Design

and all at **"mill-direct-to-you" prices.** On your next job, get our **wholesale figues** on the doors you need. Put us to the **test** on this **one** item and you will become one of our regular customers the same as over **10,000 other contractors, carpenters and builders** now are.

CRAFTSMAN "D"—Oak

SIZE	Craftsman "D" Oak
2-8 x 6-8	$ 9.95
3-0 x 7-0	10.25

MAJESTIC—Oak

SIZE	E 101 Majestic Oak	E 105 La Fayette Pine
2-8x6-8	$10.35	$ 9.05
3-0x7-0	12.40	11.60

Shipped Anywhere, Safe, Prompt Delivery and Satisfaction Guaranteed or Money Back.

Write for our big, profusely illustrated, 156 page catalog, of 5,000 Bargains in Building Material. Everything of newest, latest design.

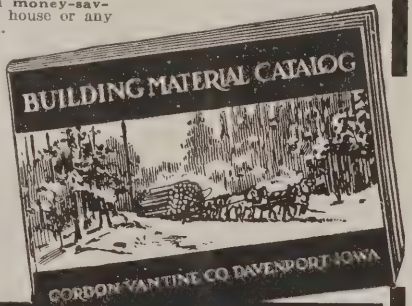
This is the book that **makes** prices for the building trade—**the book from which over 10,000 contractors and builders buy regularly.** Supplies **every** building need. Packed with **money-saving bargains.** A complete house or any part of a house at **wholesale.**

GET THIS BOOK —FREE

Put it to work saving money for you, Mr. Builder! Put this book on your desk and use it as **your price-maker.**

It saves money for others. Make it save for **you!** Send the coupon NOW!

If you also want our $10,000 Book of "Quality-Home Plans," showing over 150 homes, illustrations, (many in color), plans and exact prices, just ask for it. **Free** on request.



FREE CATALOG REMINDER

1-PANEL DOOR **2-PANEL DOOR**

1 AND 2-PANEL FIR DOORS 1⅜ Inch Thick

SIZE Width ft. in.	Height ft. in.	No. E 250 Fir, One Panel 1⅜ Inches Thick	No. E 252 Fir, Two Panel 1⅜ Inch Thick
2-0	6-0	$1.80	$1.62
2-0	6-6	2.01	1.81
2-0	6-8	2.06	1.85
2-6	6-6	2.04	1.84
2-6	6-8	2.09	1.88
2-8	6-8	2.10	1.89
2-6	7-0	2.40	2.16
2-8	7-0	2.46	2.21
3-0	7-0	2.64	2.38

GORDON-VAN TINE CO.
792 Federal St., Davenport, Iowa

Gentlemen:—Please send the books checked below.

☐ Building Material {Lumber, Millwork, Hardware, Paints, etc.} ☐ Plan Book

Name.....

Address.....

Occupation.....

Gordon-Van Tine Co., 792 Federal St., Davenport, Iowa

Established Over Half a Century

with the modern trend of public opinion toward sanitation. The action of Boards of Health in condemning the outdoor privy and the cesspool as unhealthful nuisances has brought onto the market the chemical closet. One of these, the Ro-San Indoor Closet, is being installed in nearly every State in the Union by builders, who find they can sell it at a handsome profit and give the owner a more sanitary, comfortable, convenient closet, at a lower price, than by building for him a wooden privy.

Here seems to be an excellent chance for profitable winter work. The closets may be installed anywhere in the house, and the builder can set them up or he can leave that to the owner. The builder is the logical man to handle the closet. In any building without sewer connection, the Ro-San closet is a great convenience, and the builder who sells it has behind him the local health officer and the influence of modern thought on sanitation. The Ro-San Indoor Closet is built entirely of metal, and all parts exposed to view in the house are heavily enameled. All outside parts are rustproofed. The seat is of aluminum or wood, as preferred, and an airtight metal cover fits down over it. Air admitted to the outer casing at the floor level passes over the container and out through the vent pipe, which is led into a chimney, a stove-pipe or directly outdoors through wall or roof. A little chemical placed in water in the container, destroys life matter in the contents, rendering them absolutely harmless. The closet is claimed to be odorless and may be set in a clothes closet, a hall, under the stairs or in a spare room. The contents may be emptied once a month, a task no more unpleasant than carrying the ashes from a stove. The Rowe Sanitary Manufacturing Co., 211-D, Sixth Street, Detroit, Mich., has just issued a new catalogue relating to this closet and the system involved, and a copy may be obtained on application.

Driving Woodworking Machines by Electric Motors

One of the most popular methods at present in vogue for driving woodworking machinery is by the use of individual electric motors, this method tending to

Fig. 7—Electric Motor for Driving Wood Working Machinery

economy, cleanliness and safety. Some very interesting information regarding electric motors especially adapted for this purpose is to be found in an attractive catalog just sent out by Curtis & Carhart, Inc., 150 Chambers Street, New York City, and in which is illustrated the Colonial motors and generators. In presenting the catalog the idea is to put forth such descriptive matter as will illustrate the endeavor of the manufacturers to attain the advanced styles of construction as applying to electrical equipment. Colonial motors are built of the highest grade of steel and iron adapted to electrical purposes as well as the best quality of phosphor bronze, hard drawn copper, brass castings, wire insulating materials and pure amber mica. The point is made that the Colonial apparatus is designed to meet the requirements of every conceivable purpose of machinery equipment and many types of machine are made. In Fig. 7 of the accompanying illustrations we show a general view of one of the motors ready for installation. We understand that the company maintains an engineering staff in addition to its Sales Department

(*Continued on page* 80)

for the purpose of giving, free of charge, to prospective purchasers of Colonial motors, the service of experts in motor drive for woodworking and other machines. These experts carefully investigate the working conditions in the plant and recommend the proper motor in speed, windings, control and other essential details, to perform the work required.

Improvement in Hand Saws

No doubt every carpenter and builder is frequently annoyed by having his hand saw slip to the floor when having no need of it at the moment and he leans it against some convenient nearby object. It may be necessary for him to use both hands for some other part of the work and he places the saw conveniently at hand so that when needed he can readily reach it. If, however, it slips to the floor, he is possibly obliged to let go of the work he is holding and stoop down to

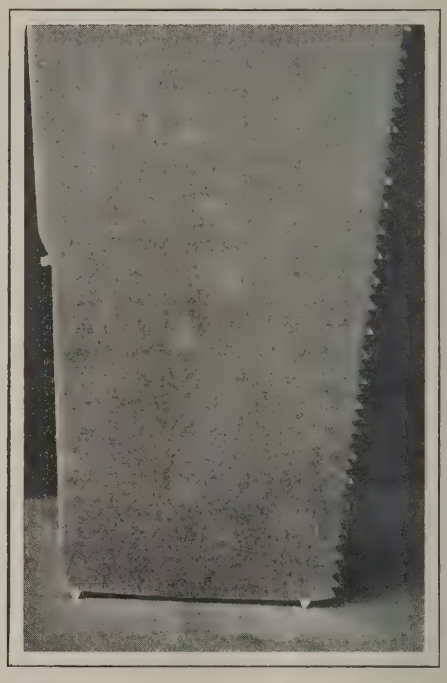


Fig. 8—Improvement in Hand Saws

recover the saw which is both a nuisance and a waste of time. One of the practical men in the trade realizing this trouble has introduced an improvement to overcome it, consisting of two spurs on the end of the blade which stick into the floor and keep the saw from slipping, while at the same time holding it in an upright position. This improvement has been recently patented by Howard N. Weddle, Dinuba, Cal., and an idea of it may be gained from an inspection of Fig. — presented herewith. The point is made that the improvement accomplishes the purpose in a way which can only be appreciated by an actual trial.

Catalog of "American" Woodworking Machinery

There has just come to our desk a copy of a catalog of 320 pages devoted to an exposition of the merits of the "American" lines of woodworking machinery, which is without doubt one of the most compact, convenient and comprehensive ever issued. The covers are illuminated in a way much resembling a work of fiction, the design being worked out in colors with striking effects. The printing is on a fine quality of paper and the half-tone illustrations made from photographs of the various machines appear to excellent advantage. The work is referred to by the American Woodworking Machinery Company, Rochester, N. Y., as a handy edition of its general catalogue, and in connection with each machine is given a description thus making it very convenient for reference on the part of the builder and woodworker. The company states that it is the constant aim to produce

(*Continued on page* 82)

the latest improved labor-saving machines and to this end employment is given to the most skilled mechanics and the best of materials are used. The early portion of the catalogue is devoted to a telegraphic code which will be found exceedingly convenient by those requiring urgent shipments and this is sufficiently extensive to occupy something like fifteen pages. The list of goods illustrated and described are varied covering a range sufficient to meet all reasonable requirements. In connection with the descriptive data are tables showing weights, floor space required, horse power, and code words. At the close of the catalog are rules for calculating the speed of drums or pulleys, also American standards for matched lumber, together with a comprehensive index. There are also a number of blank pages for purposes of memoranda.

Portable Hand Planer and Jointer

A machine which is attracting no little attention on the part of carpenters and builders throughout the country is the hand planer and jointer mounted on its own column, with self-contained motor drive, which we illustrate in Fig. 9 of the engravings. The machine is all ready to set up and operate by simply connecting to the feed wires. It is of such a nature that it can be utilized in any place most convenient in the shop or out on a job. We understand that it is quite common practice to place the machine on a low truck and move it about the shop wherever it may be most convenient for

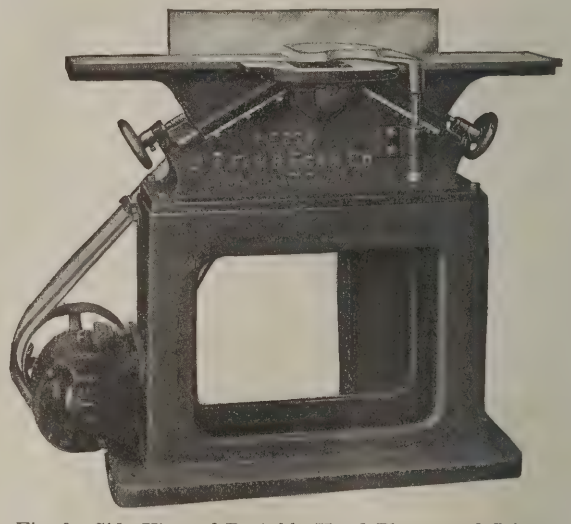


Fig. 9—Side View of Portable Hand Planer and Jointer

the work in hand. The machine carries a 6½ in. safety cutter head, has removable steel lips in the table and the fence angles to 45 deg. It is adjustable entirely across the table so that jointing can be done at any place on the head which makes a uniform wear on the knives and eliminates any possibility of the cylinder springing or breaking. The tables are adjusted on long continuous inclines by hand wheel and screw, self-locking in any position. The machine is made by J. A. Fay & Egan Company, 221 to 241 West Front Street, Cincinnati, Ohio, who point out that a big advantage of it is the fact of its being mounted on its own cast iron base and therefore a space does not have to be cleared for it on a bench.

Modern Furnace Heating

A very timely catalogue of forty-eight pages bearing the above title has just been sent out by the Hess Warming and Ventilating Company, 1201 Tacoma Building, Chicago, Ill. The matter consists essentially of a handbook on furnace heating for dwellings, churches, stores, etc., together with a description of the Hess steel furnaces and circulating room heaters with illustrations and prices of registers, pipes and other fittings. The point is made that a good furnace is more economical of fuel than either steam or hot water and diffuses heat immediately upon lighting the fire. It is also claimed to provide better ventilation, a better circulation of air

(*Continued on page* 84)

and being adapted to all classes of buildings except of the largest size, is easier and quicker to install than steam or hot water. The entire matter is arranged in a way which cannot fail to strongly appeal to the contracting builder and the house owner. Price lists are given together with tables of dimensions, etc.

The Mueller Pipeless Furnace

One of the new products just placed on the market by the L. J. Mueller Furnace Co., 190 Reed Street, Milwaukee, Wis., is a pipeless cast-iron furnace, a broken view of which showing the internal arrangement of parts is presented in Fig. 10. This furnace has been designed to meet the requirements of houses already built where the installation of a furnace with pipes and risers would be a difficult and costly job. It is said to be far superior to stove heating, and is also recommended for installation in new residences where the owner desires an efficient, economical equipment, at a reasonable cost. The furnace is surrounded by a triple casing. The outer casing is of heavy galvanized iron, while those on the inside are of rust-resisting steel placed 1 in. apart. The inner casing terminates about 1 ft. from the cellar bottom, so that the air will circulate beneath, and is about 4 in. from the outer casing. Both casings are carried up to the floor and are fastened to the register, which consists of two parts, an inner circle surrounded by an outside border. The warm air from the furnace passes up through the center while the cold air is returned to the furnace through the outer compartment of the register. The furnace is of all cast-iron construction. The fire pot is extra heavy and is provided with a deep ashpit. The grates are of the triangular pattern. The central register used in this equipment is a patented design made in four sizes, 30 x 30 in., 35 x 35 in., 40 x 40 in., and 45 x 45 in., the diameters of the warm-air flues being 22, 26, 30 and 36 in., respectively.

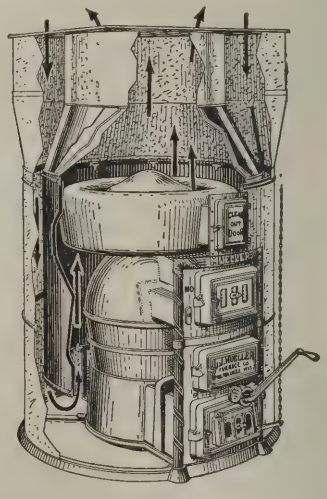


Fig. 10—Broken View Showing the Mueller Pipeless Furnace

A Rapid Nailing Device

Those members of the building trades who do much shingling are without doubt interested in what is known as the Pearson automatic nailer—a simple device having a magazine that holds a quantity of nails. In the bottom of the magazine are three slots in which the nails drop, hanging by the heads. These are fed automatically to the discharge end which securely holds one nail at a time ready for driving. Above the head of the nail is a plunger which when hit by the hammer drives the nail a sufficient distance into the wood so that another blow or two of the hammer will send it home. Nails can be driven through tin without difficulty by using this machine. The head of the plunger is so large that there is no lost motion through missing the nail. The claim is made by the makers, the Pearson

(*Continued on page* 86)

Mfg. Co., Robbinsdale, Minn., that in time saved one should be able to pay for a machine many times over in a busy season.

Large Shipment of Edwards Forged Steel Trucks

Much has been said and printed concerning the efficient methods used by government engineers in building the Panama Canal, accomplishing that in which others have failed. Even now after the work has been done the same thrifty practice is prominent in the operation of the Canal until the most efficient and prominent devices appear to have been used—and among others will be found the Edwards forged steel trucks, a view of one of which is shown in Fig. 11. At the outset twelve Edwards trucks were ordered and shipped to the Canal for investigation. They were placed under constant duty for a period of several months at which time an order was placed for 138 trucks, which proves conclusively that they stand the strain. The trucks are made by the Edwards Mfg. Company, 423 to 443 Eggleston Avenue, Cincinnati, Ohio, which has issued an attractive booklet on trucks, and a copy will be mailed free to any reader of THE BUILDING AGE on request to the address given.

Fig. 11. General View of the Edwards Truck

Cypress—"The Wood Eternal"

Architects and builders throughout the country are likely to be interested in a little volume which is being sent out by the Southern Cypress Manufacturers' Association of New Orleans, La., and Jacksonville, Fla., dealing as it does with the United States Government report on cypress—"the wood eternal." It is in fact Vol. 1 of the Cypress Pocket Library, and tells a great deal that is valuable to know concerning the wood named. There is also a list of volumes covering the many uses for which cypress is well adapted and copies of which may be obtained without charge by writing to the address given. The association does not, it is pointed out, recommend the use of cypress without discrimination, for cypress is not the best wood for *every* use. Where, however, it is appropriate it is so emphatically well adapted for the purpose that many should know about it instead of the comparatively few who heretofore have profited by their special knowledge.

Hand Drills Nos. 104 and 304

There has just been added to the already extensive assortment of mechanic's tools placed on the market by the Millers Falls Company, Millers Falls, Mass.,

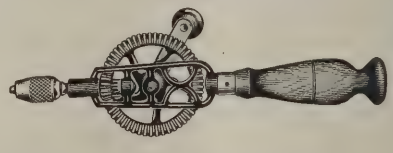


Fig. 12—General View of Hand Drill

two practical hand drills known as Nos. 104 and 304. One special feature is a chuck of new design that is compact and accurate in centering drills. It has three jaws, each in its separate solid socket and opened by springs that are concealed and it is claimed will not get out of order. The capacity is for round shanks from 0 to 3/16 in. diameter. Another feature is the main handle which is of graceful and convenient shape as may be gathered from an inspection of Fig. 12, which represents one of the drills in question. This handle is made from birch with deep mahogany stain and has screw cap with hollow receptacle containing eight woodboring points. The gears are cut, the small ones being of steel and the large gear white nickeled. No. 104 drill has a malleable iron frame and one small gear

(*Continued on page* 88)

while No. 304 has a solid steel frame with both working and idler small gears. The simplicity of design of the two drills carries with it a moderate price. The boxes in which the drills are sent out bear the striking new labels recently adapted by the company.

"American Universal" Floor Surfacing Machine

The surfacing machine illustrated in Fig. 13 and designed for use upon new or old wood floors has just been placed on the market by the American Floor Surfacing Machine Company, 521 South St. Clair Street, Toledo, Ohio. The machine embodies many interesting features representing the results of years of experience in the development of floor surfacing machines. Among the more important features of the "American Universal," as it is known, is the self-adjustment which eliminates all springs and complications, the mounting of the machine being such as to cause it to respond to irregularities of the floor surface, thus leaving the machine solid on its own truck wheels and overcoming the objectionable necessity of regulating the cut by tilting the entire machine. The "American Universal" is equipped with a sanding roll 12 in. long, making 725 revolutions per minute. The roll is mounted on pivoted arms which keep the drive chain always in direct line with the sanding drum irrespective of the position of the drum and overcoming, it is claimed, all trace of vibration while at the same time prolonging the life of the chain, sprockets and bearings. The machine is equipped with the well known S.K.F. self-adjusting ball bearings. The vacuum cleaner placed directly behind the sanding roll is automatic in action and gathers all particles of dust, storing it in a sack attached to the machine. The latter is supplied with an extra sanding drum smaller than the main roller and is used for finishing the edge of the floor close up to the wall where the main sanding drum cannot reach.

Fig. 13—The "American Universal" Floor Surfacing Machine

Something About "Con-Ser-Tex"

William L. Barrell Co., 8 Thomas Street, New York City, calls attention to what is regarded as a solution of all roofing problems and is therefore of special interest to builders, carpenter-contractors, roofers and house owners generally. It is known as "Con-Ser-Tex," which is a specially woven canvas roofing chemically treated to preserve the fiber from mildew and the detrimental action of the oil in point. It is claimed to be water-proof as well as rot-proof, weather and wear-proof, and when properly laid is said to last as long as the house itself. It is particularly adapted for roofs of bungalows, porch-decks, sleeping balconies, etc., and

(*Continued on page* 90)

December

April

SAVES IDLE DAYS

Why not be *busy* all year round? No need to stop work for rainy, damp, cold days. Any time is a fit time to use Cornell-Wood-Board. No waiting while plaster is drying. No delays because of unfavorable weather.

CORNELL-WOOD-BOARD

is guaranteed not to warp, buckle, crack, chip or fall.

It is unaffected by heat or cold, and practically unaffected by moisture in the air. There is a lot of repair work in your neighborhood—and a lot of remodeling—that can just as well be handled this time of the year when work is dull. You can do work of this kind economically and profitably with Cornell-Wood-Board. You apply it right over cracking, crumbling walls of lath and plaster. It makes possible attractive paneling and beam ceiling effects.

Write for samples and complete information on Cornell-Wood-Board.

CORNELL-WOOD-BOARD

Sales Office Dept. 106 Insurance Exchange Bldg.

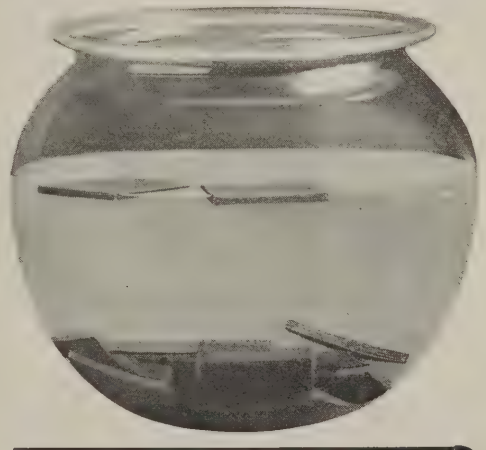
Mill at Cornell, Wis. **CHICAGO, ILL.**

Manufactured by Cornell Wood Products Co., Cornell, Wis.
C. O. Frisbie, President.

Permanent Exhibits: Insurance Exchange Bldg., Chicago, Ill. National Soo Line Bldg., Minneapolis, Minn.

Mr. Contractor and Mr. Builder:—

This Simple Test Tells Which is Best



It is decidedly to your interest to know what brand of Wall Board is best. You are often asked the question, "Which is best?" when different building materials are being considered. Isn't it a great satisfaction to be able to answer with positive assurance? When it comes to Wall Board, if you will make this simple test, you will KNOW ABSOLUTELY what brand to use and recommend.

First, secure all the different samples that it is possible for you to get. Cut them of equal size and place in a receptacle containing water. At first, all of them will remain afloat, but gradually they will commence to sink. We give herewith an actual photograph and result of a test conducted last February, March and April.

This table tells the story. You will notice that **ROBERDS' IDEAL WALL BOARD** remained afloat **35 days longer** than its nearest competitor.

Roberds' Ideal Wall Board	60 days 10 hrs.
2nd Wall Board	25 days 23 hrs.
3rd Wall Board	8 days 22 hrs.
4th Wall Board	8 days 4 hrs.
5th Wall Board	8 days 4 hrs.
6th Wall Board	7 days 18 hrs.
7th Wall Board	4 days 3 hrs.
8th Wall Board	4 days .. hrs.
9th Wall Board	3 days 22 hrs.
10th Wall Board	2 days 3 hrs.
11th Wall Board	. days 23 hrs.
12th Wall Board	. days 22 hrs.

ROBERDS IDEAL

Guaranteed Moisture Proof **Wall Board**

is the result of 21 years' experience. It consists of four sheets of macerated wood fibre cemented together with three layers of specially prepared asphalt cement, making seven distinct layers. It is absolutely moisture-proof, fire-retarding, will not check nor crack, will not mar nor crumble, and can be kalsomined, stenciled, painted or papered. Finished in gray, tan, mission and quarter sawed oak.

The use of ROBERDS will not only add dollars to your business, but add fame to your reputation. Just fill out the coupon and get our Free Package of samples, prices, etc.

THE ROBERDS MFG. CO. 101 Railroad Avenue **Marion, Ind.**

FREE Package COUPON

Roberds' Mfg. Co., 101 Railroad Ave., Marion, Indiana.

Gentlemen:—Please send me, prepaid, your Free Package of samples and oblige

Name .....

Town .....

State .....

is giving great satisfaction to those who have practically demonstrated its merits. It is referred to as attractive, profitable, serviceable and economical.

The New Smith-Chicago Concrete Mixerette

We are advised that the T. L. Smith Company, 3120-G Hadley Street, Milwaukee, Wis., has just added to its well known line of Smith-Chicago concrete mixers a new type of machine built in four sizes, the smallest being known as the 3-ft. low-charging Mixerette. This is an adaptation of the company's well known mixer, the low-charging platform taking the place of either the gated batch hopper or the gear-driven power charger. The other three sizes—the 4-ft., the 6-ft. and the 9-ft. mixers are constructed along the lines of the company's Standard Smith-Chicago mixers with the addition of the low-charging feature. The low-charging Mixerette retains the dust proof casing which completely encircles the drum and encloses the big gear ring and

Fig. 14—The New Smith-Chicago Concrete Mixerette

driving pinion. This casing is said to eliminate main rollers, shafts and boxes and is said to be proving to be one of the greatest concrete mixer improvements of the times. Another strong feature to which the company refers is the rapid discharge which is secured by means of the concave drum head which permits the long steep-angled discharge chute to swing far into the drum and still maintain a deep angle. It actually penetrates the drum beyond the center so that as the deep scoop-like blades empty the material every particle is caught and discharged with great rapidity. The vital feature of the machine, however, is the low-charging device, the height of the loading platform being only 18 in. This enables barrows to be easily run up a short plank to the low platform where they are up-ended and emptied directly into the drum. In order to accomplish this the feed end of the drum is left almost entirely open as shown in Fig. 14 of the cuts. A narrow hopper is added so that as the wheelbarrow is up-ended, it fits into the hopper, thus greatly facilitating the work. The claim is also made that the machine will not splash, this result being secured by increasing the width of the drum and adding a short wing at the feed side of the blades.

TRADE NOTES

The Oak Floor Manufacturers' Association, formerly at 822 Hammond Building, Detroit, Mich., has removed to 1358 Conway Building, Chicago, Ill.

The last issue of the *Medusa Review*, the house organ of the Sandusky Portland Cement Company, Sandusky, Ohio, contains some unusually interesting matter relative to building construction and the part which has been played therein by Medusa water-proofed white Portland cement. The illustrations are halftone engravings of attractive buildings of various kinds in different parts of the country and in connection with them brief descriptive particulars are given. Reference is also made to the demand for Medusa cement in foreign countries, the statement being made that recent shipments went to Brazil, Java, Uruguay, England, Portugal and Argentine Republic.

(*Continued on page* 92)

The Stanley Works, New Britain, Conn., makes announcement that Stanley butts, hinges and other wrought steel products received Gold Medal of Honor at the Panama-Pacific International Exposition, and this is only one of the many awards which Stanley products have received. We understand that their first Medal of Honor was received from the American Institute in 1855.

James L. Taylor Mfg. Company, Poughkeepsie, N. Y., is distributing a folder illustrating and describing the clamp known as the "Taylor No. 25." What this particular clamp can accomplish is interestingly set forth in narrative form, and its merits are such as to interest a large class of readers.

G. Alexander Wright, architect and building surveyor, 354 Pine Street, San Francisco, will be glad to receive for his office files late catalogues, particulars of labor saving devices and modern methods, especially applicable to up-to-date warehouse and factory construction.

Buck Bros. of Millburg, Mass., make announcement that they are the original makers of Buck edge tools and have bought out the business of Charles Buck Edge Tool Company.

TABLE OF CONTENTS FOR DECEMBER, 1915

SINGLE COPIES 20 CENTS

PUBLISHED MONTHLY $2.00 A YEAR IN UNITED STATES AND MEXICO
CANADA $2.50 A YEAR ALL OTHER COUNTRIES $3.00

Entered at the New York Post Office as Second-class Mail Matter.

DAVID WILLIAMS COMPANY, 239 WEST 39th STREET, NEW YORK

REAL ESTATE TRUST BUILDING, PHILADELPHIA PARK BUILDING, PITTSBURGH OTIS BUILDING, CHICAGO
MERCANTILE LIBRARY BUILDING, CINCINNATI NEW ENGLAND BUILDING, CLEVELAND

W. H. TAYLOR, President and Treasurer CHAS. G. PHILLIPS, Vice-President FRITZ J. FRANK, Secretary
M. C. ROBBINS, General Manager HENRY COLWELL, Editor J. B. BENNETT, Business Manager

THE BUILDING AGE

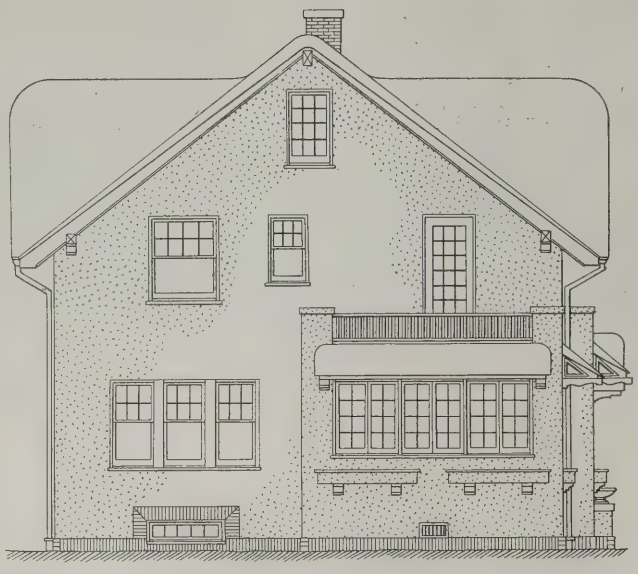
NEW YORK, DECEMBER, 1915

Residence of an Illinois Architect

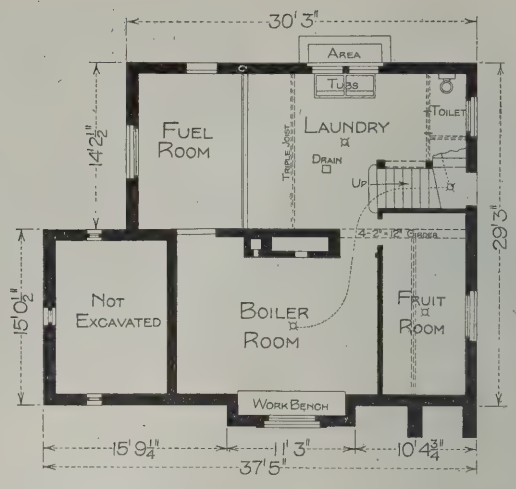
The Thatched Roof Effect a Noticeable Feature—A Well Arranged Interior—Some Details of Construction

NO doubt the thought often occurs to many a reader, more especially those who may be sufficiently interested in the plans of buildings to carefully study those appearing from month to month in the columns of THE BUILDING AGE, what sort of a house would an architect design for his own occupancy? Naturally the answers to this would be varied, depending altogether upon the architect himself and upon the requirements of his family, but it may be taken for granted that the plan would embody a compact and convenient arrangement with all those little refinements which go to make up the ideal home. Just what a Western architect, in conjunction with his business associate, designed and erected for himself a little more than a year ago constitutes the basis of the present article. The various pictures upon this and the following pages afford an excellent idea of the ex-

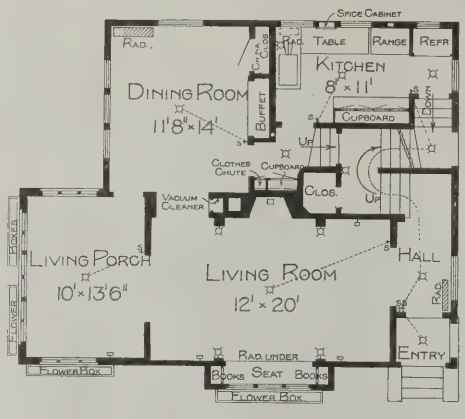
View in the Living Room of the House Looking Toward the Sun Parlor



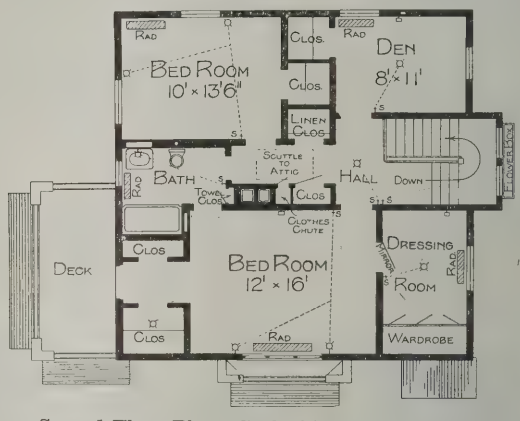
Left Side or South Elevation—Scale 3/32 In. to the Foot



Foundation Plan—Scale 1/16 In. to the Foot

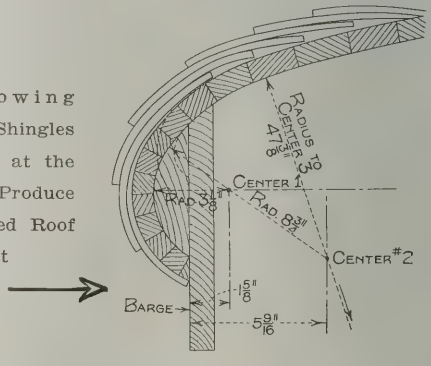


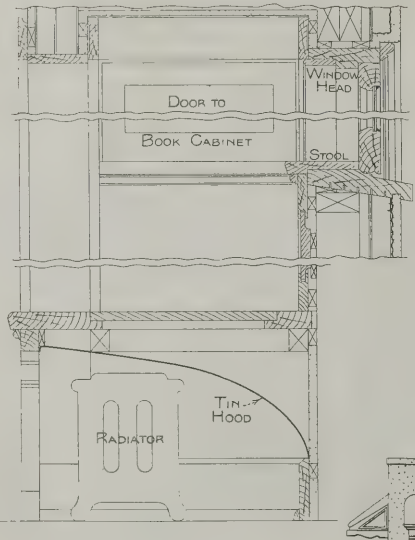
First Floor Plan—Scale 1/16 In. to the Foot



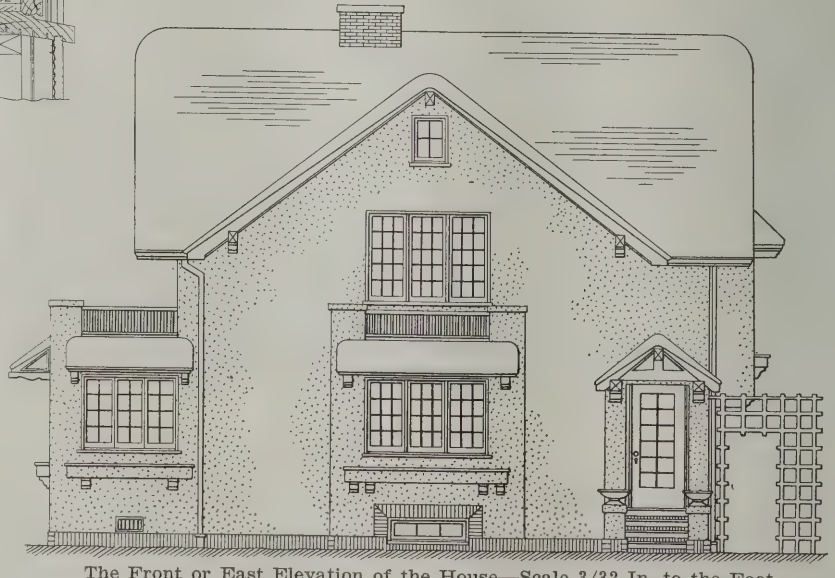
Second Floor Plan—Scale 1/16 In. to the Foot

Detail Showing How the Shingles Are Placed at the Gables to Produce the Thatched Roof Effect





Vertical Section Through Window Seat and Window in the Living Room—Scale ¾ In. to the Foot



The Front or East Elevation of the House—Scale 3/32 In. to the Foot

Residence of an Illinois Architect—Plans, Elevations and Miscellaneous Constructive Details

ternal appearance of the finished dwelling as well as of the interior of some of the principal rooms. The floor plans clearly indicate the arrangement, while the numerous details explain features of construction.

Externally one of the noticeable features is the thatched effect of the roof—a style of treatment that seems to be growing in favor in many sections of the country. A detail showing just how this effect is produced, and the peculiar placing of the shingles, is presented on the facing page.

It will be seen from an inspection of the floor plans that the main entrance is at the extreme right hand instead of being in the center of the front as is often the case with many dwellings. The arrangement affords opportunity for a large living room with open fireplace and mantel, while at the left is an inclosed living porch or sun parlor. Beyond is the dining room, having direct communication with the living room and also with the kitchen through a short passageway. The stair arrangement is unique, and the kitchen at the rear is equipped with all the modern conveniences. One of the pictures given in connection with this article represents a view in the kitchen, clearly showing the compact arrangement of the utilities.

On the second floor, the front of the house is given up to a large sleeping room with commodious dressing room equipped with wardrobe, closets, etc. The stairs, which are lighted at the landing by a large double window, are so placed as to reduce the space required for the hall on the second floor to a minimum, yet giving ready access to the sleeping rooms, the den and to the bath room. There is a linen closet conveniently placed with regard to bed rooms as well as to the bath, while a clothes chute provides convenient means for transferring the wash to the laundry in the basement.

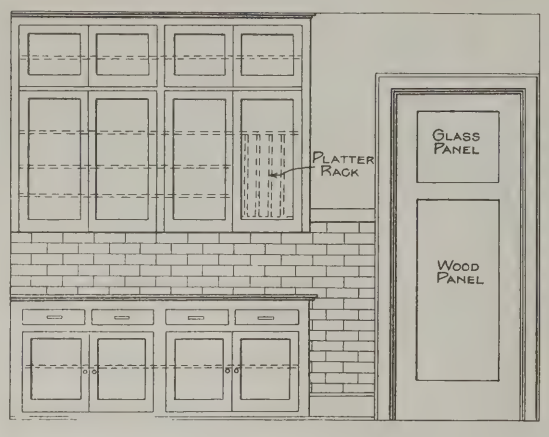
The foundation walls to grade are of concrete 12 in. thick, mixed in the proportions of one part Portland cement to eight parts washed gravel. The concrete footings under bearing walls project 4 in. on each side of the wall, and those under the chimney project 6 in. beyond the extreme dimensions of it.

The basement floor is of concrete 3½ in. thick with a 1:2 top coating ½ in. thick, making a total thickness of 4 in.

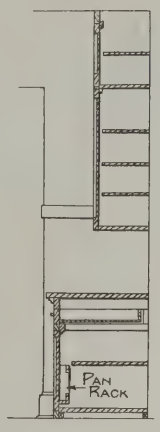
The dwelling is of frame construction with the first and second floor joists 2 x 10 in. and the attic floor joist 2 x 6 in., all placed 16 in. on centers. The wall plate consists of two pieces of 2 x 4 in. and the studs are also 2 x 4 in., placed 16 in. on centers. The studs are doubled at dormers and openings and every fourth joist of the first floor is anchored into the masonry wall with a strap-iron anchor. The floor joists of the porches are 2 x 8 in., placed 16 in. on centers. The wall plate is anchored with ⅝-in. bolts 2 ft. long and placed 5 ft. apart. A 2 x 4-in. plate is laid under all inside partitions. Trusses made of 2 x 4-in. pieces are used over all first story doors and 2 x 10-in. trussed headers over the wide openings. All joists are stiffened with rows of 1 x 3-in. bridging.

The exterior frame is covered with No. 2 shiplap carrying a layer of Neponset black waterproof paper over which 2 x 2-in. strips were placed to receive the metal lath carrying the outside coating of cement. The lathing on ceilings of porches and on the frame walls is No. 26 gage painted ingot iron lath. The outside coating consists of Woods' Crystallite waterproof stucco, the foundation of

Residence of an Illinois Architect—View in the Living Room Looking Toward the Front Entrance

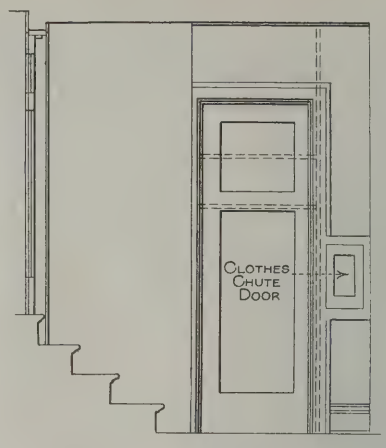


East Elevation in the Kitchen Looking Toward Cupboard and Door to Dining Room Passage

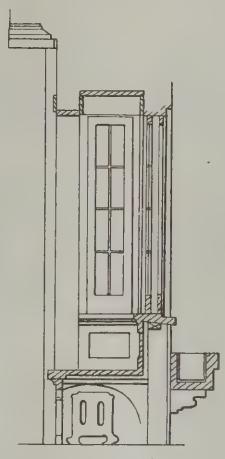


Vertical Section

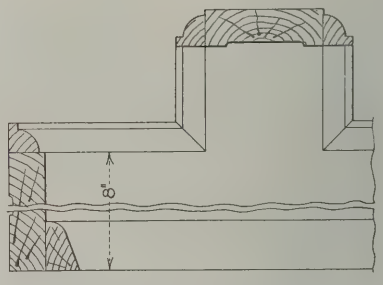
Scale ¼ In. to the Foot



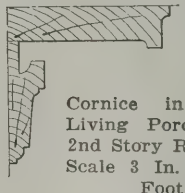
Sectional Elevation in the Kitchen Passage



Elevation and Section of East Side of the Living Room—Scale ¼ In. to the Foot

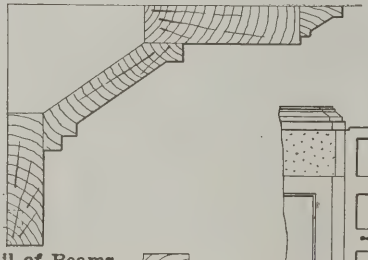


Base and Paneling in Dining Room —Scale 3 In. to the Foot



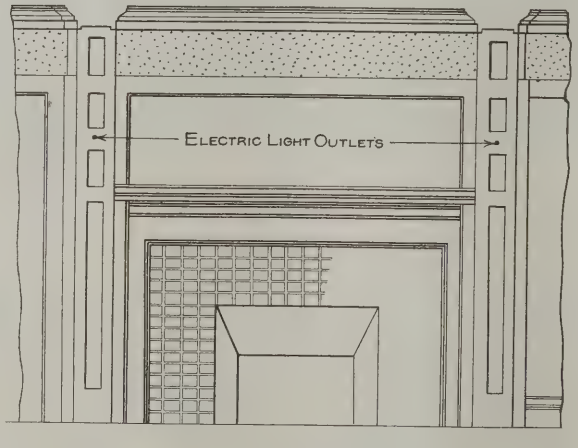
Cornice in Hall, Living Porch and 2nd Story Rooms—Scale 3 In. to the Foot

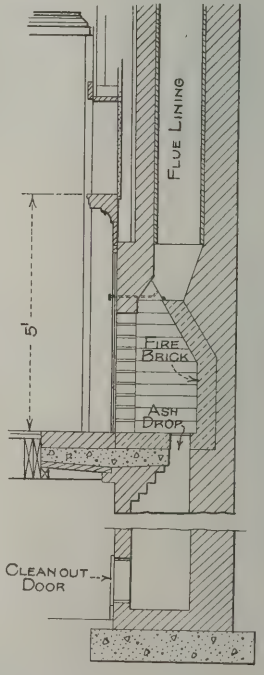
Trim in Living and Dining Rooms, Hall and Living Porch



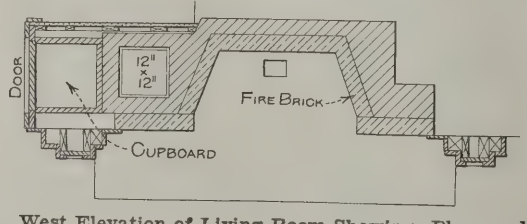
Detail of Beams and Cornice in Living and Dining Rooms

Trim in Kitchen and 2nd Story





Typical Base Scale 3 In. to the Foot



West Elevation of Living Room Showing Plan and Section of the Fireplace—Scale ¼ In. to the Foot

Residence of an Illinois Architect—Miscellaneous Constructive Details

Front View of the Residence of William H. Schulzke at Moline, Ill., Showing Picturesque Setting

which is made of Medusa waterproofed white Portland cement.

The roof is framed in the usual way with rafters and sheathing cut for the thatched curved gables as shown in the details. The main roof dormers and porches are tightly sheathed with 1 x 8-in. boards which carry Creo-Dipt thatched shingles laid according to the makers' directions. The deck roof over the sun parlor is covered with Par-a-dux roofing painted with white lead and oil.

Another View of the Exterior of the House Showing the Sun Parlor; Also the Thatched Roof Effect

The rooms in the first and second stories, except the kitchen, have double floors, the rough or subfloor consisting of No. 2 shiplap laid diagonally, over which is a layer of heavy building felt. The finish floors are first quality kiln dried red oak with 2-in. face. The kitchen and pantries have 4-in. dressed and matched flooring instead of the rough floor.

The porch floors are ⅞ x 3¼-in. fir, laid in lead and oil. The living porch floor is the same as that in the living room. The living porch trim is first quality yellow pine. The porch ceiling is plastered on metal lath.

The double hung window frames have 1¾-in. cypress sills, 1⅛-in. pulley stiles and ⅞-in. blind stops and hanging stiles. The living porch frames are 1¾-in. rabbeted white pine for Whitney sash.

The entrance door frame is of 2½-in. rabbeted oak and the interior door frames are ⅞ in. with stops nailed on. The sash for all double hung windows is of white pine 1⅜ in. thick finished for varnish on the first floor and for paint on the second floor. The windows have lip sash and are double hung on Samson sash cord, and have solid bronze front, steel pin axle pulleys properly balanced with iron weights.

North Elevation of Dining Room Showing Built-in Buffet

The kitchen portion and hall are finished in white pine, while the first and second story, the main hall, the living room and dining room are finished in red oak. The front bedroom and dressing room on the second floor are finished in first quality kiln dried red gum, while the other bedroom, the den and the bath room are finished in white pine and painted.

The main entrance door is of solid oak, glazed and 2 in. thick. The French doors leading to the living porch are of veneered oak 1¾ in. thick. The doors of the kitchen portion are 1¾-in. white pine. The remainder of the first story doors are of veneered oak 1¾ in. thick and of the "Morgan" type. The second-story bedroom doors are of the same type and are also 1¾ in. thick.

The finish of the main stairs leading from the first floor to the second is of red oak.

The built-in buffet in the dining room is plain red oak with leaded glass doors. A beveled plate mirror is placed at the back of the counter shelf and the sides of the buffet are finished with wood panels.

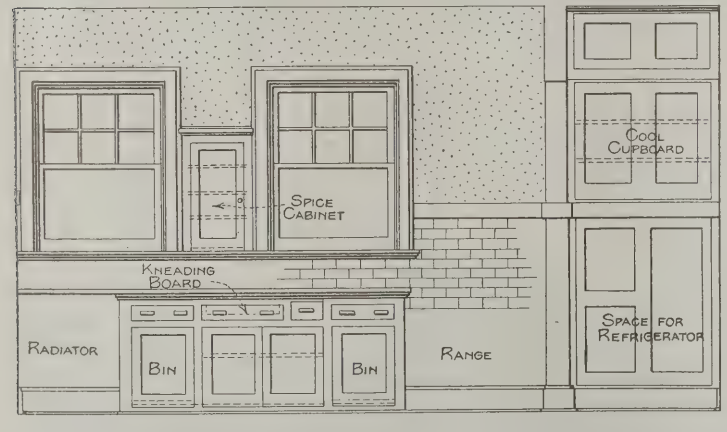
The window seat in the living room is also of plain red oak, and at the ends of the seat are book cases as shown in the details and provided with leaded glass doors. The fireplace mantel is of plain red oak and there is a small closet in the paneled opening to the dining room.

All cupboards, excepting the wardrobes in the dressing room on the second floor, which are of red gum, are of selected white pine. The cupboard doors have wood panels, and where drawers are shown the body of them is made of basswood with white pine facing.

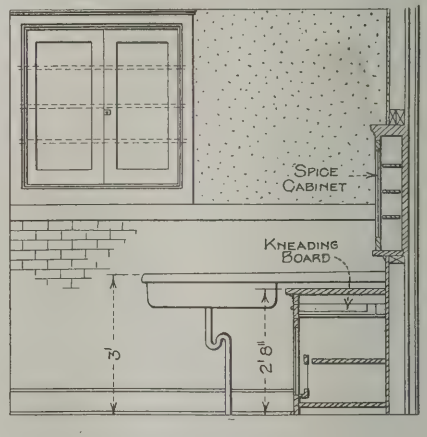
The bath room floor is of ½ x 1-in. herringbone white encaustic tile with 6-in. sanitary base, laid on a bed of a 1:3 concrete mixture 2½ in. thick. The bath room fixtures include closet, lavatory and a Standard recessed tub with a shower spray overhead. In the bath room is a medicine cabinet with beveled plate mirror. There is also a towel closet located as shown on the plan.

All walls, partitions and ceilings throughout the first and second stories, as well as hall and stairway to the basement and to the attic are lathed and plastered with two-coat work and having a white hard finish, excepting in the hall, living room, dining room and living porch, where there is a sand finish. The wainscoting in the kitchen, the pantry and the bath room are of Keene's cement troweled to a hard smooth finish and marked off in imitation of 2 x 6-in. tile.

The house is wired for electric lighting and the



West Elevation of Kitchen Pantry



South Elevation of Kitchen

Scale ¼ In. to the Foot

Residence of an Illinois Architect—Various Constructive Details

heating is by means of the Moline vacuum vapor system with thermostatic control. An Arco boiler having a capacity of 800 sq. ft. is installed and is covered with two coats of plastic asbestos cement 1½ in. thick, firmly secured by metal lath and then

Residence of an Illinois Architect—Interior View of One of the Bedrooms

protected by 6-oz. ducking pasted on over the cement. The Moline system provides easy, rapid and noiseless circulation of steam at very low pressure and without the use of pumps for exhausting the air and without the use of automatic valves or traps at the radiators or coils. The amount of radiation is such as to heat all rooms provided with radiators to 70 deg. when the outside temperature is 20 deg. below zero.

The house is equipped with piping and wiring for a vacuum cleaning plant installed in the basement. The laundry is equipped with electrical washer and ironing machines. Hot water is supplied in the winter through a coil in the boiler, and when the boiler is not in operation a Pittsburgh Instantaneous Heater takes care of the hot-water supply in a most satisfactory manner.

Another interesting feature in connection with this architect's home is that the flower boxes, shown on the exterior, are watered with sprinkler pipes with the valve control inside of the house regulating the flow and volume of water for the boxes.

The house occupies a lot 96½ x 135 ft. in size at the corner of Sixteenth Avenue and Twenty-seventh Street, Moline, Ill., and faces east. It has been so designed that an addition can be made on the north side at any time without interfering with the beauty of the design and giving the house an added capacity of two rooms and a porch.

The home is that of William H. Schulzke, a graduate of the Architectural Department of the University of Illinois and later of the Department of Landscape Architecture of the same university. The plans for shrubbery and landscape gardening of the house in question involved an outlay of about $600. The house itself cost about $7,000 and was designed by the architectural firm of Whitsitt & Schulzke with offices in the Peoples Bank Building, Moline, Ill.

The contractor for the general construction work was P. H. Lorenz; for the heating and plumbing, the Moline Heating & Construction Co.; for the painting, Fred Woodruff, and for the electrical work, the Tri-City Electric Co., all of Moline, Ill.

Architect's Right to Compensation

When an owner of a building to be constructed vests power in a representative or committee to arrange for the construction of a building not exceeding a certain cost, an architect employed by the representative or committee cannot recover compensation for preparing plans for a building to cost more than the fixed amount. This is the gist of a recent decision by the Supreme Court of Arkansas in the case of Swearingen vs. C. W. Bulger & Son, 176 Southwestern Reporter, 328.

A church organization at Hot Springs, Ark., authorized a committee to erect a building at a cost not exceeding $50,000, and that committee employed plaintiffs, a Dallas firm of architects, to prepare plans and specifications at an agreed compensation of 3 per cent, or $1,500. The work was done and $500 was paid, but the church refused to pay the remaining $1,000 on the undisputed ground that the plans and specifications prepared and delivered called for a building to cost much in excess of $50,000. Thereupon plaintiffs brought suit against both the church and the members of the committee. The trial court refused to hold the church corporation liable, on the ground that the committee had no authority to bind the corporation in relation to plans and specifications for a building costing more than $50,000, and this decision was affirmed by the Supreme Court. But the higher court finds that the trial court committed error in awarding judgment in favor of plaintiffs and against the members of the committee as individuals. This judgment proceeded upon the theory that by knowingly exceeding their authority, and by making the $500 payment, the committee ren-

The Kitchen with its Built-in Conveniences

dered themselves individually liable. The Supreme Court says on this point:

"If plaintiffs possessed knowledge of the fact that the members of the committee had exceeded the authority actually conferred upon them by their principal, ratification by payment of a portion of the agreed price did not render the committee personally responsible. On the contrary, any payment made by the church, with the knowledge

of the fact that the authority conferred had been exceeded, constituted ratification which relieved the committee from existing personal liability by reason of having exceeded the authority of their principal without the knowledge of the plaintiffs. This results from the fact that the principal and agent cannot both be liable on the contract, and if the former is liable, the latter is not."

The important lesson to architects from this decision may be summed up in a suggestion that in dealing with a building committee or other representative of the owner, an architect should ascertain and observe any limitations that may exist upon the authority of the committee or representative.

A. L. H. STREET.

Building Methods in Italy

In spite of war conditions there is considerable building being carried on in Naples. Apartment houses are being erected in the Vomero, Piedegrotto, Torretto, and other sections, one of the finest being in course of erection near the center of the city on the reclaimed ground to the south of Santa Lucia. The contracts for these works, however, were all let before the European hostilities began.

Construction work in Naples is different from that in the United States, the only point of resemblance being in the use of steel and iron girders for strengthening the floors of buildings. Window frames, doors, and shutters are all made by hand, and there would seem to be an opportunity in this business for American enterprise. American flooring and trimmings are used, but up to the present American builders' hardware and plumbing goods have not been able to compete in Naples with European products on account of prices.

Influence of Temperature on the Strength of Concrete

The Engineering Experiment Station of the University of Illinois has just issued in bulletin form some very interesting data covering the influence of temperature upon the strength of concrete by A. B. McDaniel. The data is that obtained from three series of tests of concrete cubes and cylinders and is given in the form of curves which show the relation between strength and temperature at different ages. This Bulletin cannot fail to prove valuable to the building contractor, the engineer and others engaged or interested in construction work for information regarding the strength which may be expected of ordinary concrete under different age and temperature conditions as well as the time of the removal of the forms. We understand that copies of this Bulletin, known as No. 81, may be obtained free on application to F. M. Goss, director of Engineering Experiment Station, University of Illinois, Urbana, Ill.

During the first nine months of 1915 plans were filed in the Borough of Queens, Greater New York, for 4299 buildings, estimated to cost $15,307,000, which is 560 more buildings than were projected during the same period of 1914.

Convention of National Association of Builders' Exchanges

Official announcement has been made that the annual convention of the National Association of Builders' Exchanges of the United States of America will be held in Baltimore, Md., Feb. 22, 23 and 24, 1916. The headquarters will be at the Hotel Emerson and the business sessions will also be held at the same place. The announcement is signed by President H. L. Lewman and Secretary J. M. Vollmer, who extend a cordial invitation to all interested in building construction to attend the sessions of the convention.

The National Association has been presented with a medal by the president of the Panama-Pacific International Exposition—an honor which is said never before to have been conferred upon a builders' organization. The presentation was made to H. L. Lewman, president of the National Association of Builders' Exchanges, who attended the recent Builders' Congress in San Francisco, and made a most interesting address.

New York's Most Costly Apartment House

Some time ago we presented in these columns a typical plan of an apartment house in New York City, the rental of a floor in which was given as $25,000 a year. The latest addition to the colony of apartment dwellings is now in course of construction on one of the most desirable corners of Fifth Avenue, and the rental of some of the suites in this building is placed at $30,000 per year.

It is a 12-story structure and, according to the builders, will, when completed "be the last word in apartment house construction." It has been designed by Architect J. E. R. Carpenter and the drawings show three types of apartments—one occupying the entire floor consisting of about thirty rooms with nine bath rooms; a duplex apartment of nineteen rooms and seven baths and also a simplex apartment of from fourteen rooms up, having five or six bath rooms. In each suite the foyer will open into a large gallery or salon 47.6 x 13 ft. in area, thus giving an impressive entrance. The living rooms are 20 x 30 ft. in area and there will be libraries, conservatories and other features, making the entertaining space unusually large. The living room, the library and some of the sleeping rooms have open fireplaces and special attention has been given in providing ample and comfortable servants' quarters.

The building will represent an expenditure of approximately $1,000,000, exclusive of the land, and we understand the schedule of rents varies from $10,000 for the small simplex apartments to $21,000 for the duplex apartments, while approximately $30,000 will be the price of an entire floor.

Instruction in Concrete Work

The State Manual Training Normal School at Pittsburg, Kan., has added a course in concrete work, this step having been taken by the school owing to the fact that concrete is coming into universal use, especially on farms where foundations, troughs, silos, floors, and even some of the buildings themselves are being built of this material.

Details of a Built-in China Case

Data of a Practical Nature Which Cannot Fail to Interest the Carpenter and Joiner

By W. S. Wilkin

THE subject of the present article is what is generally known as a china case, and in the sketches are shown front and end elevations with various sections indicating the method of construction in such a way as to be readily understood by almost any carpenter. Most of the new homes built at the present day have one or more cases or cabinets built-in as a part of the house equipment. with tilting bins, a china case or sideboard and perhaps other things which the jobbing carpenter may suggest to the owner.

The time of the year is at hand when work outside will be a little slack owing to the weather and for other reasons, but the carpenter can often secure little jobs of this kind to help him through the winter months. If he has no shop of his own he

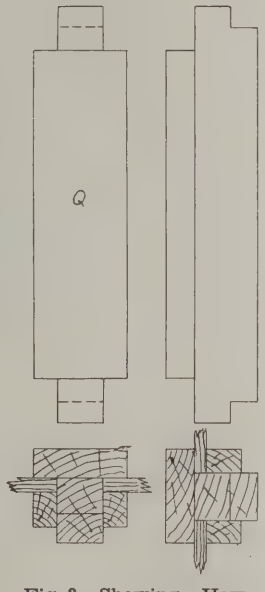


Fig. 2—Showing How to Frame the Bars

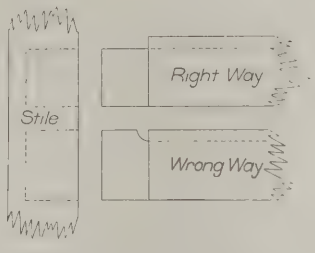


Fig. 3—Right and Wrong Way of Framing Stiles and Rails

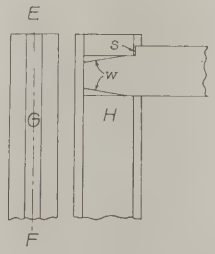


Fig. 4—One Style of Door Joint

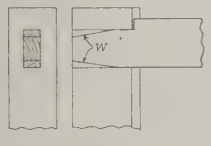


Fig. 5—Same Style of Joint as in Fig. 4 Only Stiles Are Not Plowed

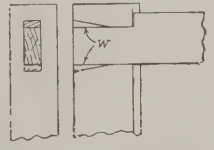


Fig. 6—Joint with Tapered Mortise

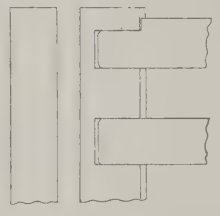


Fig. 7—Style of Joint Used in Making Good Doors

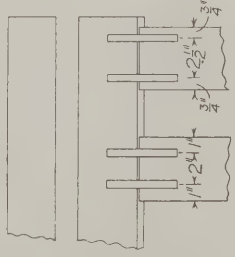


Fig. 8—Construction of the Dowel Joint

Details of a Built-in China Case as Illustrated by the Author of This Article

There are many designs, sizes and shapes built to fit various places and they are to be found not only in the new houses but in many of the old ones. The latter may be quite as good, and oftimes are better than the new houses only they require a little overhauling, adding a window here and a door there, a sink in the kitchen, or a kitchen cabinet will either have to make the fixtures by hand right on the job, or have them made by a shop or mill doing custom work. If, however, he has a little shop with only a saw in it, and that be a good one, he can get out all kinds of work with the additional aid of his hand tools.

The china case here shown has been designed so

that it can be worked out with only a saw table, planer and mortiser. If dressed lumber is bought the planer will be needed only for sizing and dressing down the panels, which are ⅜ in. The lumber *can* be worked without sizing, but it makes a little more work in cleaning up after it has been put together. In this case the widest panel is about 6¾ in., which could be sized very well with a 14-in. saw by turning the board over and ripping from both edges. Very often the saw table will have a hollow chisel mortiser attachment, and if not, a foot power mortiser will answer very well. All the rest of the machine work can be done on a good saw table.

The china case is not large, measuring only 3 ft. 6 in. by 7 ft. The base is 18 in. deep, the top 13 in. and it has paneled ends. The base is 2 ft. 8 in. high, though often made 3 ft. I regard the latter as a little too high, although it depends on the height of the person who is to use it.

Advantages of Having the Case Made by a Carpenter

One advantage in having such things as this case made by the carpenter is that it may be designed and built to suit the owner. Some times the cases are made 5 ft. wide and run clear to the ceiling and some times they fit in between a chimney and the wall, in which case a plain board can be used for the ends. Even if the ends are exposed a plain board does not look badly if not too wide. If the case runs to the ceiling the top may be set inside and a cove mold broke around the top.

The base has five drawers and one door with two vertical panels. The top has an open space above the counter of about 10 in., which gives the full width of the counter on which to place things. Above that a pair of doors is rabbeted together in the center, each having thirteen lights. For cheaper work one-light doors may be used.

The case is built in two sections, which makes it easy to handle. The stiles of the main frame are 3½ in., although they are often only 3 in., which will make the drawers a little wider. The top has one shelf nailed in and two are loose. Strips about ½ x 1 in. and notched out on one edge are set in the corners as shown at *M* in the end elevation. Where the dotted line appears a strip is run across the end of the case from one notch to the other and the shelf rests on it. The strips may be moved up or down as desired. A very good way is to use two screws in place of the ratchet strips, notching out the cross strip to fit over them. This saves cutting out the shelf in the corners, as indicated at *M*. Pins can be bought for that purpose, but I do not like them as they will not hold as well as screws.

The drawers have flush fronts and are provided with drawer pulls. If care is taken in fitting the fronts they can be made almost tight when all the way in and by beveling the front just a little they will be loose as soon as they are started out. A lip front can be used and will not require as much care in fitting.

Some Details of the Framing

The bar, *Q*, in Fig. 1, is shown one-half full size in Fig. 2. The latter is given in order to explain the correct way to frame the bars. The rest of the door is framed the same way. The stiles have a rabbet run the full length, ¼ x 11/16 in., and a little square glass mold ¼ x ⅜ in. set in. The rails are also rabbeted the full length, which takes ¼ in. from the width of the tenon and the stiles must be mortised accordingly.

It will be seen that the face of the bar in Fig. 2 is 1 in., but the rabbet on each edge cuts the tenon down to ½ in.; also the rails must be longer on the inside than they are on the outside, owing to the rabbet in the stile. This is something which requires quite a bit of care in working out. Some joiners will make the shoulders the same on both side of the rails, then they will have to stop-rabbet the stiles and cut the corners out with a chisel after they are put up. This makes extra work and gives the job a bad appearance. The joints should run straight through and not show any offsets.

The stiles and rails are plowed about ⅜ in. for the panels, which takes ⅜ in. from the width of the tenon. If plowed clear through, as they should be, the stiles must be mortised accordingly. Always arrange the mortise when possible so that it can be plowed or rabbeted clear through.

Right and Wrong Way of Doing the Work

In Fig. 3 is shown the right and wrong way to do this kind of work. A tenon is no stronger than its weakest place, so it will be seen one tenon is as strong as the other, but the wrong way requires a larger mortise, which makes the stile weaker. It is much easier to plow a rabbet clear through than it is to stop, as shown in the wrong way, and makes a much better job as the extra piece may split off and again it will not fit the mortise as it should. The tenons on the bottom rails on the front and end are shown by the dotted lines. It will be seen that the front rail has no plow and the tenon runs clear to the top edge.

The first thing to do in getting out work of this kind is to lay off a rod for height, width and depth, as shown. On the rod for the height all the mortises for the front are marked by *l*, while *k* marks the ones for the end. It will be seen that they do not come out alike owing to the difference in the width of the rails, some having a ¼-in. rabbet while others have a ⅜-in. plow. The front may be laid off on one side of the rod and then squared around and lay off the end on another side. The length of the panels, etc., are taken from this rod.

Getting Out the Various Parts

Get out the stiles about 1 in. longer than the rod shows and then saw off the lugs. After they are put together on another side of the rod lay off for the front and end, as shown. In the horizontal rod, Fig. 1, *a* indicates the front edge and ends of the counter; *b* the front edge and ends of the top of the case; *c* marks all the stiles of the frame while *d* marks all door stiles. Notice that the inside stiles of the glass doors lap over each other as indicated on the rod in the center about 5/16 in. or just enough for a rabbet.

From *g″* to *g′* is the length of the bottom shelf in the top part of the case and from *h′* to *h″* is the width of it. The length of the shelf in the bottom part of the case is indicated by *g*, *g′*, while *h*, *h″* is the width of it.

The two loose shelves must be a little longer so they will reach into the panels. The length of these shelves is indicated by *j j*, and the width by

h' h''. The muntins are indicated at *e*, while *f f* mark the width of all the panels.

The top and bottom parts of the case may be laid off on separate sides of the rod so as to keep the workmen from getting them confused, but when laid out full size on the rod they will not appear so confusing to the man doing the work.

A section of the drawers is shown at *p* and *o* of Fig. 1. The bottom shelves are set up a little and strips screwed on the inside to form a rabbet for the doors. Do not nail these strips in place, as the doors will jar them loose. Always cut the panels a little short so they will not strike the bottom of the mortise. In Figs. 9, 10, 11 and 12 is shown how a good tenon may be made with the saw. Have a flat table and a good square ripping fence; also a good saw. The saw can be filed so that it will do both the ripping and cutting off without changing saws. Have the rails square on the ends and cut the right length; then raise the saw, say, 3 in., as shown, and set the ripping fence 11/16 in. from the inside of the saw holding it, as indicated in Fig. 9, keeping the piece close against the fence. Now set the fence 5/16 in. from the outside of the saw, as in Fig. 10, and rip again. Now let the saw down to 5/16 in. and set the ripping fence 3 in. from the outside of the saw, and use the cut-off gage and cut, as shown in Fig. 11. Turn the piece over and cut as in Fig. 12. Now we have a good tenon and one that does not take very long to make.

The rabbeting may be done on the saw, and if we have dado cutters they can be put on for the plowing. If we have no cutters we can wabble the saw or can set it up and run all the pieces through once, then move the fence back a little, run again, and so continue until there is enough cut out.

On this kind of work it is always best to lay off a rod, as shown, before beginning work, as there is less liability of making mistakes. It requires care and accuracy to get out the work and have it go together as it should. Hinges should not be set by guess as we so often see done, but some rule should be followed. For example, line up the ends of the hinges with the rails, or if they have raised panels they may be lined up with the raising on the panels. With care in regard to the little details it will make a better looking job. It is not all in the design or material used that gives it a good appearance. Two men may do two jobs of the same kind and you can hardly tell wherein lies the difference, yet one looks

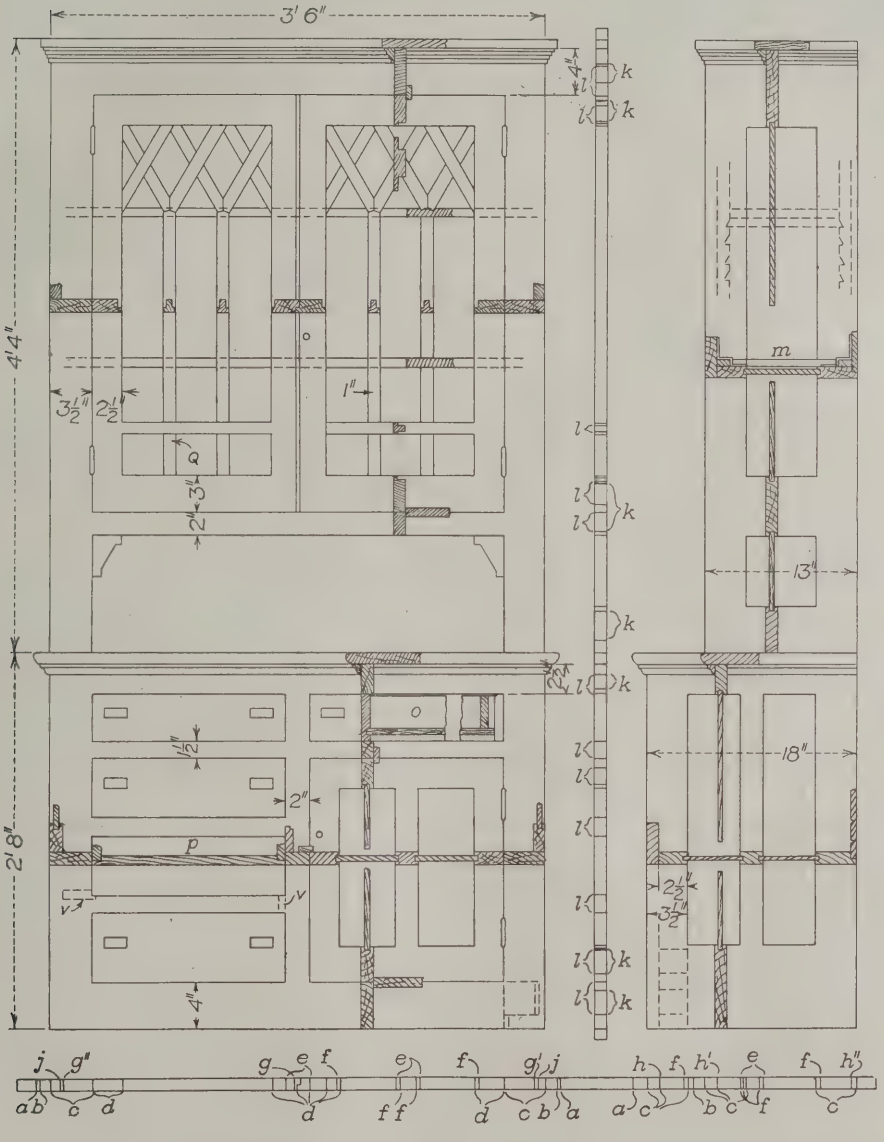


Fig. 1—Elevation and Section of the China Case—Scale ¾ In. to the Foot

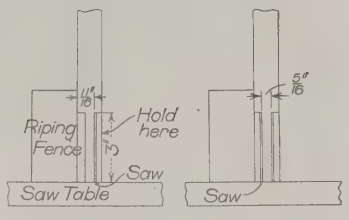


Fig. 9 Fig. 10

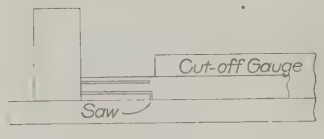


Fig. 11

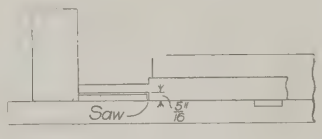


Fig. 12

Various Sketches Showing How a Good Tenon May Be Made Simply by the Use of a Saw

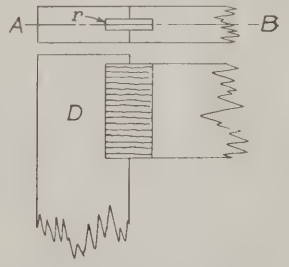


Fig. 13.—Joint Made with a Slip Tongue

Details of a Built-in China Case—As Contributed by W. S. Wilkin

much better than the other. My advice to the beginner is, learn to be accurate and neat and to do good work. The result will be success.

If the carpenter is not doing his own work of this kind it is often a good idea to make a detail of what is wanted and give it to the mill with the order and have the mill return the detail with the work. The mill men may know how to do a good job, but if there is no detail they will do it their own way or the customary way, and this may not be what you want when you get it.

How Wall Board May Be Utilized

I have been thinking that wall board, such as is advertised in THE BUILDING AGE, would make a good back for a case like this instead of using beaded ceiling as is generally employed. I have used it for medicine cabinets and for backing for mirrors. It often saves gluing up boards.

In Figs. 4, 5, 6, 7, and 8 are shown the joints used in doors. I am not showing any sticking panels or anything along that line as the joint is all I am trying to explain. In Fig. 4 the stiles are mortised clear through and the tenons are pointed and wedged, *w w w* showing the wedges, *G* the edge of the stile, and *H* the stile and rail split on the line *E F*. After the door is put together the stile is plowed down the edge and a strip fitted in, as shown, which hides the end of the tenon.

In Fig. 5 the same thing is shown, only the stiles are not plowed. It shows the end of the tenon and wedge.

In Fig. 6 is shown the same thing, only instead of pointing the tenon the mortise is tapered. This makes a much better job, although it is seldom used.

In Figs. 4 and 5 the wedges are inclined to crowd the tenon out, but in Fig. 6 they will draw it in.

Joint Used in Making Good Doors

Fig. 7 shows the joint used in most good doors. In this the tenon is made to closely fit the mortise and after it is started in then the glue is put on both sides of the tenon and the work clamped up till dry. One advantage of this joint is that while the tenon closely fits the mortise it is glued only close to the inside edge of the stile, and if the tenons are a little short, as shown, it leaves the stile free to come and go according to the weather and still will not break loose on the joint, which is sometimes the case when they are wedged tight at the outer edge of the stile.

Fig. 8 shows the dowel joint, which is used on many doors. While they hold very well their main advantage is cheapness. The rails can be cut from shorter stock and they can be bored cheaper than they can be mortised. There are lots of hardwood doors made this way. In 1⅜-in. doors the mortise is nearly always ⅜ in., and in 1¾-in. doors it is ½ in., and the plow for the panel is the same. In dowel doors the plow for the panel is hardly ever more than ¼ in. for 1⅜-in. doors, and not over 5/16 in. or ⅜ in. for 1¾-in. doors. In this way one can nearly always tell what he is buying, for by looking at the end of the stile he can see the width of the plow. No door will stand exposure to the weather year after year without showing bad effects, but the dowel door seems to give more trouble than the mortise and tenon door.

Fig. 8 also shows how the dowels are placed in the 4-in. rails. They are nearly always put in either ¾ in. or 1 in. from the edge and 2 in. or 2½ in. on centers. The bottom rail will have about four in it. The first dowel could be found by running a nail down the groove in the stile until it strikes the dowel.

When these doors open up in the joints take a clamp and draw them up tight. Get some iron sash pins and drive two in each dowel—one in the stile and one in the rail. This will hold them very well. I have bored a hole clear through the stile and into the rail and driven in a dowel, but this does not give the best of satisfaction. If this method is followed put some glue in the hole, for if the glue is put only on the dowel it will be nearly all wiped off in the stile and will not stick to the rail. Cut a groove in the dowel so as to let out the air and surplus glue.

In Fig. 13 is shown a joint made with a slip tongue which I have used some times when I did not have any mortiser. Above I show the end of the stile and the edge of the rail. The tongue is at *r* in the lower part of the drawing; *D* shows it split on the line *A B*. If there is a panel to go in the end, the rails and stiles are plowed for it and then the rails are plowed across the ends and the tongues are ripped out to just fit this plow. Be sure and run the grain as shown, as this makes it act the same as a short tenon. Although this joint is not to be recommended it may often come in handy for light work and if well glued will hold satisfactorily.

Booming Winter Building

Our readers will be interested in a campaign for more winter building which it is expected will be taken up by building supply houses, architects and contractors throughout the country where work usually shows a heavy falling off during the cold winter months and which has been instituted by the Detroit Steel Products Company through Arthur T. Hugg.

This action was prompted by replies received from letters sent out by the company to 6000 architects, a majority of whom say winter building is as practicable as is summer work. The idea advanced is that if the supply houses are able to keep their factories running at uniform speed throughout the year they should be able to offer attractive prices, service and prompt deliveries during the winter. It is contended that an increase in winter building will benefit owner, workman, contractor, architect and building supply manufacturer.

"Reports show that 106 cities, in September, took out 22,433 building permits, involving a cost of $65,980,889, as compared with 19,400 buildings and an aggregate cost of $47,373,902 for the same month a year ago, an increase for the month just closed of 39 per cent," says Mr. Hugg. "We believe that this condition is going to keep up proportionately throughout the winter."

A country residence that is about being constructed at Lawrence Park, Long Island, will have a living room 20 x 35 ft. and extend to the roof, while around it will run galleries. There will be a sleeping porch and bathroom for every bedroom.

Partial View of a Row of Twenty-five Houses, Some of Which Are Shown in Progress of Construction

Some Low-Cost Hollow Tile Bungalows

Five and Six-Room Dwellings Roofed with Asphalt Shingles and Costing from $3000 to $3500

THE contention that it is profitable for a man to be a specialist in his line was never demonstrated to better advantage in the building field than in the case of Niels Buck, a Chicago architect-builder, who for more than twenty years has concentrated his efforts in the erection of buildings of a size and cost appealing to the man commanding a moderate salary. Mr. Buck's activities during this extended period qualify him as an expert in this class of low-cost construction and equipment, and his methods are an object lesson which illustrate the advantages of buying in large quantities and the continuous employment of workmen who become exceptionally efficient through their familiarity with one type of structure. It has been his practice to erect rows of residences which are sold on the instalment plan, and during the course of construction prospective owners are presented with the opportunity of visiting the buildings with a view to introducing certain touches of individuality in the exterior and interior treatment. In regard to his ability to produce bungalows much below the average cost, Mr. Buck presents the following interesting comments:

"In response to a demand for commodious bungalows of modern construction and equipment, I have built during the past year several rows of such homes in Rogers Park, one of Chicago's growing north side residence districts. I have reason to believe that for the average family the best type of structure is one embodying an attractive arrangement of large living and dining rooms, two bedrooms, bathroom and kitchen, while the plans would be incomplete without the inclusion of porches. An examination of the accompanying floor plans show that front and rear porches are provided for every home.

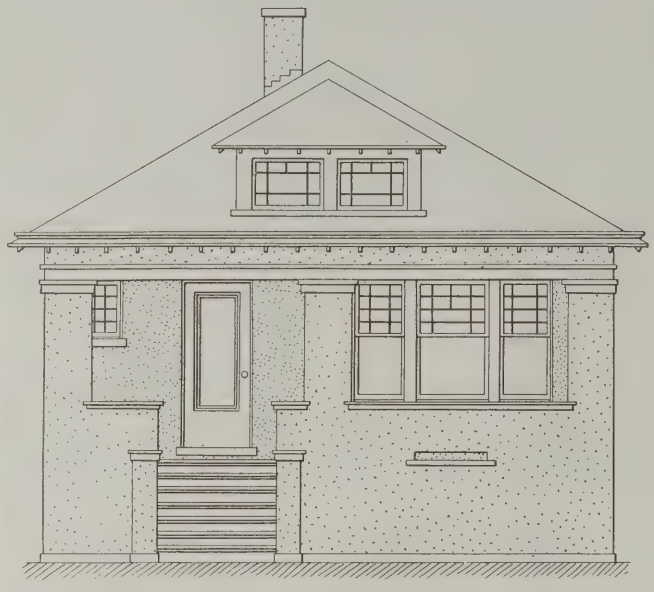
"My initial enterprises in Rogers Park consisted of frame bungalows, but recently I have been impressed with the idea that people are getting educated to the fact that fireproof homes can be built at a cost comparing most favorably with frame

View of Another Portion of the Work of Niels Buck Showing Variation in Street Architecture

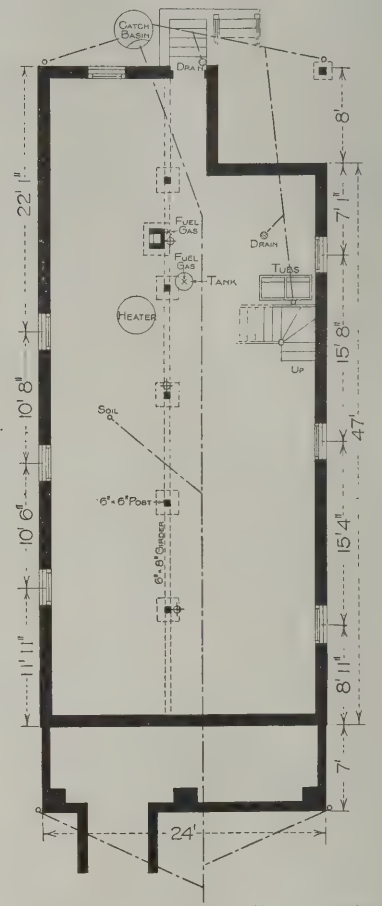
construction, and as a result two rows of twenty-five bungalows of this type are now rapidly nearing completion.

"Construction on such a scale as this means that I have to purchase materials in large quantities, my costs and overhead expenses to the minimum, resulting to my own and the customer's profit.

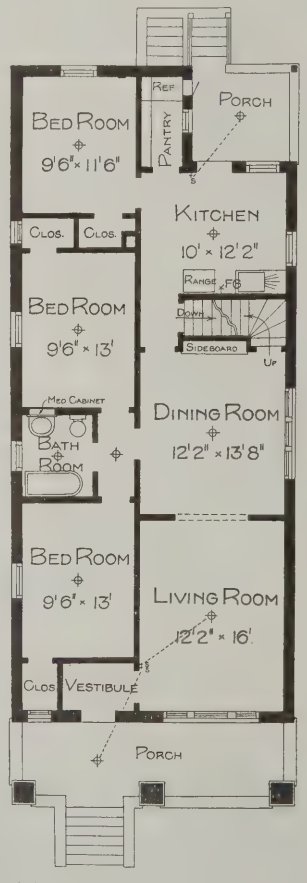
"Another important feature which all readers of THE BUILDING AGE will appreciate is that of labor. My men are so accustomed to this class of con-



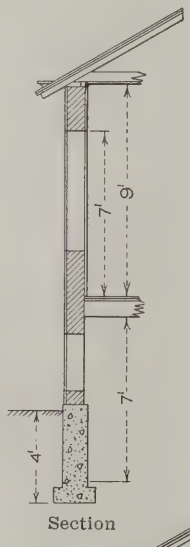
Front Elevation—Scale ⅛ In. to the Foot



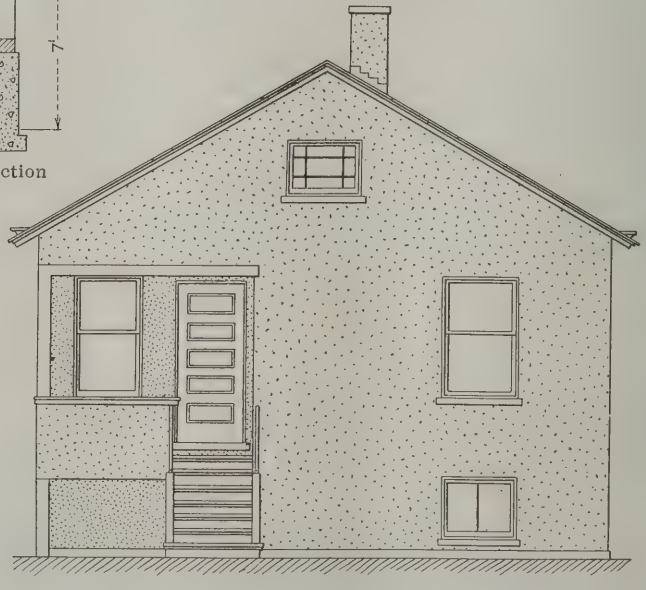
Foundation Plan—Scale 1/16 In. to the Foot



Main Floor Plan—Scale 1/16 In. to the Foot



Section



Rear Elevation of Building—Scale ⅛ In. to the Foot

Some Low Cost Hollow Tile Bungalows—Plans and Elevations of a Six-room House

and this is true whether I am in the market for lumber, tile, cement, shingles or any other products. This situation insures me of getting excellent prices from the manufacturers and enables me to reduce

struction that it is not necessary to have a foreman supervising each stage of the work. For instance, when the carpenters start to frame a house, they know that the girders, beams, joists, lathing, etc.,

SOME LOW COST HOLLOW TILE BUNGALOWS—APPEARANCE OF TWO STYLES OF HOUSES BEFORE THE STUCCO HAS BEEN APPLIED

require materials of a certain size, and with this knowledge they are able to go right ahead with the work without the least hesitation. Thus lost time is eliminated.

"When a prospective owner comes to me regarding the purchase of a fireproof house, I am well fortified with arguments which cannot fail to convince him that the tile house with a stucco exterior and asphalt or asbestos shingles is the one he wants. With this type of construction the cost of maintenance is extremely low, insurance rates are much cheaper, all danger of conflagration is eliminated, and it has been proven that the tile home is warmer in the winter months and cooler in the summer season than is the case of the frame building.

"In order to be consistent I naturally selected non-inflammable shingles, and I chose asphalt because I have always been well satisfied with their service and appearance on my frame bungalows. The colors are permanent, and the shingles are fire resisting, durable, and their cost compares favorably with other roofing materials. In this instance it would have been folly to have used an inflammable roof on an otherwise fireproof residence, as in most cases the spreading of fire, in residence districts at least, is caused by burning brands falling on inflammable roofs.

"Further on is an estimate of cost of a five-room bungalow, but does not include sidewalks, street improvements, concrete fencing, new sewers, etc., for which the owner has to pay. Including these items the cost ranges from $3,100 to $3,500, the latter figure being for the six-room bungalow.

"The stucco exteriors are of selected shades; white, gray, lemon and brown. The asphalt shingles are either dark red, green or slate color, to harmonize with the finish of the exterior walls.

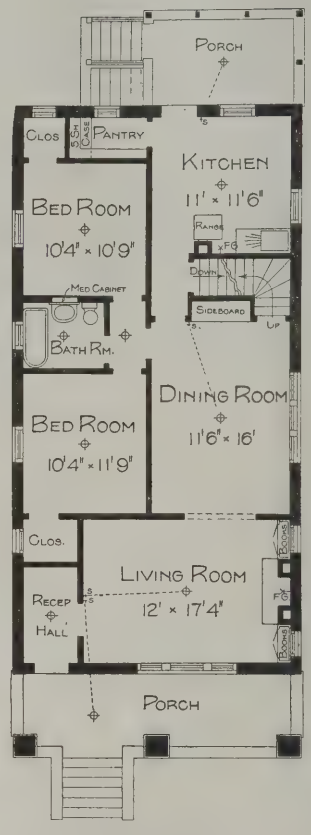
"An examination of the typical floor plans repro-

TWO DIFFERENT TYPES OF TILE HOUSES AS THEY APPEAR WITH THE STUCCO APPLIED TO THE EXTERIOR SURFACES

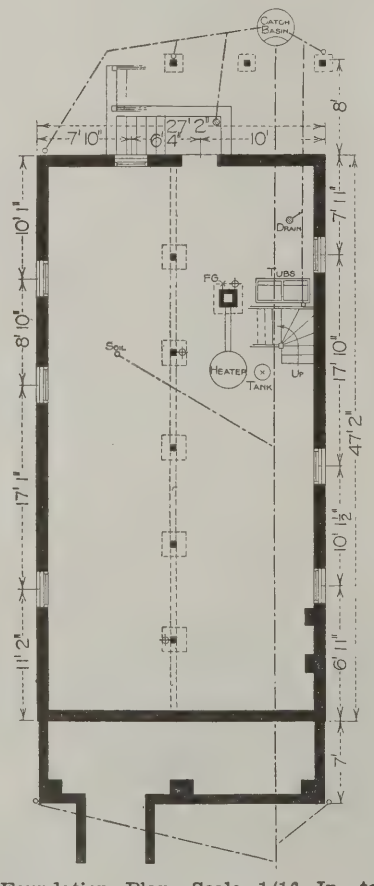
duced herewith reveals a well lighted and comfortable lay-out in both the five and six-room homes, the only difference being that the larger building has an additional bedroom. The bungalows are 47 x 24 ft. in plan, the five-room size being divided into living room, 17 ft. 4 in. x 12 ft.; dining room, 16 ft. x 11 ft. 6 in.; bedrooms, 11 ft. 9 in. x 10 ft. 4 in., and 10 ft. 9 in. x 10 ft. 4 in.; kitchen, 11 ft. x 11 ft. 6 in.; bathroom, 10 ft. 4 in. x 5 ft. 6 in.; front porch, 24 ft. x 7 ft.; rear porch, 8 ft. x 14 ft.

"In the six-room home, the living and dining rooms are sacrificed somewhat in order to accommodate the additional bedroom. The living room is 16 ft. x 12 ft. 2 in.; dining room, 13 ft. 8 in. x 12 ft. 2 in.; kitchen, 10 ft. x 12 ft. 2 in.; bedrooms, 11 ft. 6 in. x 9 ft. 6 in., and two 13 ft. x 9 ft. 6 in. The bathroom measures approximately 7 x 7 ft. The front porch runs the entire width of the building, while the rear porch in the six-room structure is 8 ft. x 8 ft. 8 in.

Front Elevation—Scale ⅛ In. to the Foot



Main Floor Plan—Scale 1/16 In. to the Foot



Foundation Plan—Scale 1/16 In. to the Foot

Rear Elevation of Building—Scale ⅛ In. to the Foot

Some Low Cost Hollow Tile Bungalows—Plans and Elevations of a Five-room House

"It will be apparent from this data that the average small family finds such a residence ample for its needs. The rooms are compact in every instance. Rear porches are adjacent to the kitchen and may be utilized as a breakfast porch and sewing room. Fireplaces are built in the living rooms according to the owner's taste. Each dining room has a buffet china closet. Bedrooms have roomy closets and kitchens are provided with pantries equipped with the necessary shelving and cases. All vestibules are finished with a tile floor, which allows mud and dirt to be cleaned off rapidly. The equipment includes an automatic gas water heater and laundry trays in the basement, a complete bathroom and an efficient plumbing and heating system."

Some Low-Cost Hollow Tile Bungalows—General View of One of the Six-room Houses

According to the specifications the 12 in. foundation walls and 24 x 24 x 10 in. footings are of concrete, composed of one part Portland cement, two parts sand and four parts broken stone. The exterior walls are built of 8 x 12 x 12 in. "Natco" tile laid with the cores running vertically, and made by the National Fireproofing Co., Pittsburgh, Pa. The mortar used in laying the blocks was made up of one part Portland cement, two parts lime and three parts sand. The exterior walls when dressed are 10 in. thick, all plastering being two-coat work applied directly to the walls, with a dash coat of stucco of selected shade.

The basement floor is entirely of concrete 4 in. thick, resting on a 4 in. bed of cinders, the former mixture containing the same ingredients, and proportions as the foundations. A top coating 1 in. thick is well troweled and pitched to the floor drain. Concrete steps lead to the basement from grade in the rear of the building.

Lally columns filled with concrete support the 4 x 8 in. girders. The floor joists throughout are 2 x 10 in.; ceiling joists, 2 x 6 in., and the rafters supporting the main roofs and dormers, 2 x 4 in., all spaced 16 in. on centers. Wall plates are 2 x 8 in.

Interior partitions are of frame construction 6 in. thick, lathed and plastered. All floors are double, the underflooring consisting of 1 x 6 in. clear yellow pine which is covered with one thickness of building paper. The interior plastering is two-coat work, the second coat being a hard finish.

The window frames are built of Norway pine, and the sills are of 1¾ in. cypress. Windows are double hung except in the dining room, which has French windows of white pine. Porch floors are made of 1 x 4 in. clear spruce, and porch ceilings of 1 x 4 in. beaded yellow pine.

The chimney is constructed of interlocking cement blocks built into the tile wall, having dimensions of 16 x 16 in. and forming an 8 x 8 in. flue.

Roofs and dormers are covered with 4-ply asphalt shingles of selected colors to harmonize with exterior walls, manufactured by the International Roofing Mfg. Co., Chicago, Ill. Each shingle is 16 in. long, exposed 4 in. to the weather.

The sheet metal work for downspouts, gutters, ridges and flashing is of 26-gage galvanized material.

The floors in the living room, dining room and bedrooms are 2¼ in. first and second quality red oak, and the kitchen and pantry floors are 2¼ in. clear maple. The dining room trim is oak, and the living rooms have birch, with a mahogany finish. Kitchen trim is left natural and bedrooms are finished in white enamel. Oak and birch trim received one coat of stain and two coats of varnish.

General View of One of the Five-room Houses Showing the Two High Windows Over the Bookcases in the Living Room

The front doors are 1¾ in. thick and the interior doors 1⅜ in. thick, of one-panel stock conforming to the trim of the rooms to which they give access.

The bathroom has an imitation tile wall to a height of 5 ft., above which the walls are tinted. All fixtures in the bathroom, kitchen and basement are of types made by The Standard Sanitary Manufacturing Co., Pittsburgh, Pa., supplied by the Enterprise Plumbing & Supply Co., Chicago, Ill.

The hardware throughout has a lemon brass finish. The buildings are piped for gas and wired for electric lighting.

Some Low-Cost Hollow Tile Bungalows—View in One of the Living Rooms

The following figures covering the principal classes of work in connection with a typical five-room bungalow are likely to prove of interest.

Estimate For 5-Room Bungalow

Excavating and grading		$100
Masonry work:		
Foundations	$245	
Cement floor	65	
Chimney	22	
Setting tile	220	
Tile	173	
		725
Plastering		175
Stucco		185
Carpentry		350
Millwork		250
Hardware		50
Tile floors, bathroom and vestibule		25
Metal work		35
Roofing		115
Glazing, shades, screens		60
Painting, staining and tinting		125
Heating		240
Plumbing and gas fitting		250
Electric lighting and fixtures		100
		$2,785

Hot water heat is supplied through the medium of "Vasco" boilers, made by the V. A. Smith Co., 213 West Lake Street, Chicago, Ill. Hot water is furnished to the faucets by a "Peerless" automatic gas water heater, made by the Peerless Heater Co., Pittsburgh, Pa.

Roof Construction on Concrete Building

Whether the structural part shall be flat and then covered with cinders to give a proper pitch for drainage, or whether the structural part, including the ceiling, shall be pitched and the fill avoided, is a point which may be discussed to advantage by engineers, is the opinion of L. C. Wason in a paper before the Boston Society of Civil Engineers. In construction the most serious objection to the first method is based on the lapse of time between the casting of the roof and the placing of the waterproof cover of tar and felt over the cinder fill. This usually permits a quantity of rain to collect in the cinder on top of the roof slab, which, while not absolutely watertight, will still hold a considerable quantity of water. In some cases holes have to be drilled through the ceiling to drain this slab. In one building water from this source dripped from the ceiling five months after the roof had been waterproofed. In another case there was some dripping even after two years.

"Sweating Stone" on an Ohio Farm

There is a stone on the farm of John Owens near Columbus, Ohio, that is said to never fail to give a correct forecast of rain. Seventy-five years ago a barn was built on this farm and one of the stones used in the foundations was what is known in that part of the country as the "sweating stone."

View in the Dining Room of One of the Houses Showing Sideboard and China Closet

The Village Church in England

The Stone Walls of the Building Form a Striking Contrast with the Materials Used in Other Countries

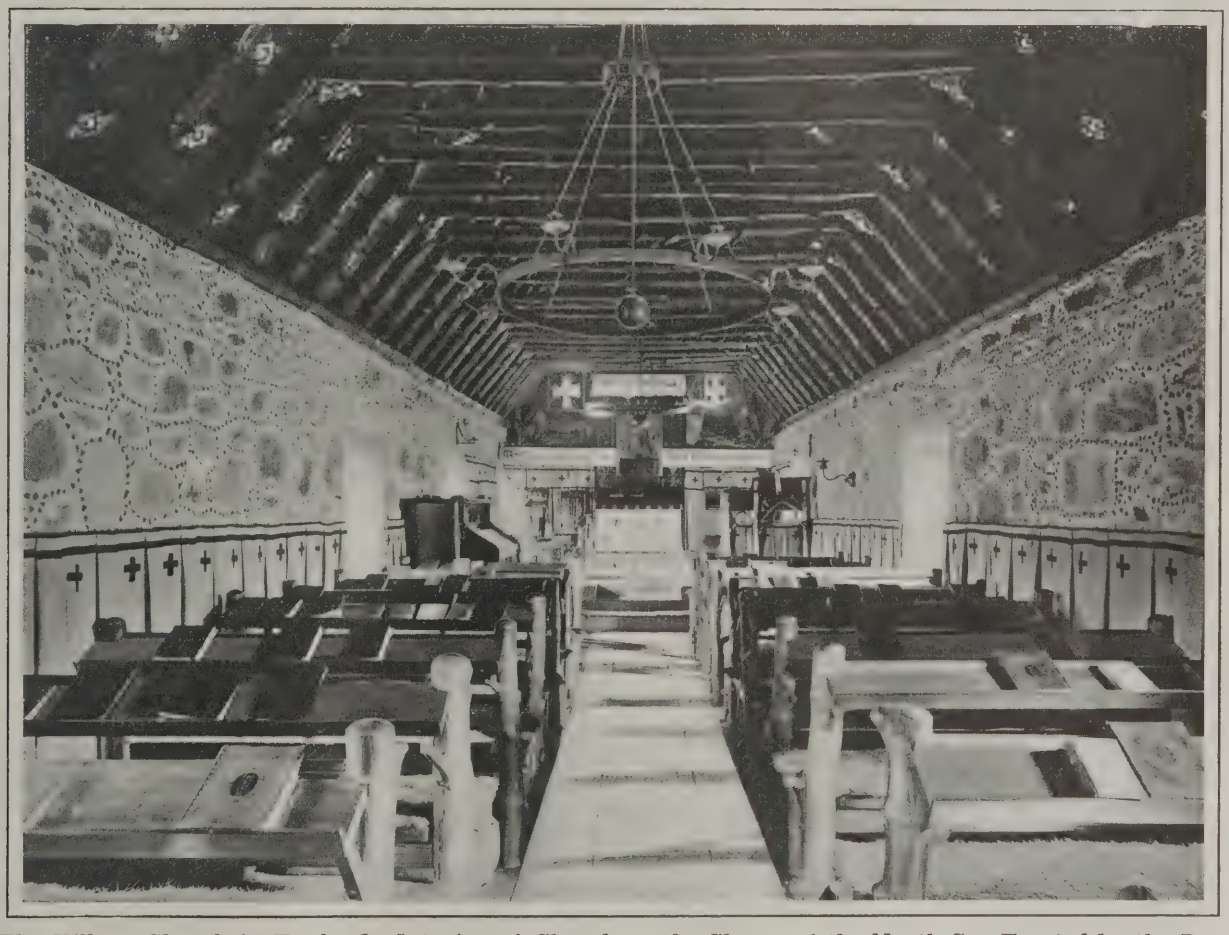
By John Y. Dunlop

THE evolution which has taken place in the problems of the construction of the village church in England has been partially influenced by the revival of medieval church feeling and by a desire to provide for the celebration of modern congregational worship. For the village church the problems which arise are due to the conditions which belong to modern worship.

In medieval times the church plan was composed of the long choir often spoken of as the chancel, which was originally the portion of the building set apart for the service by a segregated body of clerics. Where this type of plan is still adopted the resemblance to its origin is retained by putting there the choir, which is not a clerical but a lay —body, merely performing the musical part of the service.

The choir and the nave are as a rule two separate portions of the building, and in many cases in small churches the length of the choir is equal to the length of the nave of the church.

The long choir necessary means greater cost of the building, and in many cases it shuts out not only the officiating clergy but a large number of lay members of the congregation who are only distinguished from the rest in that they hold the musical part of the service. Clearly therefore in a village church the long choir has many disadvantages, and it is to the nave church with its shallow compartment behind providing only for the clergy with the choir in front—not a separate body with special privileges, but a collected portion—that attention is being directed.



The Village Church in England—Interior of Church on the Shores of the North Sea Erected by the People of the Village with Stone and Timber from the Adjacent Forest

In some of the early plans the shape of the whole church was a rectangle with a portion set off at the end for the choir, a type of which is shown in the halftone engraving representing the interior of a church on the North Sea, and in which the

whole of the building is of useful proportions. In this primitive church which was built by the villagers of Aboyne, Aberdeenshire, we have a fine example of what can be done with local materials. The walls were built with boulders taken from the shore and placed in their position in the wall without any dressing.

Naturally building with a class of material which had been exposed to wind and weather for many years did not lend itself to close joints, with the result that a large proportion of the material was composed of hydraulic lime.

To relieve the inside of the walls there were embedded in the face of the mortar joints pieces of quartz of varying colors, with the result that to this day the example of building is looked upon with much interest.

The Village Church in England—Interior of Crawley Church, an Early Example of the Three Aisle Building which is to be found in many sections

The width of the structure is 20 ft., and the roof is built of collar beam construction with rustic timbers taken from the adjacent forest. Each couple is stripped of its bark, and the joint at the apex and collar is made by halving. Rustic pews and pulpit are also used, and the same idea is carried out in the fittings at the choir end. The rustic "halfits" or end finish of the pew seats are about 6 in. in diameter and have been arranged in the cutting so that one of the growing branches forms the bracket for the book-board.

In the erection of this building the villagers could have had no thought of style or of architectural expression; to them it was a place for prayer and preaching, and their main object was that it should have a solemnizing and impressive effect upon the feelings of those who entered for worship.

To return now to the more recent type we have the introduction of the three-aisle plan which is very common in England for large churches. Naturally for a small country church this plan with its two rows of pillars unavoidably intercepting the view of a certain portion of the congregation is a practical inconvenience, still it is this type of plan which is looked for in the revival of Gothic architecture which has now run its course, although it must be admitted that it is a most fitting phase of architectural style for churches.

In small churches such as are the subject of this article the openings were mostly finished with a point, with the result that we find in Crawley Church single lancet windows and similar openings grouped in twos and threes. The windows are grooved to receive the glass so that no wood or metal frame is required.

Internally the walls are finished as on the outer face, and all openings are finished with stone dressing, in which the Gothic masonry of that time excelled.

The thickness of the stone walls was as a rule over 2 ft., and it is entirely due to their solidity that they are able to carry the heavy framed rafter roofs which are so common on these buildings.

In the roof over the choir in Crawley Church we have one of the earliest forms of which there is any record, and for a trussed roof it is the simplest in construction, each truss being formed of two

An Exterior View of Crawley Church, Having a Seating Capacity for 200 People

The Village Church in England—The Choir of Crawley Church with Trussed Roof and the Walls Built of Quartz Rock

heavy rafters laid in the king post. The tie beam which is shown is cambered and to all appearances has been cut out of a piece of compass timber.

In the nave of the church, which is divided into a three-aisle one by vertical wooden posts which are strutted at the top to support the purlins and the cross beams, we have an example of construction which was probably chosen for the purpose of gaining headway.

The Roof Construction

The roof has also a collar stiffened by braces in the upper part. All the rafters are halved and held together with wooden pins. As the rafters pitch on the outside of the wall a ledge is formed on the inside, and to this hollow and unsightly appearance an upright strut has been introduced, forming a triangular foot, thus adding greatly to the stability of the roof, and is held to be the obvious origin of the hammer beam roof which is used so much in large churches.

Interiorly the arrangement of the church is very simple and shows how much at one time the pew seat was in favor. The fittings are framed together with a seat board and a panelled back with flush panel, while the sloping book-board is supported on wooden brackets behind. To finish the end of the seat the molded halfit is much in vogue. These are simply heavy deal boards, the breadth of which are sufficient to cover in the end of the seat and book-board which are shaped and molded according to the period in which the church has been erected.

Within recent years a marked change has come over the erection of these small churches in England. Now the village church is modeled on the lines of city churches, with the result that each has its towering spire, its organ and other fittings.

In the plan of this last example the seating accommodations are 200, and a goodly portion of the floor space at the rear is given over to the choir. The organ is placed on a line with the choir, and as there is congregational hymn-singing a large organ has been built in a musical sense to supply the harmonious basis of a congregational singing.

Gothic Style of Architecture

The style or rather the architectural expression is Gothic, which is the expression of inspiration. This has been carried out in stone in which the stone walling is unbroken rubble with such features as the window dressings, base buttresses and parapet in coursed work. The stone spire is built with a parapet, and on the sloping sides are formed a double Gothic light with quatrefoil and a stone pediment. The joints of all the courses in the spire are at right angles to the pitch of the side. Near the top the courses become solid, and it is here that the rod for the finial is firmly fixed. The beam roofs are used over the three aisles, and the choir in which the tie beams are cambered for the central span. This camber gives the pitch of the roofs, the purlins resting immediately on the beams, which are connected to the wall space with curved brackets. The roofs are covered with sheet lead, and rain water pipes are solid drawn lead, with lead ears.

Internally the piers which support the nave wall are in stone, each course being built out of one block. The top course has a projecting molding.

The pointed arches which extend from pier to pier are finished with a label course, while immediately above the masonry consists of rough rubble finished on the inside with Keene's cement. Clearly this is a village church on the medieval plan which has arrived at a combination of conveniences with spiritual impressiveness and practical usefulness. Modern ideas here have abolished the pew seat and substituted chairs with a book-board back. In the choir two rows of seats are placed at each side, the front row on a platform 4 in. high and the back row on one 9 in. high.

The pulpit, which is about 2 ft. 6 in. in diameter, is built octagonal in shape with paneled sides. Each panel is open underneath from the pulpit floor, and the stiles of the framing run down to the floor to form the finish for the posts. The fittings of this little church are very complete, and the edifice is in every way adapted for the celebration of modern congregational worship.

Four New Apartment Houses

Among the building improvements on the upper east side in the Borough of Manhattan, N. Y., is a fourteen-story apartment house, the plans of which have just been filed by Schwartz & Gross, the architects, who estimate the cost at $400,000. The building is designed to cover a plot 100 x 102 ft. in area and will be erected on the south side of Seventy-ninth Street, 70 ft. east of Lexington Avenue.

Another improvement in the same locality for which plans have been prepared by Architect E. L. Capel is an eleven-story apartment house to cost $350,000 and occupy a plot 77.9 ft. x 90.5 ft. on the northwest corner of Lexington Avenue and Sixty-ninth Street.

A twelve-story apartment house covering a plot 75 x 100 ft., is about being erected in West Eighty-eighth Street, 190 ft. east of Amsterdam Avenue, the cost being estimated by the architects, Schwartz & Gross, at $300,000.

Architect Robert T. Lyons has recently filed plans for a nine-story apartment house to cost $150,000, having a frontage of 60 ft. on West Fifty-eighth Street, east of Seventh Avenue, and a depth of 85 ft.

Export Trade with Chile

The Government of Chile has appointed Eduardo Carrasco a special delegate to study commercial conditions in the United States, and he is at present in New York, where he will remain for two or three months. He will be pleased to attend to any inquiries or give any information desired about business conditions in Chile and the opportunities open to American manufacturers for building up export trade with that country. Patrons of THE BUILDING AGE are invited to visit Mr. Carrasco at our office, where he can be found daily between the hours of eleven and one o'clock, or he can be addressed in care of THE BUILDING AGE, 239 West Thirty-ninth Street, New York City.

As we go to press with this issue the annual convention of the Michigan Builders' and Traders' Exchanges is being held in Muskegon, Mich.

Exterior View of Aboyne Church Showing Broken Squared Dressed Rubble Work

The Village Church in England—View in Aboyne Church Looking Toward the Altar

Design for a Six-Room Country House

Arranged for a Family of Five Persons—Various Details of Interest to the Architect and Builder

IN accordance with the announcement in our last issue, the subject of the colored supplemental plate for December is a story-and-a-half cottage having an exterior finish of stucco and a roof covering of slate, asphalt or wooden shingles as may be preferred. The colored plate so clearly shows the architect's conception of the finished building that extended comment is unnecessary. The house has been designed for a plot of ground having a frontage of 30 or 40 ft. and with accommodations for a family of five persons.

The Foundation Walls

The foundation walls and footings are to be of concrete, the walls to be 8 in. thick, supported on footings 10 in. thick and extending 6 in. beyond each side of the wall above. All concrete used should be mixed in the proportions of one of cement to three of sand and five of broken stone.

The chimney is to have a concrete foundation and to be built of brick with the three flues lined with vitrified flue lining.

The framing timbers are to be of spruce, the corner posts and the plate to be 4 x 6 in.; the girders 4 x 8 in.; the first floor beams 2 x 10 in., and second floor beams 2 x 8 in., all placed 16 in. on centers. The second floor ceiling beams are to be 2 x 6 in., and placed 20 in. on centers. All joists are to be strengthened with one row of cross bridging. The studding is to be 2 x 4 in., placed 16 in. on centers and doubled at all openings. The rafters are to be 2 x 6 in., and the porch floor beams 2 x 8 in., all placed 20 in. on centers.

The Exterior Covering

The exterior frame of the building is to be covered with 1 x 9 in. hemlock sheathing laid diagonally and covered with building paper over which is to be placed 1 x 2 in. furring strips spaced 16 in. on centers, and to these are to be nailed the wood lath to which the outside coating of stucco is to be applied. The exterior stucco is to consist of two coats, the scratch coat to be at least ½ in. thick outside of the lath surface and is to be made up of one part cement, three parts sand and not more than 10 per cent lime putty. The first coat is to be applied under pressure and is to be well scratched before it sets. The finishing coat is to be at least ¼ in. thick and consist of one part cement, two parts sharp sand and three parts of pebbles for rough finish. The stucco is to be a light cream.

If red cedar shingles are used for the roof covering they should be exposed 5½ in. to the weather and should be dipped in shingle stain at least two-thirds their length.

The exterior cornice, rails, brackets, trim, etc., are to be of clear white pine.

The rooms in the second story are to have a double floor, the sub-floor to consist of 1 x 9 in. tongued and grooved hemlock, and the finish floor of ⅞ x 2½ in. maple. The rooms in the second story are to have a floor consisting of ⅞ x 2½ in. North Carolina pine.

All rooms are to be plastered with a hard smooth finish except the living room, which is to have a sand finish. The trim for all rooms and doors is to be white wood.

The Living Room

The main entrance to the house is from the front porch and leads into a large living room, the features of which are the commodious open fireplace, the seat and the open stairway to the second floor. The walls of the room are to be paneled to a height of 5 ft. with narrow strips of wood and the panels left in a rough plaster finish. Above the paneling the walls and ceiling are to be plastered. All trim and doors of this room are to be painted white and the walls are to be finished in an old gold, while the ceiling is to be a very light cream.

The kitchen is conveniently located and all fixtures arranged in one line. This room has a dining nook which is so placed as to save the housewife a great many steps. The walls of the kitchen as well as of the bath room and toilet are to be covered with waterproof cloth in tile effect. The walls above are treated with a waterproof paint, light blue in color, and the ceiling is to be white.

There is one sleeping room on the first floor which can be used by the domestic or the space can be changed into a small "den" by having a door open into the living room.

Rooms on Second Floor

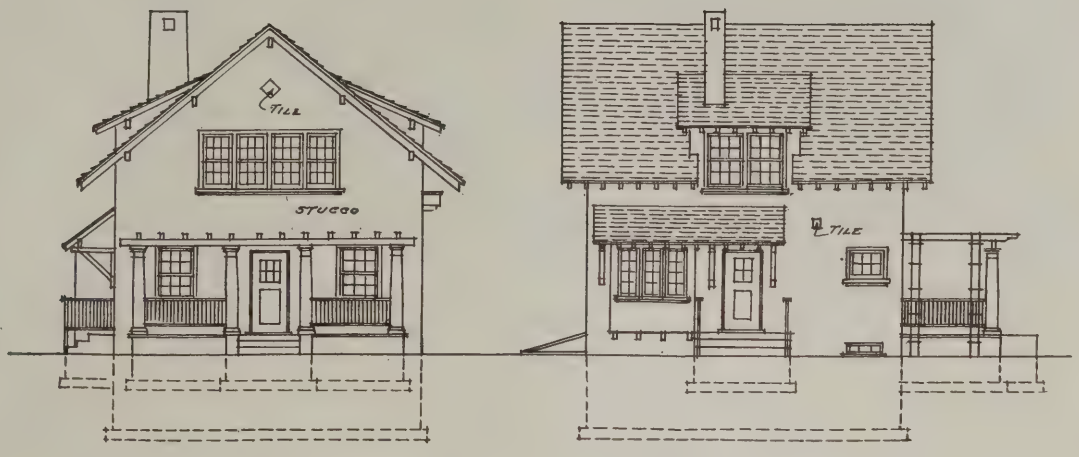
On the second floor are three sleeping rooms and bath, the latter being readily accessible from all parts of that floor. Ample clothes closets are provided for the several sleeping rooms, the trim of the latter to be painted white and the plastered ceilings left with a hard smooth finish.

One line of plumbing supplies all the fixtures on the first and second floors and one chimney is provided for the furnace, the kitchen range and the fireplace in the living room.

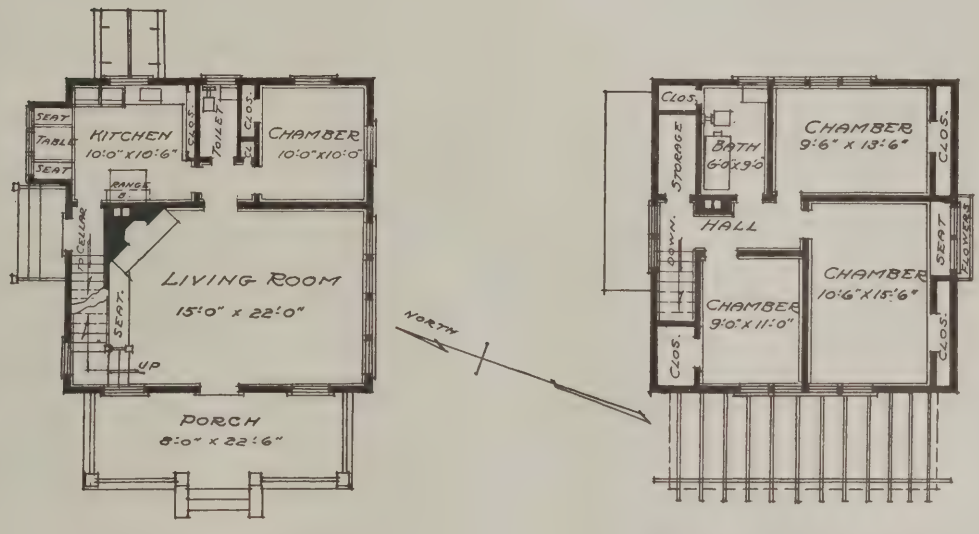
A cellar is to be located under the entire house and to contain furnace and storage room. The plan is such that it is convenient to reach it from the outside or from the kitchen by a flight of stairs placed directly under the main flight.

All trim throughout the house and all doors are to be enameled white—three-coat work. The floors are to be brought to a smooth finish, then filled and varnished.

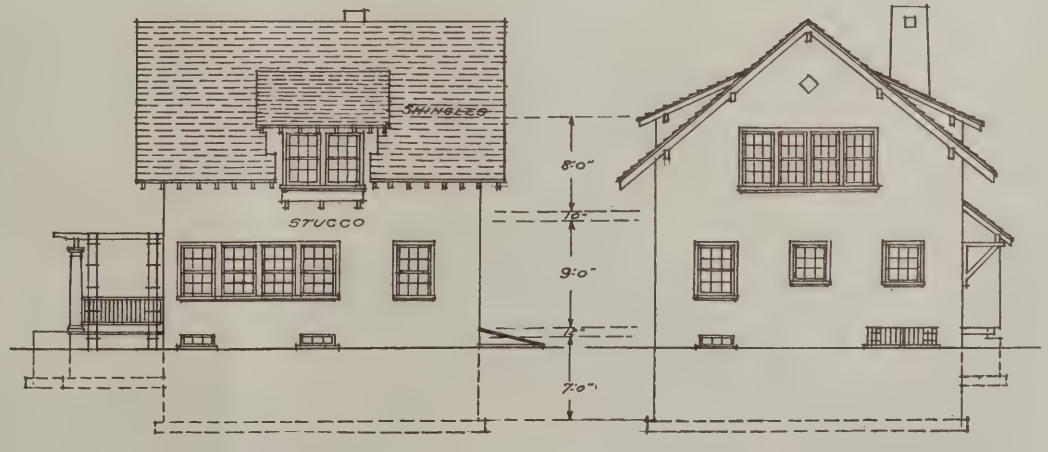
A good system of plumbing is to be installed with simple fixtures using a galvanized iron enameled sink, a two-part wash tray of soapstone or enam-



WEST ELEVATION NORTH ELEVATION

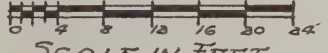


FIRST FLOOR PLAN SECOND FLOOR PLAN



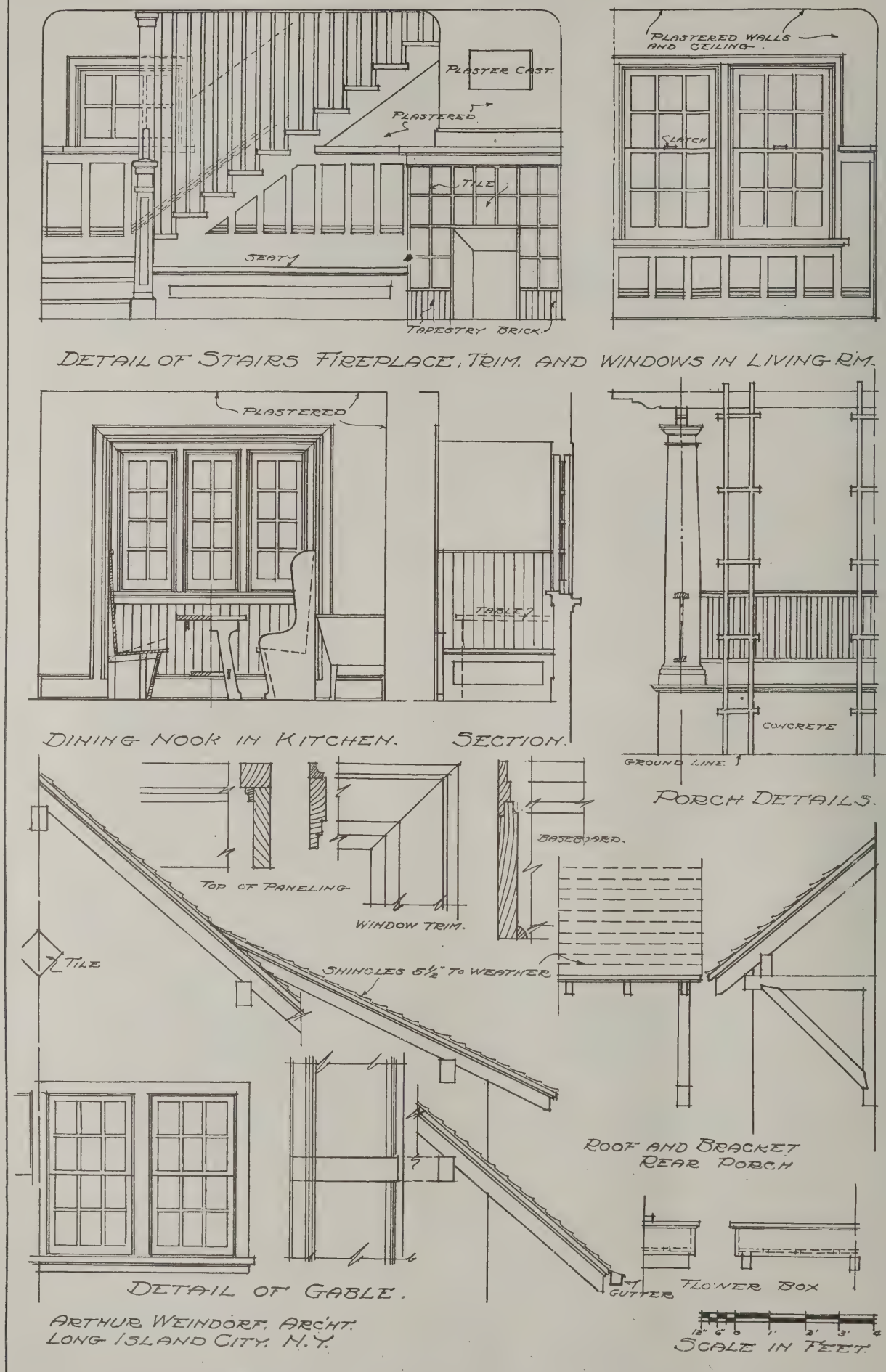
SOUTH ELEVATION EAST ELEVATION

ARTHUR WEINDORF. ARCH'T.
LONG ISLAND CITY, N.Y.



SCALE IN FEET

Plans and Elevations of the Country House Forming Basis of Our Colored Supplemental Plate



Miscellaneous Constructive Details of Country House Shown on Our Supplemental Plate

eled iron, and over the range a hot water boiler of galvanized iron. All plumbing is to be exposed and all rough pipes are to be painted with enamel paint. The plumbing in the toilet will be open. The bath tub is to be iron enameled, the water closet to have a china bowl and a low tank and the wash stand to have a marble top with white china basin. The exposed pipes are to have a nickel plated finish. In the toilet the fixtures are to consist of iron enameled wash basin and toilet similar to the fixtures used in the bath room.

All sheet metal work is to be painted on both sides before it is laid and all leaders are to be of galvanized iron.

The hardware is to be of a bronze plate finish and is to match the radiators and lighting fixtures.

The house is to be heated by furnace and the lighting is to be by electricity. The living room is to contain two drop pendants of two lights each.

The architect figures the cubic content of the house at 20,633 cu. ft., and the cost at 15 cents per cubic foot. He states that the design in some parts of the country might be executed for $2,900, not including the contractor's 10 per cent profit, the actual figure depending largely upon local conditions and prices of materials.

The country house here shown was designed by Architect Arthur Weindorf, Long Island City, N. Y., or care of THE BUILDING AGE, 239 West Thirty-ninth Street, New York City.

A Portable Electric Reading Lamp

A Piece of Work Which the Carpenter, Clever with His Tools, Can Make in Leisure Time

By EDWARD H. CRUSSELL

THE portable electric reading lamp shown complete in the picture, differs somewhat from those seen in the furniture stores, but it offers an excellent opportunity for the careful workman to prove his skill in the use of his tools. The amount of material required is not great and may consist of odds and ends left over from more important jobs, the largest piece of wood in it being only 10 in. square. The finished lamp is a piece of household furniutre, both useful and ornamental, and makes an ideal present for almost any occasion. Mention is made of this fact because Christmas will soon be here, and the suggestion may be useful to someone having a home work-shop, as it may show him how he can use to advantage his scrap wood and spare time.

FIG. 1—GENERAL VIEW OF THE FINISHED LAMP

In Fig. 2 is a side elevation of the lamp drawn to scale, and Fig. 3 shows the development of one side of the shade. The latter is perhaps the most difficult portion of the lamp to construct, so we will attempt it first.

A full size section of the molding used in the shade is shown in Fig. 4. This molding can be obtained ready to use at most planing mills, but if we intend to use up scrap material it will be necessary to make it either with a plow or a rabbet plane. The writer is assuming that it will not be necessary to describe the actual work of each portion of the lamp as if it were being made by a novice, yet he thinks it is well to mention the fact that the molding is best rabbeted before it is cut into strips because of the difficulty of handling the small pieces.

In Figs. 5 and 6 are shown two different methods. In Fig. 5 the strip is cut from the edge of the board, and the thickness of the board governs the width of the molding. In Fig. 6 the edge of the board is rabbeted on both sides, and the width of molding required is gaged back from the edge. After this piece has been sawn and dressed to the gaged lines it is again split down the center, giving two pieces slightly less in thickness than half the thickness of the material. A 7/8-in. board, if cut with care, will provide two pieces 3/8 in. thick. Fig. 6 shows the best method to use with quartered oak, because it will show the face of the board and consequently the best figure.

After sufficient material to make the shade has been worked a full drawing of one side of it should be made according to the measurements given in Fig. 3. It is important that this drawing be symmetrical, and it is best to prove it by testing the diagonals before proceeding further with the work. Having done so, set a bevel to the angle at the corner and obtain the exact length of each piece from the drawing. Proceed to fit up one side of the shade. The joints are halved together with the up-

right piece running through on the face side as shown in Fig. 3. After the four pieces for one side have been cut, fit them together over the drawing to prove the correctness of the joints and then use these pieces as patterns for the other sides. Cut and fit the long pieces first, so that if you make a slip or spoil one you can use it up for a shorter length.

The shoulders of the joints may be cut in a miter box if preferred, but the writer finds it about as easy to mark them with a bevel and cut them without this aid, using a small size of buck-saw, called a dovetail saw, for the cutting.

The four pieces of each side are best glued and clamped together on a board of approximately the same shape as Fig. 3. The four pieces can be held to the board by laying a piece of 1 x 3 in. on top of them and running a wood screw down through the center of it into the board. The corners may on top of the bench and hold the two sides in the angle thus formed. This is not the most scientific method, but it is a long way the handiest, and is also useful for testing and correcting the joints after they have been planed.

After the four sides have been completed they should be formed into a shade by tying them together at the corners by twine. Make a tie near the top and bottom of each corner, put the twine around twice, tie it loosely, and bring it tight by pushing small wedges between it and the shade. Set the shade on a level surface and be sure it is "out of wind." It can now be seen if everything is as it should be. If it is not, make it so and then cut out four strips of triangular section to fit in the inner angle of each corner. These strips are usually omitted from the factory-made shade, but they do not add much to the cost of the job and they help to make a much stronger shade, besides affording

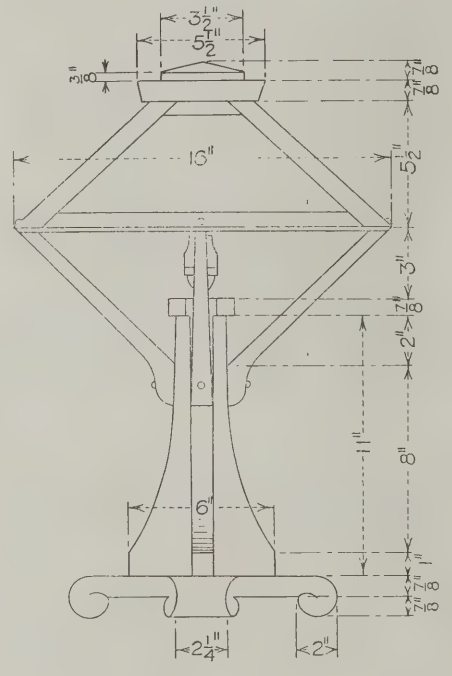


Fig. 2—Elevation of the Lamp—Scale 1½ In. to the Foot

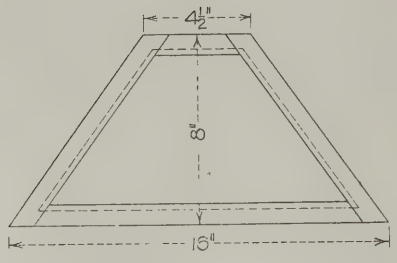


Fig. 3—Development of the Shade—Scale 1½ In. to the Foot

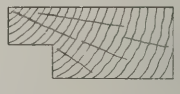


Fig. 4 — Full Size Section of the molding for the shade

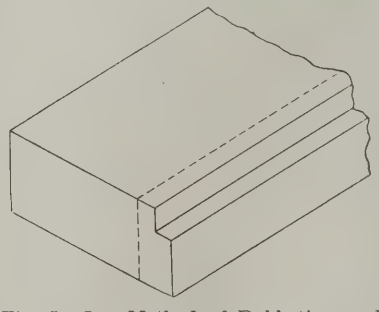


Fig. 5—One Method of Rabbeting and Cutting Molding for the Shade

A Portable Electric Reading Lamp—Designed by E. H. Crussell

be further tightened if necessary by pushing thin wedges under them, or what is better, the corner may be clamped to the board with four small iron screw clamps if you have them.

After the glue has set, the four sides of the shade must be carefully smoothed up and all brought exactly to the same size. This should not be much of an undertaking if care has been exercised in measuring and fitting the pieces. If one has not been careful he will now have plenty of time to wish he had been. The easiest way to get the angle for the joints and the corners where the sides of the shade come together, is to hold two of the sides together in the position they are to occupy and note how much their outer corners are apart. Half of this distance is of course to be planed from each shade. It is important that the two pieces be correctly held, and the easiest way of doing this is to tack two strips at right angles with each other greater ease in fastening the glass. They are easily made by planing the edge of the board to the correct angle as shown in Fig. 7 and then ripping it off at the dotted line. Smooth up the edges of the strips and slip them in the corners of the shade under the strings. If necessary push wedges between them and the strings to bring them tight.

Having now seen that everything fits correctly, take the shade to pieces, glue, tie and wedge up again, and set aside to dry. Have plenty of wedges and everything handy so that there may be no cause for delay, and after it is glued set the shade on some level surface with a weight on top of it to prevent warping.

The two blocks forming the top of the shade are dressed to the size and shape shown in Fig. 2. The top block is fastened to the lower one with glue and two screws, the latter passing through the lower block from the under side. To avoid mistakes it is

better to screw the blocks together dry. Then remove the screws, glue the blocks and screw them together again. They are fastened to the shade with screws from the under side.

A plan of the base and the method of marking it is shown in Fig. 8. It can be cut to shape with a coping saw, and finished with a half-round file and sand paper. Four blocks are glued beneath this base at the corner as shown by the dotted lines for the purpose of forming the scroll feet. It is important that the grain in these blocks run the same way as that in the base. The easiest way to make the blocks is to take a piece of wood about 4 in. wide and cut it into 2-in. lengths with a 45-deg. cut in a miter box. Arrange and glue these pieces to the corners of the base in their proper positions, and after they are dry, trim them to the shape of the base with a coping saw. The lower left-hand corner of Fig. 8 shows one of the blocks before the corners are trimmed off. The corners of the base can now be rounded with chisel and file and an indication of a scroll cut with a V-tool. A tin or cardboard pattern should be used for marking the corners to insure them of being the same size and shape.

The standard of the lamp is formed of three pieces fixed together as shown in Fig. 8. The size and shape of these pieces may be obtained from Fig. 2. Like the base, they should be cut with coping saw and finished with file and sand paper. They are fastened together with glue and two ¼-in. dowels. The dowels are made to run right through the double standard for ease of construction, and although they are afterward cut through when boring the hole through the standard for the light cord they still have hold enough to keep the pieces together. In this of course they are assisted by the base and the small cap on the top of the standard. The standard is fastened to the base from the under side with screws, and the cap is fastened to the standard with glue and two 8d. finishing nails, the head of the nails being cut off just before they are driven home. The shape and size of the cap and its position in relation to the standard are shown in Fig. 9.

The shape of the brackets that hold the shade is shown in Fig. 2. They should be made an inch or so longer than the finished size to allow for trimming when the shade is fitted. They are tapered to ½ in. in thickness at the top as may be seen from the front elevation of the one in Fig. 2.

This completes the woodwork of the lamp, and we are now ready to fit the opalescent glass. The latter is rather mean stuff to cut, and it will probably be best to take the shade to the paint store or wherever the glass is obtained and let the fellow there have the pleasure of doing the fitting.

The lamp is now ready for finishing, which should be done before the glass is fixed, though not necessarily before it is fitted. The lamp in Fig. 1 is quartered oak and was given a fumed finish. It received first a coat of Johnson's wood filler (No. 10 Natural), the various parts were then assembled and the lamp was placed in an old packing case, which had been made air-tight by placing strips of paper over the joints. "Strong ammonia water" was placed in shallow vessels—lids of tin cans—at the bottom of the case. The lid was fastened down and the lamp left over night. It is necessary to fume the article somewhat darker than the desired shade because it will grow several shades lighter the first few days after it is taken from the fuming box by reason of the ammonia sinking into the wood. This is a point well to keep in mind.

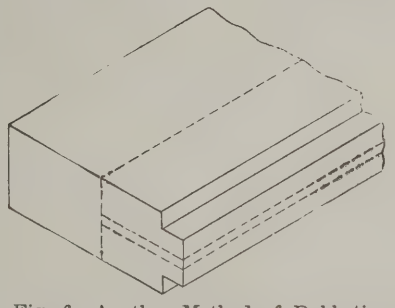


Fig. 6—Another Method of Rabbeting and Cutting the Molding

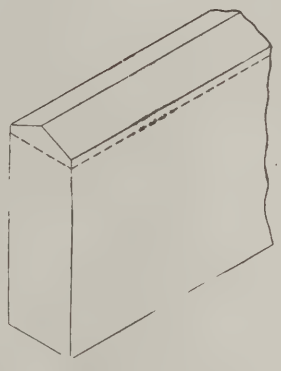


Fig. 7—Method of Forming Strip for Corner of Shade

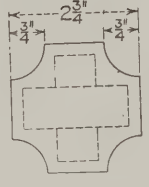


Fig. 9—Plan of Cap for Standard

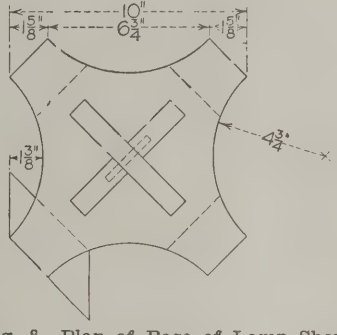


Fig. 8—Plan of Base of Lamp Showing Method of Marking

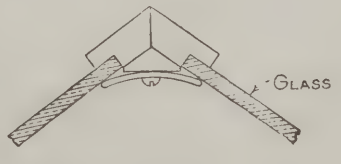


Fig. 10—Section of Corner of Shade Showing Method of Fastening the Glass

A Portable Electric Reading Lamp—Designed by E. H. Crussell

After fuming, the lamp was given a finishing coat of wax, the latter being "put on rather sparingly and rubbed off very lavishly," which is the whole secret of a wax finish. The lamp socket and extension cord and attachment plug can be obtained at any electrical supply store. A piece of ⅜-in. brass tubing about 3 in. long should also be obtained and fitted into the end of the lamp socket. A hole that is a tight sliding fit for this tube is bored through the lamp standard, and the tube with socket attached is held in place by friction.

The bead fringe round the lower edge of the shade is fastened with glue and tacks, and to get it on neatly requires care. Have ready at hand some liquid glue, some grocer's twine, and some 2-oz. *steel wire* tacks. Glue the edge of the shade and tack the end of the fringe carefully to place—stretch it tight, put in another tack near the end of the first side and then bind it round and round with the twine. Of course the glass has not yet been fixed. Do all four sides in this way and then go over them again, driving a tack about every two inches. After the glue has set, take off the twine and proceed to fasten the glass. The latter is held in place with narrow strips of sheet brass, two of which are screwed across each corner of the frame. Fig. 10 shows a cross section of a corner of a shade with one of these strips in place. They are about ½ in. wide and 1¼ in. long. The writer made his from a piece of an old blacksmith's rule.

Some people of artistic tastes claim that a fumed article should not be filled. The writer finished his lamp to suit himself, and the reader, if he undertakes to construct one, will undoubtedly follow the same method of procedure.

A Country House in the Thirteenth Century

In a fold of the Kentish hills, surrounded by apple orchards and hop gardens, there stands a humble building whose walls are eloquent of the past, says a London evening paper. It is almost the only one of its kind left standing—so far as the exterior is concerned—in its entirety. There is no trace that any portion of it was ever pulled down, nor, save for the fact that a farmhouse has been built on to it, has it been in any way modified to meet the changing fashions of the centuries. Originally the mansion or "manor" of a knight of Edwardian days, little is left of the interior but dividing walls and architectural mouldings.

The adjoining land was granted to one of his knights by Edward I. in 1272, and the most reliable antiquarian opinion is in favor of the house having been built shortly after. This knight, in the matter of building, did not despise the record of the past, for he adopted the Norman method, then dying out, of placing his living-rooms on the first floor. This made for safety, and the ground floor apartments were simply windowless dungeons and store-rooms.

In those days they built for strength, and the walls of Kentish rag are of great thickness calculated to withstand the assaults of any quarrelsome neighbors, while the turret which gives admittance by a stone spiral staircase to the living-rooms above, is guarded top and bottom by massive oaken doors, and is lighted by oylets through which a rain of arrows could be poured upon intruders below.

The main style of the building is that of the Transition from Early English to Decorated. Oblong in form, it has gables north and south, and at either end of the long east wall is a square projection.

Ascending the stairs is a room of truly noble proportions, occupying the length and breadth of the building, 28 ft. by 18½ ft., and lighted by windows east, west, north, and south. It is open to the roof, which contains nearly, if not quite, its original form, and has a fireplace, and an "ambrey" or cupboard in which cooking and table requisites, and alms for the poor were kept. In this "aire" or "aitre" the family lived and worked, and here visitors and better-class retainers slept. Here, perhaps, from the beams supporting the roof hung the store of dried provisions for winter use, and the herbs collected by the squire's dame.

It was here in the "aire" that, at even, the family gathered round the firelight (candles were expensive luxuries in those days) to listen to the story of battle or chase. The windows were unglazed, but glass might be fixed in the shutters, the iron hook for which still remains. Oaken settles did duty as seats by day, and as resting-places at night, and meals were served on a board placed on trestles—hence, perhaps, the phrase "the festive board."

From the hall a doorway gives admittance to one of those square chambers already noticed as built on to the ends of the east wall. It is the "Lord's Chamber," the sleeping room of the women and children. The walls are thick, and lancet slits, high above reach, let in a dim light by day, while the shutter hooks, still tightly wedged in the wall, show how jealously the retreat was guarded by night. It was the inner sanctum, the most protected part of the house, where those dearest to the knight found refuge in troublous days, and where in ordinary times his wife and children obtained privacy from the more public life of the hall.

The other projecting room, a little larger than the Lord's Chamber, is the chapel. It has a long narrow Early English window, and two smaller ones, and retains on window arch and piscina tracery of much architectural beauty.

Painting Gas Logs in Imitation of Wood

In discussing the question as to what to use for painting the logs of gas radiators in imitation of wood, a recent issue of the *Painters Magazine* contains the following: These logs are usually bronzed with copper bronze or green bronze, and then blended in with colors, so as to imitate the bark of certain trees. To give certain effects, such as the bark of birch or maple shows, asbestos fiber is attached in certain spots.

The colors used, or, rather, the pigments employed, must be resistent to heat, as, for instance, umber, raw or burnt. Indian red, mineral brown, oxide of chromium green or copper green. The paint must be made with a medium or binder of silicate of soda, because there is no medium containing oil or gums will be able to stand such degrees of temperatures as are required here.

Forest fires in the United States have caused an average annual loss of seventy human lives and the destruction of $25,000,000 worth of timber.

The Congress of American Builders

An Occasion Which Was Most Unique in the History of the Building and Allied Industries

WHAT will undoubtedly be long remembered as the most notable gathering of representatives of the building industry from all parts of the country assembled in San Francisco, Oct. 19 to 23, for the observance of what is known as "American Builders' Week." The Congress was called to order Tuesday, Oct. 19, in the ball room of the Palace Hotel, with John D. McGilvray, chairman of the general committee, presiding. After brief remarks he introduced Arthur Arlett, member of the California Commission to the Panama-Pacific Exposition and representative of the Governor of California, who extended a cordial welcome to the visiting delegates. William B. Faville, president of the San Francisco Chapter of the American Institute of Architects, was introduced to act as chairman of the session, and after a few remarks he introduced as the first speaker R. Clipston Sturgis, president of the American Institute of Architects, who delivered a masterly address upon "The American Builder," the keynote of which was a plea for unselfish co-operation between the builder and the architect.

President Lewman's Address

In the afternoon session the chairman introduced H. L. Lewman, president of the National Association of Builders' Exchanges, who spoke upon "National Organization in the Building Industry—Its Needs." He referred to the advantages of proper organization, reviewed the history of past efforts along these lines, outlined the constitution and work of the National Organization of which he is the head, and spoke hopefully of the future possibilities of organizing to effect intelligent co-operation for the public good.

Taking up the difficulties that confront the contractors, Mr. Lewman said in part:

We are constantly confronted with the evils of unfair, irresponsible and destructive competition, shopping and peddling of bids, favoritism and inequality in treatment in receiving bids, awarding of contract, and lack of frankness and fair dealing, and many other current wrongs. A common and vicious practice is that of receiving bids and immediately rejecting them upon some slight pretext or change, and calling for new proposals after publicity has been given to the original bids. This strikes at the very heart of the system of awarding contracts by sealed bids and is merely a subterfuge for inviting irresponsible competition. It generally results in reliable firms, who made well-balanced bids with the intention of properly carrying out the work, withdrawing from the competition, and usually the work is finally let to some one at much below a proper price, resulting in improper construction, loss, annoyances and delay to the owner, as well as to contractors and material interests. The just settlement of all these matters, like contract reform, lies beyond the local and within the national sphere. We found the progressive and fair-minded architects, the owners and business interests of the nation, with us on contract reform, and I am confident they will assist in the remedy of these unfortunate disabilities and unnecessary costs imposed on building.

The builder's duty is to give the public skilled and economical service. He is generally a factor and not a producer, usually providing in his price for all inherent and contingent costs, consequently the great burden of superfluous cost and loss, which has always been abnormal, must enter into the owner's investment. The exceptions to this rule are the losses incurred at times by the capital of the builder, but this is very small when considered with the vast sums unnecessarily invested by the owner. Excessive cost of material or labor does not come out of our pocket. We absorb it in our price and pass it on to the owner and he passes it to the tenant, who ultimately bears the burden. We should avoid as much as possible this condition, which imposes a burdensome tax upon the poorer classes of tenants, who are in the large majority.

Universal Standards Needed

The standardization and nomenclature of materials, labor, etc., used in our business is extremely important. Before rapid transit disposed of the limitations of space, the building interests were to a large degree local, the result being that terms and measurements often differed widely, according to locality, in amounts, quality and method of description. This lack of universal standards often caused great confusion and loss, and still exists to a degree that should not be permitted. Efforts are being made to correct this evil, and its importance cannot be overemphasized as it will save time and prevent many differences between owners, builders and architects if fixed authoritative standards can be established. We

are the sufferers, but also the practical men who should assist in its cure, and in this cosmopolitan era it has become a national question to be corrected by organization.

All of the States have different building codes, and many cities in the same State differ widely. Conditions require some difference, yet owners and builders suffer by unnecessary and improper requirements of many of these codes. A national organization, through a proper committee and perhaps through a paid expert, should collect all existing building codes and report a standard code for adoption in the different States and cities, subject to necessary local modifications.

Mr. Lewman's address was greeted with prolonged applause and at its conclusion the chairman introduced Charles W. Gindele, president of the Building Construction Employers' Association of Chicago, who read an address upon "The Building Business as a Factor in the Commercial Life of the Country." The speaker referred in facetious terms to the respective merits of Chicago and San Francisco as windy cities; called attention to the noteworthy accomplishments of the builders in the rapid reconstruction work following the great fires of Chicago and San Francisco, and referred to the building business as a national barometer of the life and activity of a community.

Grand Ball and Excursion

On Tuesday evening a grand ball was held in the immense new municipal auditorium—a splendid, fireproof structure accommodating over 10,000 dancers with spacious galleries for spectators.

On Wednesday morning the visitors were treated to an excursion on San Francisco Bay, and afterward disembarked at the Exposition grounds, proceeding to the Yellowstone Park concession where luncheon was served in the Old Faithful Inn.

The Congress reconvened later in the Recital Hall of Festival Hall on the Exposition grounds, with Harry Maundrel, president of the Builders' Exchange of San Francisco, in the chair. He introduced W. E. Dennison, second vice-chairman of the National Terra Cotta Society, who read a carefully prepared paper on "Clay Products and Their Modern Application." The speaker traced the development of clay working from the sunburned bricks of Egypt, Assyria and Babylon, the pottery of the Etrurians, Greeks and Romans, the clay water pipes of Rome and the molding of ornaments in bas-relief which was borrowed by the Romans from the Tuscans, down to the present time when the clay products of the United States alone have reached an annual value of $200,000,000 and which are increasing at the rate of 5 per cent per annum.

On Thursday afternoon a great building industry parade in nineteen divisions typifying the progress of the building industry took place and passed in review of the grand marshal of the State, municipal and Exposition officials in front of the Tower of Jewels. This parade did credit to the builders and materialmen of San Francisco and vicinity, and it was noticeable that cities one hundred miles distant were represented by gorgeous floats.

Following the parade was a reception and tea dance in the California Building under the auspices of the ladies' reception committee.

Later there was a session of the Congress in the Recital Hall of Festival Hall, where L. R. Ferguson, assistant secretary of the National Association of Portland Cement Manufacturers, spoke most interestingly upon "The Fireproof Value of Concrete." His remarks were illustrated with stereopticon views of the Edison plant immediately following the fire at Orange, N. J.

Next in order was a stimulating address upon "The Efficient Conduct of Building Operations," by Grant Fee, president of the Building Trades Employers' Association of San Francisco. Following this address there was a brief discussion by Charles Nye, architect and quantity surveyor of Durban, South Africa, who spoke with particular reference to the advantage of a guaranteed bill of quantities as a common basis for proposals. He was followed by G. Alexander Wright, who further elaborated along the same line, and who may be regarded as the pioneer in the United States in the movement looking to the establishment in America of the quantity system of estimating.

Bonding the Builder

Another interesting address was that of Henry A. Jacobs, attorney for the California Building Laws Association, who spoke an "Bonding the Builder—Its Origin and Present Effects on Building Contracts." Another address was that of George W. Kelham, chief of architecture of the Panama-Pacific Exposition, who spoke briefly on the subject of "Opening Bids in Public as Essential to Proper Business Conditions." He strongly supported the practice of opening all bids in public, and referred to the necessity of assurances on the part of the architect that the portions of the work which would be sublet by the general contractor would be placed in the hands of satisfactory parties. He also favored the establishment by contractors' organizations of bureaus which would prepare guaranteed bills of quantities for every job on which the proposals of all members of the organization should be passed as a means for eliminating the risk of error upon a large number of individual estimated quantities.

On Friday morning the visitors were treated to an automobile tour of the city covering the principal points of interest from a sightseeing standpoint.

In the afternoon the Congress reconvened in the Palace Hotel with G. Alexander Wright, fifth vice-chairman of American Builders' Week, presiding. The following addresses were made and were followed by interesting discussions:

"The Building and Maintenance of Good State Highways and Bridges" by A. E. Loder, division engineer of the California Highway Commission.

"Electricity as a Factor in Building Construction" by J. E. van Hooseer, electrical engineer, Pacific Gas and Electric Company.

"The Building Contractor and the Architect" by Felix Kahn, member of the General Contractors' Association of San Francisco.

"Modern Plumbing in Its Relationship to Building Construction" by John L. E. Firmin, State secretary, Master Plumbers' Association of California.

On Saturday there was an excursion across the bay to the Marin County shore at Sausalito, and thence to the top of Mount Tamalpais, 2600 ft. high. In the evening the week was concluded with a banquet at the Palace Hotel.

Design of Beams, Girders and Trusses*

A Series of Articles on the Above Subjects in Which Only Arithmetic Is Used for the Calculations

By Ernest McCullough, C.E.

WHEN a nail resists a shearing force three actions are set up: 1. A bending caused by the pull of one piece against the nail embedded in the other piece. 2. A shear in the nail which is caused if the nail is so stiff that it will not bend. 3. Bearing against the wood in which the nail is embedded. The size of the nail must be proportioned to care for the action most likely to cause a failure. When the material to be held is wood the bearing action of the nail against the wood is the only one to be considered, for if the nail furnishes area enough to transmit the shear it will be thick enough to resist bending and also thick enough not to shear across. Rivets in metal have to be similarly proportioned, but bending is seldom feared while failure by shear of the rivet or by insufficient bearing against the metal is practically, and usually, of equal importance. Both must be figured, whereas in the case of wood only the bearing value is considered. The bearing value is computed as follows:

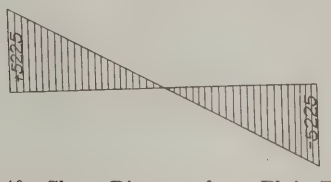


Fig. 49—Shear Diagram for a Plain Beam

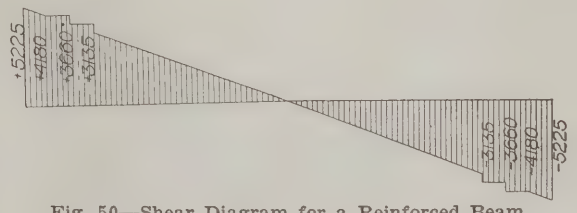


Fig. 50—Shear Diagram for a Reinforced Beam

Design of Beams, Girders and Trusses

The 30d. nail (not spike) is made from No. 5 wire, the diameter being 0.207 in. The cross-sectional area through a 1½-in. plank is $0.207 \times 1.5 = 0.311$ sq. in. The compressive value of the softer wood must be used, which is 700 lb. per square inch with the grain, assuming the nail to bear on the end of the wood where it enters. The bearing value for one nail is found by multiplying the bearing area by the allowable fiber stress in compression with the grain, $0.311 \times 700 = 218$ lb. This is the method to be used when no data is at hand giving the actual safe bearing values.

The actual safe bearing value for any nail is about two-thirds of the value as above computed. One reason is that there is no common gage used by nail makers, so that while tables may show that nails are made of certain wire not all tables give the diameter of the wire in decimals of an inch, and there being a number of wire and metal gages in use we do not know the exact sizes of the nails used in the published experiments. The experiments referred to may have been made with nails not quite so thick as the nails used in computing the bearing value. A second reason for the actual bearing value being so small is that the nails push the fibers of the wood aside and start a splitting action, which is increased when the shearing action is set up. This second reason is no doubt much more important than the first. The method of figuring bearing value just illustrated is correct for bolts for which holes must be bored, but gives a value about 50 per cent too large for driven wire nails and for screws. The designer must not forget this. Having settled on the size of nail and the bearing value of each nails, the number and spacing must be determined.

Fig. 49 is the shear diagram for the uniformly loaded beam. At each end the shear = reaction = $10{,}450 \div 2 = 5225$ lb. The nails should be closer together near the ends, where the shear is a maximum, so theoretically the spacing should vary from nail to nail. Practically the spacing can be maintained at uniform intervals for each foot, which makes the diagram resemble Fig. 50, the reinforcement ending 2.5 ft. from each end.

The method now about to be described is the common method for spacing rivets in the flanges of plate girders. It will be used in the case of the plate girder following in this chapter. In a succeeding chapter dealing with details of joints and connections a superior method will be illustrated, in which the reader who may not be able to quite understand how the shear comes in will, it is hoped, be clearly shown just what effect the stresses in the top and bottom of the girder have on the nails or rivets used to fasten material to the web (the web of the plate girder being the same as the original beam in the case now being considered, in which the fastening of the reinforcing planks resembles the attachment of flange members to the web plate of a girder). The examples given will also help in an understand-

Note—In this series of articles no algebra is used. The rules are written in the modern way in the shape of formulas by using letters instead of writing in full words that are often employed. The words for which the letters stand are explained for every formula so that readers may in time understand how to read and comprehend formulas used by other writers. The actual computation is arithmetical and worked examples are given.—Editor.

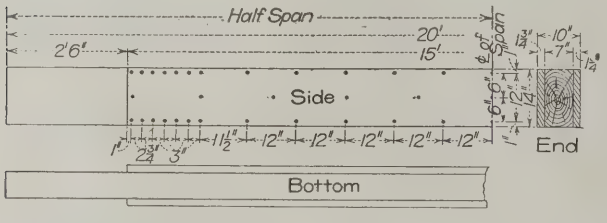
*Continued from page 37 of the November issue.

ing of the problem of using stirrups in reinforcing concrete beams and girders. Two feet from the end of the beam the shear is $\frac{5225 \times 8}{10} = 4180$ lb. The width of the original beam is 7 in., and the two planks increase the width to 9.75 in., or $\frac{4180 \times 7}{9.75}$ = 3000 lb., which will be carried by the original beam, leaving $\frac{4180 - 3000}{2} = 590$ lb. to be carried by each plank. The nails must transfer this from the beam to the plank and they should be driven 1 in. from the edge, both top and bottom. Let

V = total vertical shear at the point considered.
r = resistance of one nail (bearing value).
d = distance in inches between lines of nails (in the present example $d = 12$ in. vertically).
p = pitch of nails in inches (the horizontal distance center to center between nails).

$$\text{then } p = \frac{rd}{V} = \frac{145 \times 12}{590} = 2.95 \text{ in.}$$

Space the nails 2¾ in. center to center along the upper and lower edge for at least 6 in. at each end,



Design of Beams, Girders and Trusses—Fig. 51—Beam Reinforced with Planks

the first nail being driven 1 in. from the end of the plank.

Shear 3 ft. from end $= \frac{5225 \times 7}{10} = 3660$ lb.

Shear carried by each plank $= \frac{3660 - 3000}{2} = 330$ lb.

$p = \frac{145 \times 12}{330} = 3.92$ in. Space the nails 4 in. center to center along the upper and lower edge of the plank for 1 ft.

Shear 4 ft. from end $= \frac{5225 \times 6}{10} = 3135$ lb.

Shear carried by each plank $= \frac{3135 - 3000}{2}$ = 67.5 lb.

$p = \frac{145 \times 12}{67.5} = 25.8$ in.

Nails should be driven not more than 12 in. on centers, so beginning at the end of the fourth foot from the end of the beam drive nails on 12-in. centers top and bottom. Along the neutral axis drive nails on 18-in. centers. The completed work is shown in Fig. 51.

No reduction in area was figured as nails merely push wood fibers aside, but when bolts are used the effective depth of the beam is reduced by the thickness of each line of bolts. If bolts ¾ in. in diameter are used in two lines, and the hole for each bolt is ⅞ in., the effective depth is reduced by $2 \times ⅞ = 1¾$ in. This is serious, for the strength of beams varies with the squares of the respective depths.

Sometimes beams are reinforced by nailing a plank or strip of steel along the bottom. Assume the same conditions as in the last example, and use a thin white pine plank on the bottom. Maintaining the breadth the problem is to obtain a new depth.

The fiber stress for white pine is 800 lb., so $R = 800/6 = 167$ and $h = \sqrt{\frac{M}{Rb}} = \sqrt{\frac{300{,}000}{167 \times 7}}$ = 16 in. The original depth is 14 in., so a plank 2 in. thick by 7 in. wide must be spiked or bolted to the bottom. A thick plank like this must be fastened with bolts, and the holes will reduce the area, which will make necessary an increase in thickness. Methods for finding the length of the reinforcing plank and the pitch of the bolts have been given, the depth used being the full depth of the original beam plus half the thickness of the reinforcing plank.

To reinforce with a steel plate on the bottom use a moment arm $= 2/3 \times 14 = 9.333$ in. The fiber stress in the steel will be 16,000 lb. per square inch. Then area of plate $= \frac{117{,}067}{9.333 \times 16{,}000} = 0.783$ sq. in., and $0.783 \div 7 = 0.118$ in., the thickness of the plate. Use lag screws to fasten the plate to the beam, the proper pitch being determined as in the last example, using the full depth. The objection to the use of the steel plate is that the compression in the upper half of the beam is increased, although the effect of adding the plate is to lower the neutral plane. The proper method for reinforcing a beam, or girder, in place is to add planks on one side or on both sides, but when fixtures or wires are in the way it may be best to use a steel plate on the bottom.

(To be continued)

Present Economy of Building Construction

Cheapness of materials and the condition of the money market are important reasons why intending builders should hurry their work, is the opinion of E. O. Davis, a prominent builder in Indianapolis, Ind. According to his views it is certain that the consumption of lumber will increase before long and when the railroads come into the market again for their usual quantities of lumber they will create a demand that will drive prices higher. Such an increase in consumption may come next year and if it does the man who builds then will have to pay more, and other materials in sympathy with lumber will go higher. Every factor in the building situation is in favor of pushing work now rather than waiting on the future and its prospects of higher prices, but the man who is debating whether to buy ground now or wait until next year must make his choice quickly. In the present condition of the money market it is not difficult to get loans for building purposes.

A Bungalow of the California Type

An Exterior of Siding with Roof of Moss Green Shingles—Five Rooms and Bath

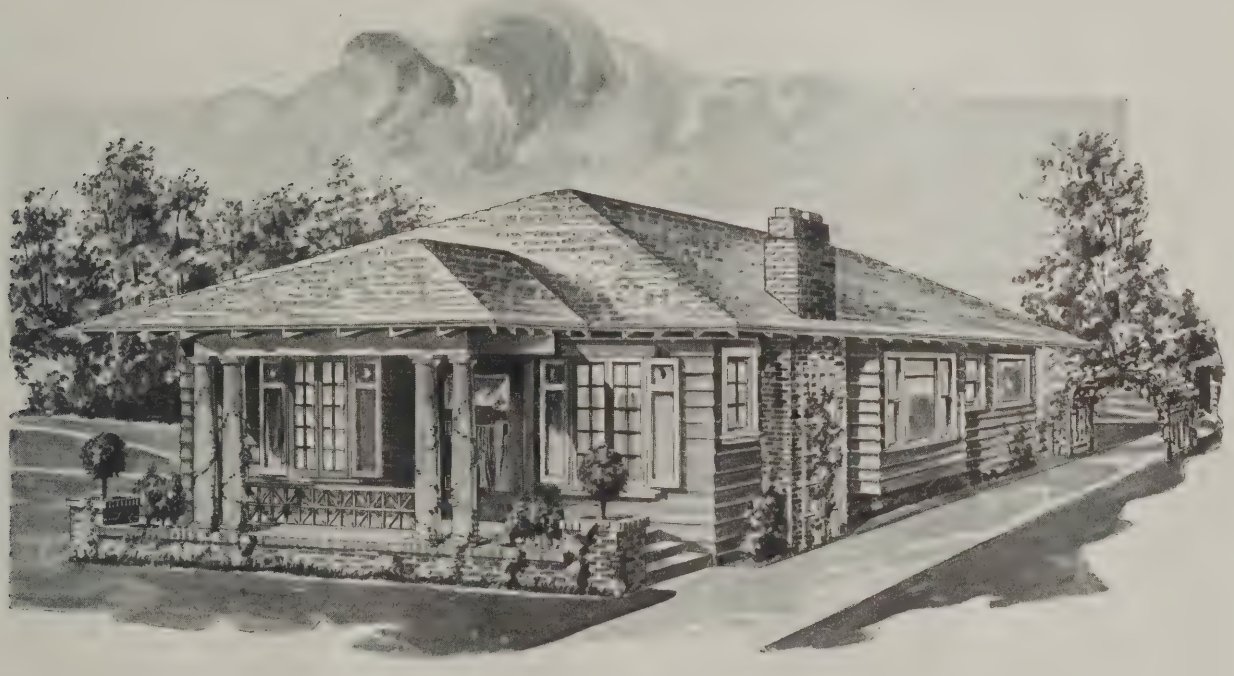
THE bungalow here illustrated represents a particularly successful example of a type of home, numerously found on the Pacific Coast, and will doubtless invite close study on the part of those in the East who may be thinking of building a cozy and convenient home along these lines. The exterior frame is covered with 1 x 6-in. sheathing, over which is a layer of heavy building paper, and this in turn covered with ¾ x 8-in. rabbeted resawed siding. The mud sills are 2 x 6 in., the floor beams 4 x 4 in. and the first floor joist 2 x 8 in., placed 16 in. on centers. The rafters are 2 x 4 in., placed 32 in. on centers, and studs and ceiling joist 2 x 4 in., placed 16 in. on centers.

The columns of the front porch are of the staved or built-up variety, and are grouped in pairs in such a way as to form, with the balustrade clearly shown in the picture, an interesting detail. Along the outer edge of the porch in the spaces left in the brick border are planted arborvitæ, which add an attractive note to the bungalow and tend to make the porch exclusive.

The floors are double, the subflooring consisting of 1 x 6-in. pine, covered with a layer of heavy building paper, over which is placed the finish floor, consisting of 1 x 4-in. tongued and grooved vertical grain flooring, well driven up and blind nailed.

An examination of the floor plan shows the interior to be divided into five rooms and bath, together with two screened porches. One of the latter is designed for a breakfast room, being located adjoining the kitchen. It can, however, be used for a sleeping porch in case it is desired to use the space for this purpose, as the casement windows may be thrown open, making ideal sleeping quarters. The room is finished in white enamel trim and delf walls. The small hall connecting the dining room with the two bedrooms and bathroom is an admirable feature as it enables one to pass from one room to the other and to the bathroom without the necessity of entering any other room.

In the living room is an open fireplace of pressed brick with a wood mantel, and in the dining room is a built-in buffet. Separating the two rooms are



A Bungalow of the California Type—Designed by Rex D. Weston, Los Angeles, Cal.

The rafters are covered with 1 x 6-in. pine sheathing laid tight, and over this are cedar shingles exposed 4½ in. to the weather and with a layer of heavy building paper beneath.

All of the exterior woodwork is painted white, which forms a pleasing contrast with the moss green shingle roof.

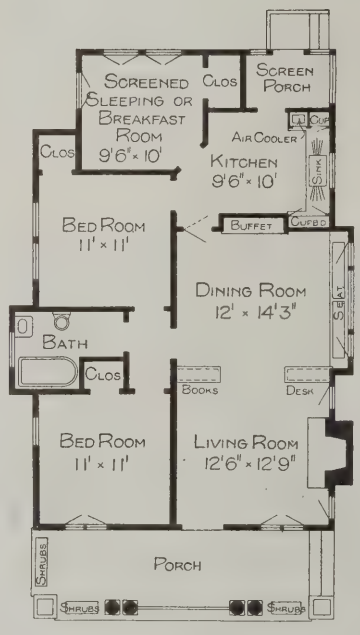
The massive chimney, which constitutes a feature of the exterior architecture of the cottage is of tapestry brick laid up in black mortar. The porch work is also of this material, and the porch floor is of cement with a brick border. The combination of colors is particularly effective, while the Colonial front door of mahogany affords a striking contrast and gives to the main entrance a dignity which it would not otherwise possess.

the buttresses containing the built-in bookcase and writing desk. In the dining room window extension is a seat with hinged top in two parts so that the space beneath may be utilized as a receptacle for many things.

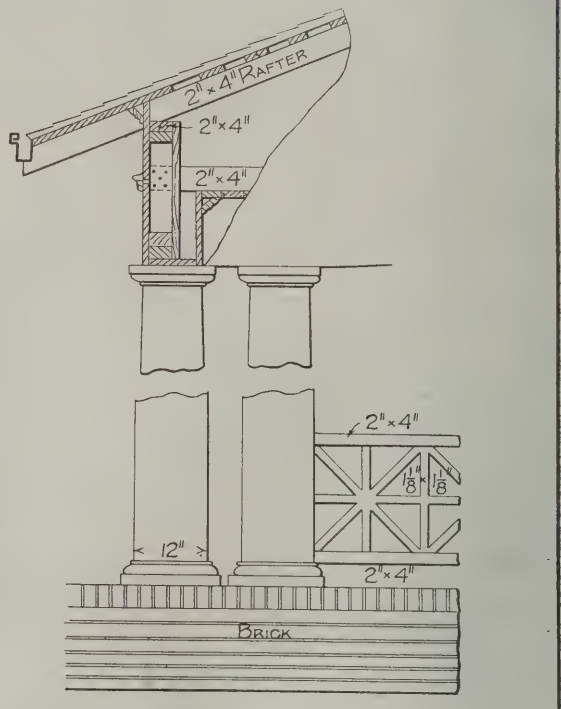
The living and dining rooms have oak floors, and the woodwork is of pine, stained a light golden brown. The kitchen is finished in the natural wood and has mottled painted walls on smooth plaster. The sink has a combination drain board. Adjacent to it are the air cooler and the built-in cupboards, bins, drawers, bread board, etc., etc.

According to the architect the bungalow here shown would cost a little more than $1,500 in California, this being without cellar and heating apparatus, as none is required in that climate, outside of the open fireplace. Built in colder climates the cost would be governed by local conditions and individual requirements.

The architect was Rex D. Weston, 507 Chamber of Commerce Building, Los Angeles, Cal.



Floor Plan—Scale 1/16 In. to the Foot



Details of Porch Construction—Scale ⅜ In. to the Foot

A Bungalow of the California Type

Rough Work on Interior Walls

A method for making the composition which is put on walls to give them a rough appearance is described in a recent issue of *The Painters Magazine* in the following language:

This, at one time, was termed "mud work" and the material was mixed very stout from one-third to one-half by weight of keg lead, balance being made up with equal parts by weight of whiting and plaster of Paris, thinned sufficiently with equal parts boiled oil and turpentine to be just barely workable with a stubby brush. Enough drier was added to keep it from sagging when on the wall and dry color used for tinting. While still wet it is gone over with a plasterer's smoothing or troweling board, that has been moistened with water. This is pressed lightly against the wall, then raised, so as to raise some of the paint in the shape of small pebbles, in other words, it is really enlarged stippling. When dry, the surface may be painted over with any desired color or tint. If done properly, it is very durable.

"Buying the Key"

A term much used in the east end of London, England, where the competition for living accommodations is keen is "buying the key." For example, a flat house containing accommodations for five families is in course of erection, but before it is anywhere near inclosed inquiries are made by prospective tenants as to the name of the owner, the rental and other particulars. If the building provides desirable accommodations the owner is besieged with offers from would-be tenants who are willing to pay as much as £2 (about $10) for the "key," or in other words—as there are no keys at this stage of the work—for the first choice of the apartments.

National Builders' Supply Association

The seventeenth annual convention of the National Builders' Supply Association will be held at the Hotel Statler, Cleveland, Ohio, on Feb. 17, 18 and 19, 1916.

The meeting will occur at a time when the first Complete Building Show ever held in America will be in progress from Feb. 16 to Feb. 26.

Two Handrailing Systems Contrasted

Interesting Comments by an Expert Stair Builder on the Tangent and Falling Line Systems

By Morris Williams

IT is the purpose of the present article to show wherein the two systems mentioned differ one from the other. The tangent system has been known to the trade for the last century and has been used as a guide by which to do stair work throughout that period in this and European countries. From its early inception it has been going through a number of changes following the worthy endeavors of ingenious mechanics to attain greater simplicity and more satisfactory results.

Those to whom the greatest share of credit in this connection is due are Robert Riddell and James Monckton. A number of others less well known perhaps have added much to the simplification and perfection of the system, but within the last quarter century, however, it may be stated that no efforts have been made toward further progress, indicating either a state of mind predicated upon the supposition that achievements accomplished comprised all potentialities of the system, or that the system in its present advanced state of simplicity is entirely satisfactory. Whatever the cause it must be considered that the system with all its merits proves inefficient to satisfy every demand of practical handrailing, causing a desire for a more perfect system, and one of a wider scope of operation.

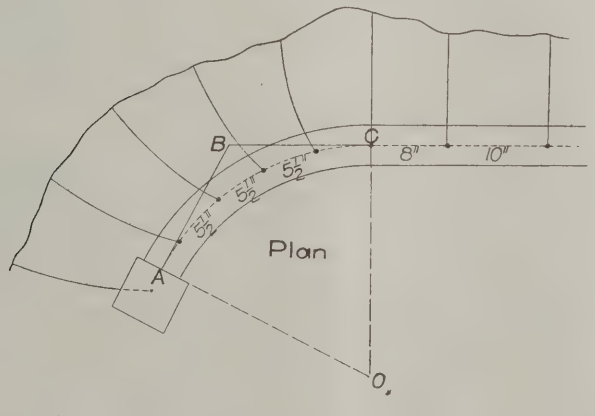


Fig. 1—Plan of a Turn Out Rail

The accompanying sketches clearly show in what manner and to what extent the two systems differ, also the extreme simplicity of the tangent system as well as the advancement toward more satisfactory results as indicated in the falling line system.

Referring to the sketches, Fig. 1 represents the plan of a turnout rail at the bottom of a stairway. The curve contains five winders, and the tangents form an obtuse angle. In Fig. 2 is shown the plan of the same rail, also its elevation, pitch of the

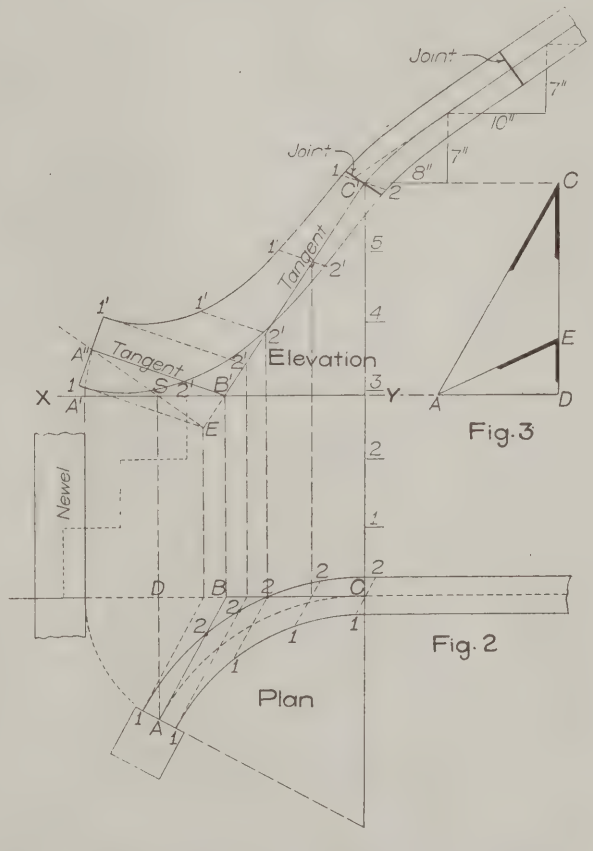


Fig. 2—Plan, Elevation, Pitch of Tangents, etc., of Same Rail
Fig. 3—Diagram Showing Method of Finding the Bevels

The Tangent and Falling Line Systems of Handrailing as Contrasted by Morris Williams

Such a desire is intended to be satisfied in the effort presented in the falling line system in which the development of the tangents as the cardinal principle of operation is replaced by an arrangement of lines to project a predetermined falling line of the center of the wreath. In this system the wreath is not assumed to lie upon an oblique plane as in the tangent system, but to strictly follow the best contour that the stair requirement demands, thus expanding in its operations beyond the limitations of the tangent system.

tangents and the development of the face mold according to the tangent system. To simplify the construction of the wreath the ramp is made in the straight rail adjoining as at *C'*.

The method selected to develop the face mold is the simplest of all; namely, the ordinate method. The principle of operation is to locate a certain number of ordinates across the plan rail as shown in Fig. 2, at 1-2, 1-2, etc., and project them to the elevation as shown at 1'-2', 1'-2', etc., making those in the elevation equal in length on both sides

of the tangent to their correlative ordinates across the plan. Next trace the curves of the mold through the points found.

The only apparent difficulty in this operation is to find the direction of the ordinates. The plan ordinates in this example will be parallel with the bottom plan tangent *A B*, because it is a level tangent.

Finding Direction of Ordinates

To find the direction of the face mold ordinates draw a line from *A* in the plan through *D* to *S* upon the line *X Y*. Then draw a line through *S* as shown by *E, A″*, square to the pitch tangent *B′ C′*. Now connect *A″* with *B′* which will be the projected bottom tangent, and because the tangent is level this line also gives the direction to the face mold ordinates, as indicated in the drawing. The tangent thus becomes the directing ordinate of the face mold. This simple operation is all that is necessary to lay out the face mold by the ordinate method.

To twist the wreath it is necessary to find two different bevels because the pitches of the tangent are different.

The bevels are shown in Fig. 3. Make *A D* in this figure equal to *A D* on the plan in Fig. 2. Make *D E* in Fig. 3 equal to *S E* of Fig. 2, and make *D C* in Fig. 3 equal to the full height of the elevation as shown in Fig. 2. Now connect *C A* and *E A* for the two bevels. The bevel *C* is to be applied to the bottom joint *A″* of the wreath and bevel *E* to the top joint *C′* all as shown in Fig. 4. This drawing also shows the wreath after it is twisted. It also indicates the thickness of the plank required for the wreath and shows that the center of the wreath coincides with the center of the plank which is a distinctive feature of the tangent system. On the other hand, the principle of operation according to the falling line system is to make the wreath agree with the projection upon the plank plane of a predetermined falling line, as will be shown in the explanation of the following figures, which have been prepared to show how to lay out a wreath of the same plan conditions according to the falling line system.

Laying Out a Wreath

Fig. 5 illustrates the plan, elevation, development and the section bevels. The falling line is shown dotted, extending from the top joint at *D′* of the elevation to the bottom joint at *A′*. From *C′* to *D′* it shows a ramp to agree with the straight rail and at *A′* an easement to butt plumb with the newel.

The pitch of the top tangent *S, C′, B′* is discretionary; depending absolutely on good judgment. In Fig. 5 it is shown touching the falling line at the point 5 and continues to the ground line at *N*, from which point a line is drawn to *M* on the floor line and from *M* through *A* to 1 as shown on the plan. The last line is the plan directing ordinate.

The seat line as shown is drawn square to it, and through the point 5, which is the center, and from which the plan rail is struck.

To project the falling line to the plank pitch, ordinates are drawn from the plan center of the rail shown at 2, 3, 4, 5, *C* and *W*, across the seat line and continue beyond it a distance to agree with the length of the projectors shown in the elevation extending from the line *X Y* up to the falling line and shown at 2-2, 3-3, 4-4, etc. For instance *D, D′, S′* below the seat line is made equal to *D′, S* of the elevation above *X Y;* 6-6 of the plan being equal to 6-6 of the elevation; 5-5 of the plan equal to 5-5 of the elevation, etc., etc.

By tracing a line to touch the points thus determined upon the ordinates we obtain the projection upon the plank pitch of the falling line as indicated by the dotted curve 1, 2, 3, 4, 5, 6 *D′*. The plank pitch is drawn from 1 through 5 to *S′* as shown. Now draw the offsets from the points 2, 3, 4, etc., upon the falling line projection to *a, b, c,* etc., upon the plank pitch.

Finding the Bevels

The bevels shown in the figure indicate the twist in the wreath at different sections along its length. They are found as follows: Parallel to the plank pitch draw a line from 5 on the seat line to *Z*; place in the compasses a distance equal to the radius 5 *C* or 5 *A* of the plan center of the rail. Fix one point of it in 2 on the seat line and turn around to cut the line 5 *Z* in point 2′. Draw the line 2′ *x* square to 5 *Z* and connect 2 with 2′ as shown for the bevel.

Repeat the operation for the other bevels by fixing the point of the compasses alternately in 3, 4 and 6 upon the seat line and extending it out to cut the line 5 *Z* in the points 3′, 4′ and 6′ as shown. No bevel is required from point 5 because it is upon the neutral or minor axis.

The two bevels marked *J B* on the plan, Fig. 6, are to be applied to the joints in the same manner as the bevels in the tangent system are applied and for the same purpose of twisting the wreath.

They are found by the following simple operation: For the top joint at *D′* a line parallel with the joint is drawn from *Z* upon *X Y* to *E* upon the prolonged part of the top tangent. This line is revolved as shown by the arc to *H′* upon *X Y* and dropped to *H* upon the floor line. From *B* and square to the floor line is drawn a line to *K* upon the ordinate. From *H* also is drawn a line to *K*, forming the angle at *H* which is the bevel required to apply to the top joint *D′*.

Difference in the Operation

The reader should note the difference between the operation in the finding of this bevel and that for finding the same bevel in the tangent system. The line *Z E* in the tangent system is always made square to the tangent while in the falling line system it is made parallel to the tangent joint as shown at *D′*. Observe also that the triangle constituting the falling line bevel as shown in Fig. 6 is made up of the base line *B K;* a line parallel to the plan joint *W* and a height equal to *Z E*, a line which is parallel to the tangent joint *D′*.

The same operation is shown applied in the figure to find the bevel for the bottom joints. This joint is shown at *A′* upon *X Y* plumb butting square with the newel. Draw a line form *Z* parallel with the joint as shown to *B′*, then revolve *B′* to *X Y* as shown by the arc, drop a line to *R* upon the floor line and revolve *R* as shown to *X*. Now draw a line from *B* parallel with the plan joint *A* to *P* upon the ordinate, and connect *P X* for the bevel.

It will be seen that the base line *B P* in this triangle is parallel to the plan joint *A* and that its height *B X* is a line equal in length to *Z B′*—a

line parallel to the joint A' and shown upon X Y butting plumb with the newel.

These two bevels as already mentioned and those shown in Fig. 5 are exclusively for the purpose of twisting the wreath. The two in Fig. 6 are to be applied to the ends and those in 5 to the intermediate sections.

In addition to the twisting bevels the construction of this wreath owing to the ramp at the joint D' and the easement at the joint A' require two more for each joint—one to be applied to the face of the plank and the other to the face of the joint. The object is to produce a true butt at D' with the flight rail and at A' against the newel.

To find the bevels for the top joint D' in Fig. 6 draw a line from B' parallel to the joint. From S draw the pitch of the flight rail as shown to 2. At 2 place the joint bevel H shown in the plan, and from B' draw a line square to the blade of the bevel as shown from B' to 3. Now revolve the line B' 3 as shown to 4, and draw the line 4 S to give the bevel which is to be applied from the face of the plank through the face of the joint.

For the other bevel revolve 2-3 as shown to 1 and connect 1 with S—the guide line, which determines the correct direction of joint on face of plank.

The same operation is shown at A' to find the bevels for the bottom joint. Place the bottom joint bevel X of the plan at A' as shown in the elevation. Draw a line from B'' square to A' 3. Next revolve 3 to X and connect X with B' for the bevel which is to be applied from the face of the plank through the face of the joint. Again revolve the point 3 to 5 and connect 5 with B' for the guide line.

In the remaining figures it is shown how the bevels are manipulated in the layout of the face mold and the squaring of the wreath. In Fig. 7 is shown what is called a section board, whereon are drawn square sections of the wreath at points corresponding with those marked 1, *a*, *b*, *c*, *d*, *e*, and *f* upon the plank pitch indicated below the seat line in Fig. 5. The dotted line X Y in Fig. 7 represents an assumed center line of the plank and is used as a base from which to measure the offsets 2, 3, 4, 5, 6, and D' of Fig. 5 from the plank pitch to the falling line projection which determines the deviation of the center of the wreath from the center of the plank. This produces a wreath which will be in agreement with the falling line and not in the center of the plank as it is in the tangent system. The bevels shown on the ends 1 and 7 are

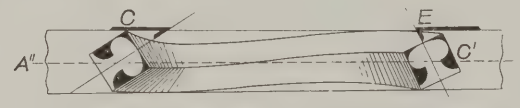


Fig. 4—Showing Manner of Applying the Bevels

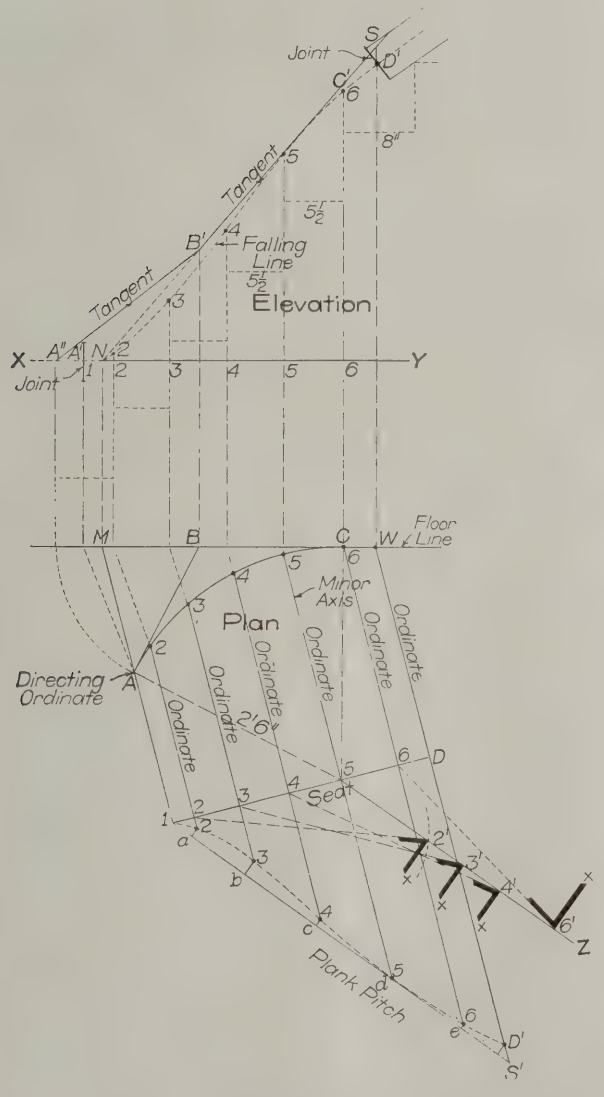


Fig. 5—Plan and Elevation Showing Falling Line and Its Projection to the Plank Plane or Pitch and How to Find the Section Bevels

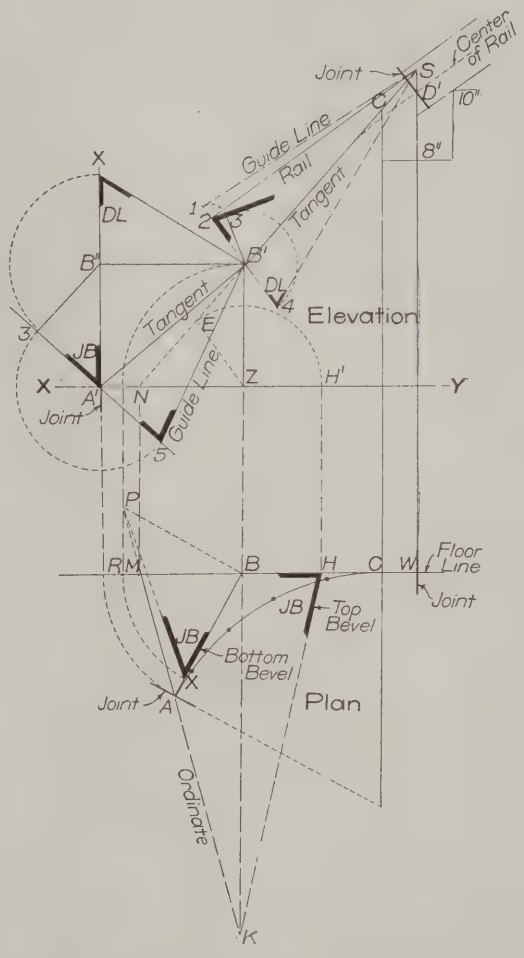


Fig. 6—Plan and Elevation Showing How to Find the Joint Bevels and Guide Line

The Tangent and Falling Line Systems of Handrailing as Contrasted by Morris Williams

the joint bevels *J B* shown in Fig. 6. The intermediate bevels are those shown in Fig. 5 bearing corresponding reference letters.

Upon each offset point, 2, 3, 4, 5, etc., is drawn a square section of the wreath as shown upon the blades of the various bevels. The squares indicate the amount of twist in the wreath at each section and serve as guides in the squaring of the wreath in the following manner.

On each side of the band saw surface of the wreath material find where the corners of the rail come through as indicated upon section board and connect the points by penciling. Upon each surface of the plank find where the sides of the wreath come through and curve in the points with a corresponding part of the face mold curve. Proceed to remove the waste wood to these lines and obtain the sides of the finished squared wreath first, after which remove the top waste wood to points agreeing with the corners already worked and to the section lines coming through to the upper surface.

Having completed the top surface the depth can

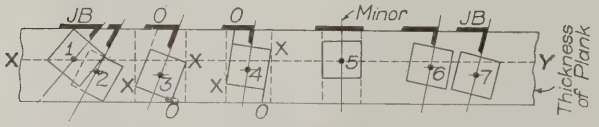


Fig. 7.—Section Board Showing Edge of the Plank

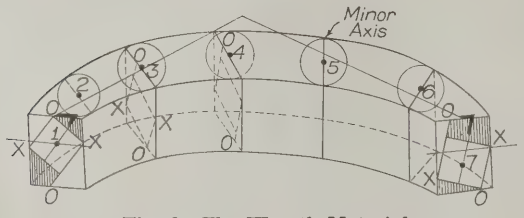


Fig. 8—The Wreath Material

be gauged therefrom and the lower waste wood removed to the gaging. An indication of the operation is found in the sketch, Fig. 8, which represents the wreath material cut to the form of the face mold shown in Fig. 10. Its thickness having been determined as indicated in Fig. 7. A section of the wreath is shown at each end drawn upon the joint bevels and in position agreeing with the offsets 1 and 7 on the section board, Fig. 7. The wreath sections are shown at *X* and *X* to touch the band saw sides of the material, and at *O* and *O* upon the top and bottom surfaces is indicated where the sides of the wreath come through.

After all the points are connected and the waste wood removed the square wreath will appear as in Fig. 9, showing the easement and ramp, also its deviation from center of the plank.

The method for laying out the face mold is shown in Fig. 10. The base line 1 *a, b, c, d, e, f, S'* is a duplicate of the plank pitch shown in Fig. 5. Upon each point draw perpendicular lines the exact length of each to correspond with the plan ordinates. Measure from the seat line to the plan center of the rail shown in Fig. 5. Make 1 *A* in Fig. 10 equal to the ordinate 1 *A* in Fig. 5; *a* 2 equal the ordinate 2, 2 of Fig. 5, *b* 3 equal to 3, 3 of Fig. 5, etc.

The diameter of the circles shown on each point corresponds with the amount of twist in each section of the wreath as shown on the section board, Fig. 7. For instance, the amount of twist in section 3 is indicated by the distances between the two dotted lines *X X*, then the diameter of the circle on point 3 of the face mold should be the same. Proceed in the same manner for all the circles and draw the face mold curves by tracing the circumferences of the circles.

To find the tangents make 1 *A M* of Fig. 10 equal to the directing ordinate 1 *A M* shown in Fig. 5 and connect *M* with *W*. Place in the compasses the length of the bottom tangent *A" B'* shown above *X Y* in Fig. 5. Fix one point in *A* of Fig. 10, extend the other to cut the line *M W* in the point *B* and connect *B* with *A* for the tangent. The other will be the line *B W*.

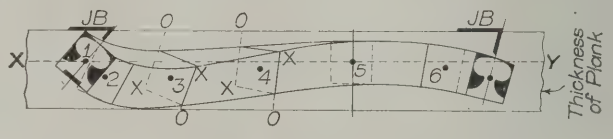


Fig. 9—The Material Squared Showing the Wreath

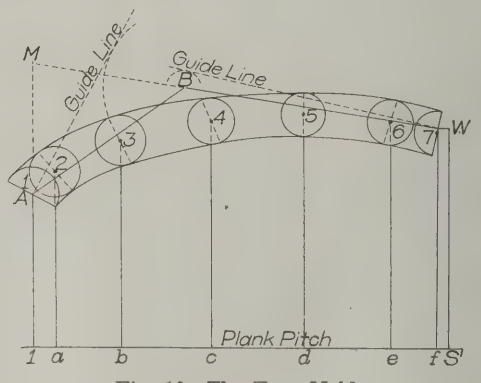


Fig. 10—The Face Mold

The Tangent and Falling Line Systems of Handrailing as Contrasted by Morris Williams

To draw the guide lines place in the compasses the distance 2 3 shown upon the top bevel above the line *X Y* in Fig. 6. With one point in *B* turn around and draw a line from *W* to touch the curve as shown in Fig. 10 for the guide line. Again place in the compasses the length shown from *A'* to 5 of the elevation Fig. 6; turn around and draw a line from *A* to touch the curve as shown in Fig. 10. The joints at *A* and 7 are square to the guide lines.

New Idea in Fuming Oak

A new process of fuming oak was described in a recent number of the London *Timber Trades Journal*. The usual way of evaporating ammonia for fuming has been to allow it to drop from a tank outside the vat on a series of slides inside, and finally into a jar on the floor, this dripping process extending over a period of from twelve to twenty-four hours.

The new method is to place in a long, shallow pan about one-third the quantity of ammonia usually required, and place this over a coil of steam pipes, says the *Hardwood Record*. The advantages claimed for this way over the old method are that a more uniform color is obtained, the work is done in half the time, and much less ammonia is required.

CORRESPONDENCE

A Department Where Those Interested Can Discuss Trade Topics—Every Reader is Invited to Participate

Building Methods on the Pacific Coast

From O. K., Wapinitia, Ore.—In the October issue of the paper I notice that Mr. Barry has an article on roof framing and that Mr. Hobart, in an extended article, ridicules the method the Westerner employs in shingling, although to a Web-footer, Indiana is pretty far East, so perhaps it may interest some of the readers to know how *we* shingle houses on the Pacific Coast.

We distribute the shingle bunches over the roof as Mr. Hobart shows in one of his pictures, but we do not always carry them up at one point as the Hoosier did. Sometimes we draw them up with a pulley and line before the last of the roof sheathing is nailed down, more especially if there are a great many bunches to go up, or if the building is a tall one. Then we break the bunches apart and stick them between the roof boards—just a handful in a place.

If we have not already made one, we construct what we call a "shingling-jack." There are different ways of making these, but I always construct them after the pattern of which I inclose drawings. I make them of a 1 x 8-in. piece and in the lower end at *A* of Fig. 1, drive a row of 8d nails and break off the heads. In the end *B*, I drive a row of shingle nails and the jack is then ready for use. Fig. 2 represents a rear view of the device.

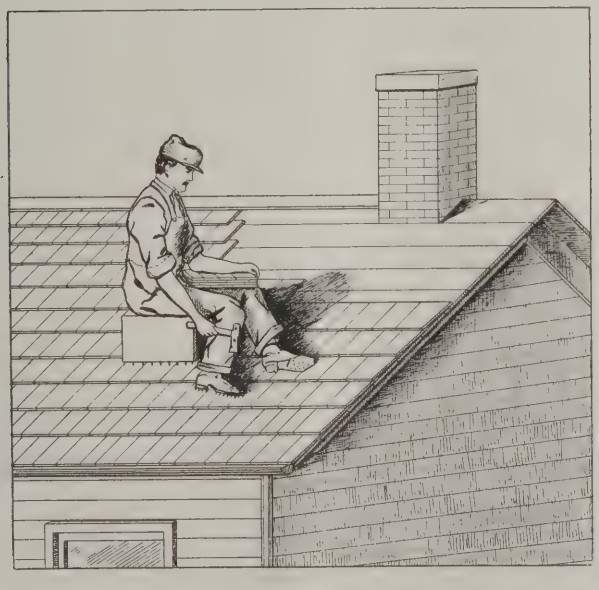
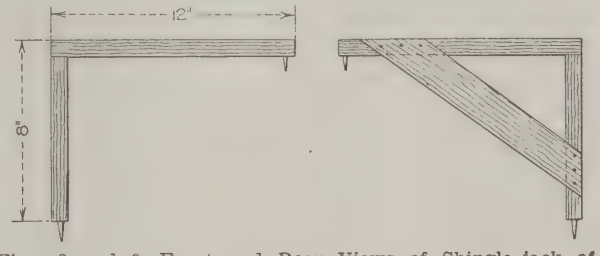


Fig. 1—The Shingle-jack in Use Upon a Roof

For a hatchet we use a lath hatchet and some of the boys make use of a small gage fastened with a set screw, but for myself I had the blacksmith drill three holes, 4 in., 4½ in. and 5 in. from the pole end; thread them and then thread a plug to screw into them. With this device I can lay shingles 4 in., 4½ in. or 5 in. to the weather, but the gage can be set anywhere though it sometimes works loose and slips. I like the plug better.

As the ordinary pockets in a carpenter's apron are unhandy to get into, I use a single pocket fastened to a belt and wear the pocket over my left hip. I put plenty of logger's calks in my shoe soles and am then ready to shingle any old roof up to a 2/3 pitch without any staging—not even the 2 x 4-in. scantling of which Mr. Hobart complains.

It is some awkward starting the first corner and the double course will bother some if the roof happens to be steep. We will therefore suppose that the carpenter has gotten over these slight difficulties and is ready to go to shingling right. Set the jack on the shingles already nailed and sit down on it good and hard. Plant the right foot on the roof below you and draw the left foot back almost under you, letting the leg lie flat on the roof. Fig. 3 of the sketches affords an idea of the position.



Figs. 2 and 3—Front and Rear Views of Shingle-jack of 1/3 Pitch

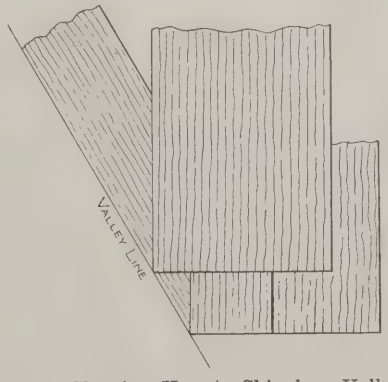


Fig. 4—Showing How to Shingle a Valley

Building Methods on the Pacific Coast as described by "O. K.," Wapinitia, Ore.

You may feel a bit timid at first but you will soon get over that as I have never had a slip as yet. Do not put so many nails in your mouth but

what you can handle them well with your tongue. Now turn two nails between your lips with the points out—remember always two. You will never be a shingler if you do not learn to handle two nails at a time.

Now draw out a handful of shingles; lay them on your left thigh, with the butts toward your right hand; draw them up against your body and you can tell by the feel of them which is the widest one. Draw it out and lay it with the corner nearest you in an exact line with the corner of the last one you nailed down. Reach out with the hatchet and hook the gage under the butt of the last course nailed on and lay the farther corner of the shingle against the pole of the hatchet. Hold it there with the hatchet while you reach with your left hand and take the two nails from between your lips. Nail the farther edge first and then the edge nearest you and you are ready to repeat the operation unless you think that shingle is too wide for only two nails; if it is, put in two more.

Never drive a nail in the middle of a shingle. Now take the next widest and lay it on top of the one you have just nailed; then the next widest on top of that and repeat this operation until you have as many courses started as you can handily reach. I generally carry seven courses across the roof at one time.

Some reader will be sure to ask in what way is this better than the other method. In reply I say that no time is lost in staging up; you are not running back and forth the roof lining up straight edges but are sitting on the jack nailing shingles all the time. You can lay a straighter line and a better roof than you can with a straight edge. You are not so tired at night though you have nailed on more shingles than you could by the other method.

It is not at all unusual to find a carpenter who can lay and nail 5000 a day of our Oregon cedar shingles, while the boys who follow the work the year round lay 8000 shingles and better. There is one shingler among my friends who thinks he has not done a day's work until he has nailed 10,000 shingles. Yes! they are well nailed, too. How many of you Easterners can do that over a straight edge? Let all interested speak up.

I am also sending a sketch, Fig. 4, showing the proper way to lay a shingle in a valley. After the tin has been fitted and nailed, strike a line on both sides, and as you lay the course out to the valley be sure that the corner of the last shingle touches the line you have struck. Now select a good shingle about 8 in. wide and lay the lower corner against the corner of the last shingle nailed with the edge lying along the line of the valley, all as clearly indicated in the drawing. Mark the edge where it crosses the edge of the shingle just nailed, and take the hatchet and trim to the lower corner, or if you want to be economical, you can tack a bunch of them together with a shingle nail and cut them with the saw, using the corners on the hips if you have any.

Now lay the shingle just as it was placed when you marked it with the fiber running up the valley and the end wood against the other shingle and not the end wood against the line as I have seen it, as that necessitates double coursing all the way up the valley and makes an unsightly job.

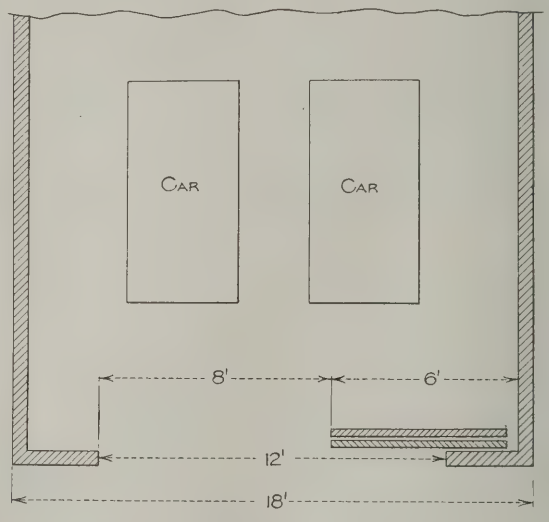
Designing Terra Cotta Trimmings

From North Western Terra Cotta Company, Chicago, Ill.—There appeared in the issue of the paper for September a number of questions by a correspondent, one having to do with regard to the precautions to be used in designing terra cotta trimmings. Replying to this we would suggest to the correspondent that he be careful to maintain suitable relation of length to section. For a 3 x 4-in. section the lengths should not be more than 14 in., and for an 8 x 16-in. section not more than 2 ft., and practically no pieces should exceed 2 ft. 6 in. in any dimension.

Suitable shelf supports should be provided over openings and for extreme projections there should be steel lookouts and hangers. Generally speaking the manufacturer can be depended upon to arrange the construction skillfully.

Simple Solution of Garage Door Problem

From John N. Thompson, New Rochelle, N. Y.—Many times your excellent journal has been of aid to me and in return for information derived, I am sending a simple solution of the garage door



Simple Solution of the Garage Door Problem

problem which may be of interest to some of the readers of The Building Age. The sketch, which represents a partial plan of a garage of a size suitable for housing two cars, shows double sliding doors at the main entrance. Each half of the sliding doors is 6 ft. wide and the two parts run on separate tracks allowing an 8-ft. passage on either side.

Why the Chimney Tops Overhang

From E. A. N., Rockville, Conn.—I have read the comments of "D. P. B.," Redford, N. Y., and of "G. W. N.," of Toledo, regarding my inquiry as to the cause of certain chimney tops leaning toward the east to the extent of 2 in. or more in a height of 4 to 5 ft. I do not regard the expressed opinions of either of these correspondents as at all satisfactory, more especially as I asked the question to obtain the opinion of practical men. Scientific men claim the phenomena is

caused by cold weather. I would state that two of the chimneys have been laid up twenty-eight years, and four of them for more than ten years, and none of them overhung until within the last five years. I laid them up myself and left them plumb, square and level.

Having been in the business fifty-six years it seems as if I ought to be capable of plumbing a corner.

From W. B. B., Southampton, N. Y.—Regarding the query of "E. A. N.," Rockville, Conn., it is my opinion that as most storms are from the east and during freezing weather the wind is from the northwest and west, this condition causes the west side to stay frozen while the east side thaws from the heat of the sun during the day, then freezes again at night when the fires are low. This causes the mortar to crumble and some of it to wash out during the storms and eventually the chimney leans as stated by the correspondent. I have taken down a number of chimneys and have found the first few courses to be plumb while if they were built leaning, the tendency in that direction would start at the flashing.

Criticism Invited on Barn Roof Construction

From L. H. B. H., Palestine, Ill.—I am submitting sketches of two styles of barn roof construction which have just been erected here and

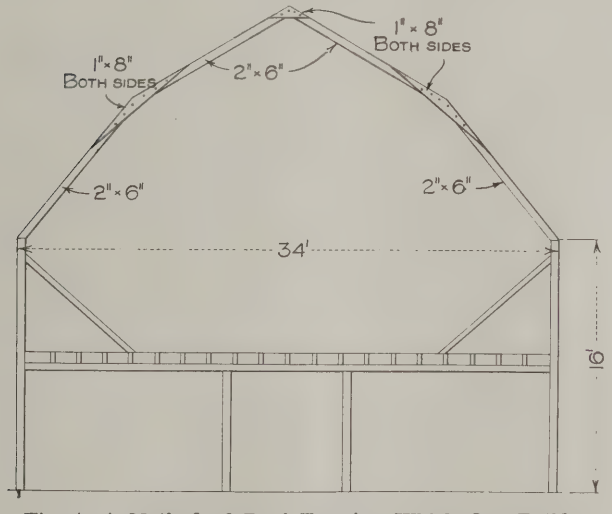


Fig. 1—A Method of Roof Framing Which One Builder Designates as "Self-Supporting"

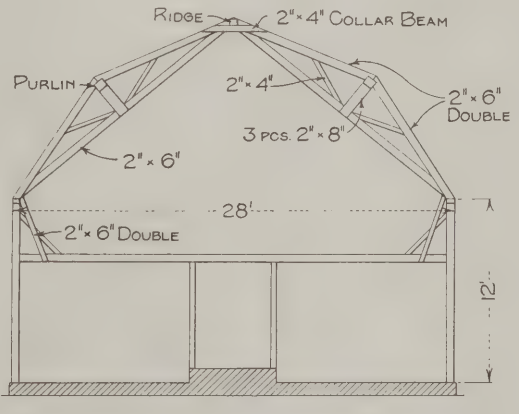


Fig. 2—A More Substantial Form of Roof Framing

Criticism Invited on Barn Roof Construction—Sketches Submitted by L. H. B. H.

I would like to have the opinions of practical readers of THE BUILDING AGE concerning them. In the cross-section of the barn in Fig. 1, the span is 34 ft. and the builder calls it a "self-supporting" roof. There are no roof trusses or purlins, and the rafters are spiked together as shown. The builder's claim is that where timbers or trusses of any kind are used the roof is not self-supporting, but is supported by such timbers or trusses.

In the cross section of the barn in Fig. 2 there is a truss at each bent and the rafters are 2 x 4 in., resting on purlins and a heavy ridge plate. No bolts are used in either roof.

The question arises, is the construction indicated in Fig. 1 strong enough, and what is a self-supporting roof?

What Constitutes a Day's Work for a Carpenter

From "Builder," Danville, Ill.—A feature of the building business which has often come to mind but which neither time nor experience has satisfactorily demonstrated is the amount of work in the various branches of his trade that the average carpenter ought to do in a day of 8 hours. In other words, how many windows should the average man case in a day; also how many doors; how many feet of clapboards should he be able to lay and how many thousand shingles?

In regard to the latter, I do not mean the expert who goes about the country with a patent shingling hatchet and under favorable conditions can lay all the way from 4,000 to 8,000 shingles in a day, but rather the average man such as we usually find when hiring a force of mechanics to work on dwelling houses or other buildings having shingled roofs.

What is a day's work in making window frames, both single and weighted?

How many feet or squares of flooring should a man lay and how many feet of base, stairs, partition, wainscoting, etc., should be put in place?

It seems to me that a discussion of some of these phases of carpentry work would prove not only interesting but instructive to many of the present-day workers, as it would enable one to judge of the relative efficiency of workmen in different sections of the country.

Note.—Some ten years or more ago we presented in these columns not a little very interesting comment on the subject raised by our correspondent above, letters being printed from readers in practically all parts of the country. The conclusions reached, however, were almost as varied as the number of those participating in the discussion, but the opinions expressed were highly interesting and of suggestive value. We have no doubt that the present generation of readers will be able to throw much light upon this subject, more especially in the way of telling just what the average carpenter is expected to do in a day in the locality in which the writer may reside. There have been many changes in the last decade in methods of doing work and what was current practice then may be out of date now. The columns are open to all, and we trust the practical men in the trade will not hesitate to contribute to the discussion.

Details of Picket and Board Fences and Grape Arbor

From John Wavrek, Jr., Pa.—There appeared in the Correspondence Department of the paper for October a request by "M. M. L.," Orange, N. J., for details of picket and board fences and also of a grape arbor. In what is here presented I have made an attempt to meet his requirements, although the information does not cover all the data for which he asks.

Picket and other wooden fences have, to a great extent, been consigned to oblivion in our part of the country and are being replaced with more modern and durable material, such as cement, iron and galvanized wire. Of the two last mentioned there are concerns which issue illustrated catalogues describing their goods, but the designs which I submit are of a kind anyone may cheaply have built or possibly build himself, which is still less expensive, if one is able to do work of this kind.

In Figs. 1, 2 and 3 are shown a picket fence of a design suitable for the better class of residences and is made with the idea of long years of service. The posts are of cement reinforced with two iron rods running vertically the full height.

A mold for such a post is not difficult to make and may be stored away for future use. The length of the posts may be made to suit requirements. They should be placed in the ground about 2 ft. and the posts here shown are 5 x 5 in. and 4 ft. 4 in. above ground. The rails for the fence are 1¾ x 3¾ in. and slightly beveled on top so as to readily shed water. They are fastened to the posts by means of ½-in. bolts as shown. The pickets are 1¼ x 1¼ in. and are 4 ft. in height. These are kept in stock by most planing mills or lumberyards.

Figs. 4 and 5 represent a fence made of 4-in. iron posts to which are bolted 1⅛ x 5½-in. fence boards, surfaced on one side with the top edge beveled so as not to absorb water easily. To the fence boards is fastened galvanized wire netting of any desirable quality or width according to the special requirements of the case.

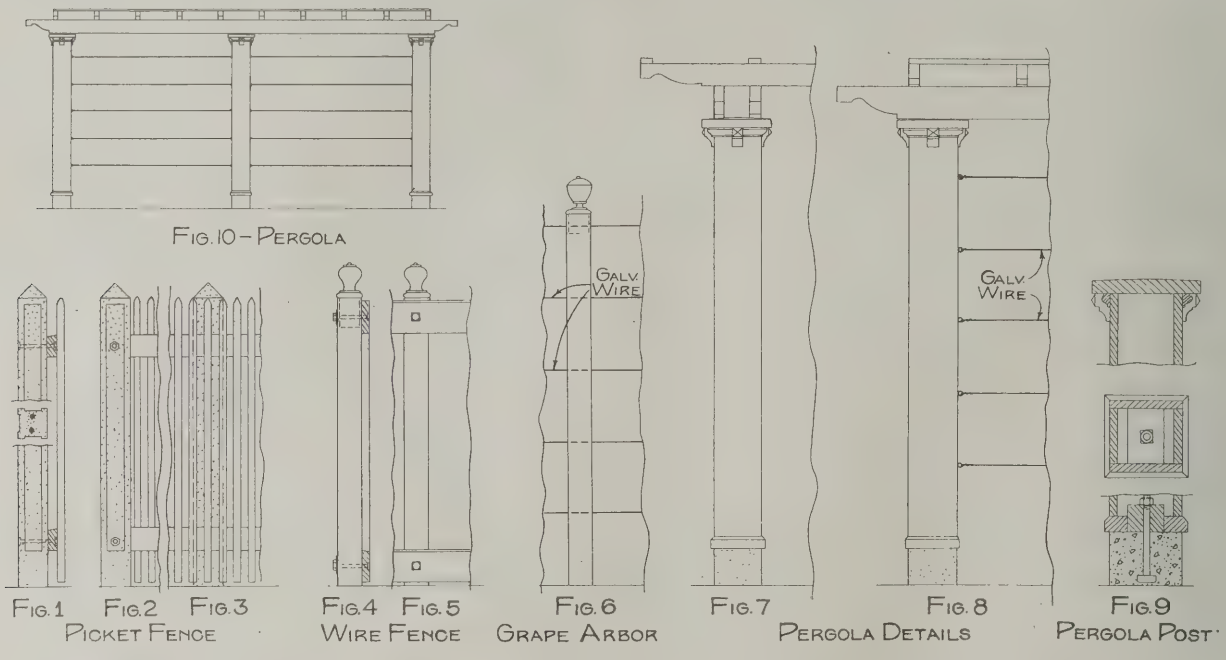
The top of the iron post, which is hollow, may be closed with neat turned tip which should fit tight and is kept in place by means of the bolt which also holds the fence board. This makes a very good party fence between two adjoining properties. The posts should be imbedded in a concrete mixture which will keep them very rigid.

In Fig. 6 is a detail of a grape arbor designed to throw very little shade, it being 15 ft. 3 in. from the ground to the upper wire and may be made still lower if desired. The posts may be placed about 10 ft. apart and connected by strong galvanized wire passing through holes in the post. The latter are of 4 in. diameter and topped by an ornamental urn. These posts should also be fastened in cement the same as those for the wire fence.

Figs. 7, 8, 9 and 10 show a more elaborate treatment in a grape arbor in the shape of a pergola, this making a beautiful and useful ornament for any garden, and if put up by the owner is not very expensive. The bases are of concrete 8 x 8 in. and 2 ft. deep. In the center at the top a bolt is placed in position when making the base. This bolt is ⅝ in. thick, about 10 in. long and serves to hold the wooden base in place as indicated in the detail, Fig. 9. The wooden post is nailed securely to a piece of 3 x 4-in. hemlock which fits inside of it. To this base the post is then fastened.

The posts should be made of ⅞-in. cypress, x x 8 in. square as shown in the detail. The total height of posts is 6½ ft. from the ground to the bottom of the 1¾ x 5¾-in. rafters. On top of these rafters, which serve as a plate, are placed 1¾ x 3¾-in. rafters about 18 in. on centers, and to these rafters are fastened ⅞ x 1¾-in. strips placed 18 in. on centers.

The plan of the pergola may be of any desirable size, as, for instance, 8 ft. wide x 14 ft. long, outside of the posts. This size will allow of stock lengths of rafters and require six posts.



Details of Picket and Board Fences; Also of Grape Arbor, as Submitted by John Wavrek, Jr.

Construction of a Covered Gateway

An Entrance Design Well Suited for the Country Estate or Suburban Grounds—Various Details

THERE are many places in the country and suburbs where it is both convenient and desirable to have the main entrance gateway to the grounds or estate provided with a roof covering of some sort and of a design which will in no sense detract from the neat appearance of the other parts of the construction. While adding to the general effect the roof serves as a slight protection at least to the gate and its fittings, thus prolonging the duration of their service.

laid on a 9-in. bed of cement concrete. The oak pillars at the right and left of the gate, and forming the support for the shingled roof, are supported upon stone bases worked to the shape shown and tooled to an even surface. The coping of the side walls should be of the same kind of stone as that used for the bases. The pillars are anchored to the stone base by 1-in. iron bolts.

According to an English contemporary from which these particulars are gleaned the rafters

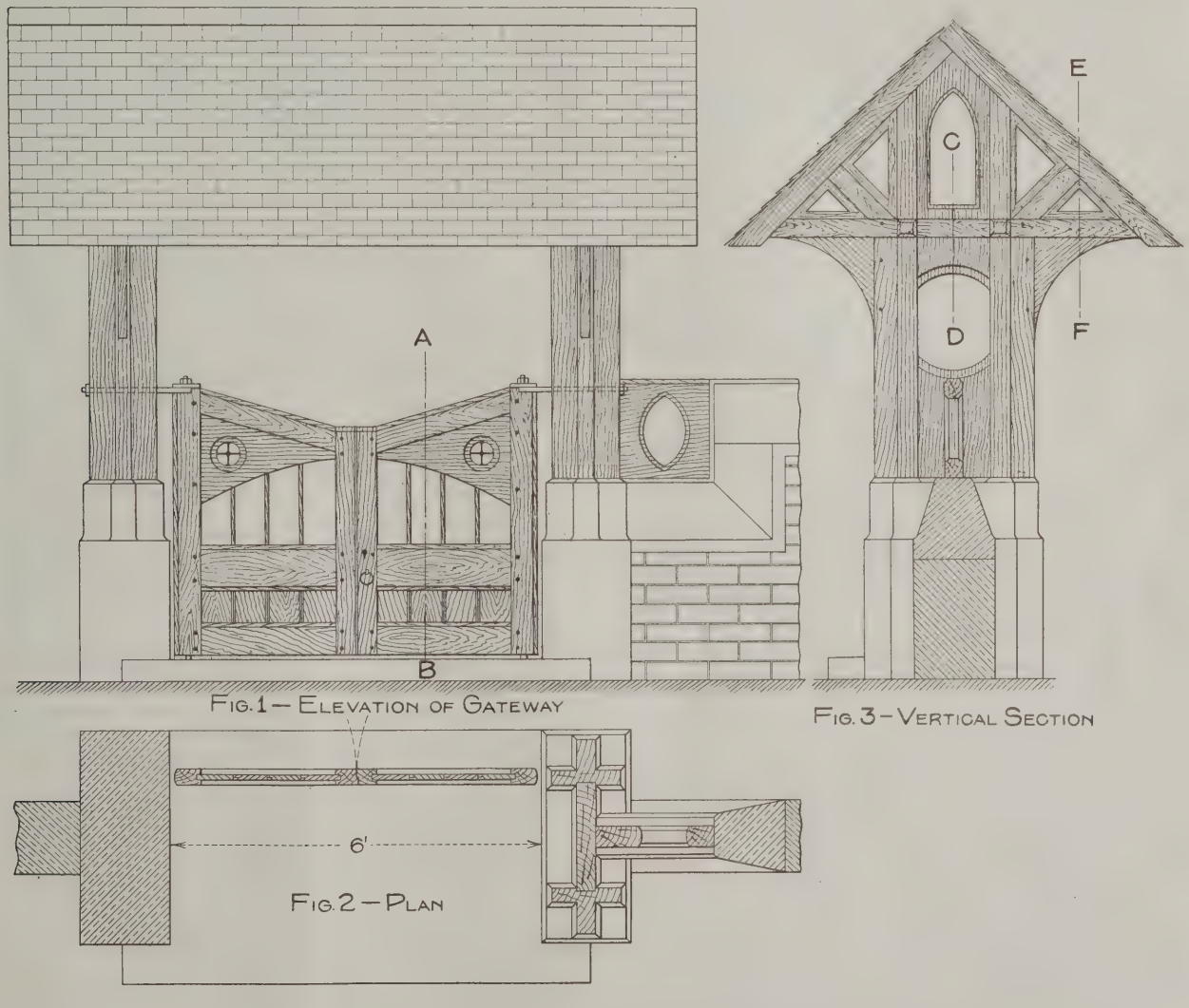


FIG. 1—ELEVATION OF GATEWAY

FIG. 3—VERTICAL SECTION

FIG. 2—PLAN

Construction of a Covered Gateway—Plan, Elevation and Section

In the illustrations presented herewith the practical builder will find a suggestion for a gateway and its covering which may serve as a guide in connection with local work he may perhaps be called upon during the season to execute. This gateway is of substantial construction, well seasoned oak being suggested for the woodwork. The step or threshold, as it might be termed, is of stone and should be covered with ¾-in. V-jointed oak boards over which 1 x ¾-in. oak battens should be fixed. These in turn carry tile or shingles as the case may be, forming the protective covering.

The gates shown in elevation in Fig. 1 and in plan in Fig. 2 are made of 3-in. oak plank and are hung by pivot and iron socket at the bottom and pivot and bolted eye at the top. To form the top

panel iron bars 1 in. square in cross-section are set anglewise in the rails. A rabbeted folding joint is formed on the two gates and a strong bolt and lock are fitted to complete the work. The oak work of the construction has an oil finish.

Fig. 3 represents a vertical section through the covered gateway, while Figs. 4 to 7 inclusive are enlarged details, clearly indicating the manner in which various parts of the work is done.

Art and Democracy*

When you say "art" most people think of museums, picture galleries and old masters.

It is quite the thing for gentlemen burdened with wealth to collect expensive and curious bric-a-brac and, upon the occasion of their death, to leave it to the city, to be known as the Smith-Jones collection.

What good is it? Who goes to museums? A very small portion of the people. The effect of the "art gallery" upon the community is something, but the whole idea is a very poor grasping at the real function of art in democracy.

If benevolently inclined folk want to increase the ministry of the beautiful, let them improve the appearance of the houses of the citizens, the furniture in them and the grounds around them. Particularly let them make beautiful the homes of the poor.

A hundred thousand dollar picture from Europe is not in any way so valuable artistically as $10,000 worth of trees would be, or $20,000 spent on adorning the water front, or $50,000 invested in changing slum tenements into home-like dwellings.

Art for the exclusive set only, whether that set is millionaires or alleged highbrows, is as bad as anything else that is exclusive. Unless art can get to the common people it is a superfluity.

In Minnesota, the director of the State Art Commission, Maurice Irwin Flagg, has been doing some sensible and real art promotion. He supplies farmers and dwellers in small villages gratis with models for attractive homes and landscape designs.

The purpose is "to beautify the dwelling places of the people and develop at the same time ambition for and a love of the beautiful in the minds of men with small incomes."

This is the sort of art work that is sincere and effectual. It gets somewhere. It helps. It is not a conceited effort to appeal to the superior classes.

When we do away with the ugly "shoe-box" farmhouse, with its abominable barn, and substitute something picturesque in their place; when we transform the village from a collection of huge dry goods packing cases set in rows, dull and dreary and stupid in appearance, into a lovely garden, trees and flowers, with houses of charming and individual attractiveness; when we get some sort of artistic unity in our city building; then we shall be entitled to be called lovers of beauty.

Other States are following. California, Kentucky, Texas and Indiana are formulating programs similar to that of Minnesota. Germany, Italy, France and Canada have published the Minnesota plans.

Says Mr. Flagg: "This better housing program is supplementary to the other work of the commission. It circulates exhibits of industrial art, sculpture, home furnishings, home industries and school art. It organizes home industries and handicraft classes and puts into the field specialists to teach such work. And it has been successful in finding a market for its product."

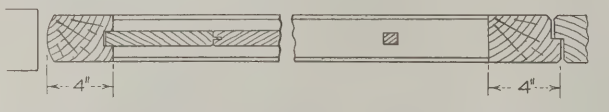


Fig. 4—An Enlarged Horizontal Section Through the Gate Showing How the Panels Are Mortised Into the Stiles of the Frame

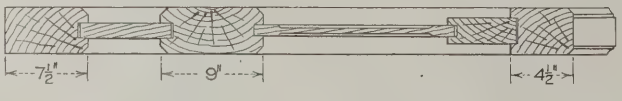


Fig. 5—An Enlarged Section of Gate on Line A-B of the Elevation

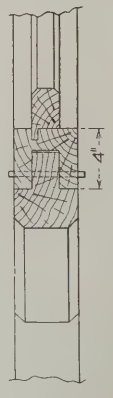


Fig. 6—Section on Line C-D of Fig. 3

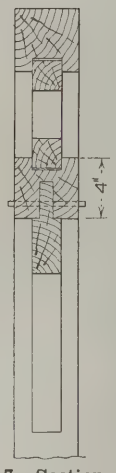


Fig. 7—Section on Line E-F of Fig. 3

Construction of a Covered Gateway—Some Details of the Work

Width of Buildings in Washington

Some of the prominent builders and real estate men in Washington, D. C., are advocating the enactment of a law restricting the minimum width of all buildings on the residential streets of the city. It is understood that the District Commissioners will be requested to adopt new regulations prohibiting the erection of small buildings on lots with a frontage on streets where large dwellings and apartment houses are located. The proposed measure would apply to nearly all streets in the city and a minimum width of buildings would vary according to the location of the streets.

Concrete Foundations for Houses

Methods of Doing the Work Suggested by a Pacific Coast Building Contractor—The "Forms" Used

By George L. McMurphy

THE carpenter-foreman is usually called on to lay out the lines for the foundations of buildings which are not so large or expensive as to require the services of a civil engineer, and unless concrete is used for the foundations he has very little further to do with the construction of them than to see that the necessary door and window frames are properly spaced and put in position.

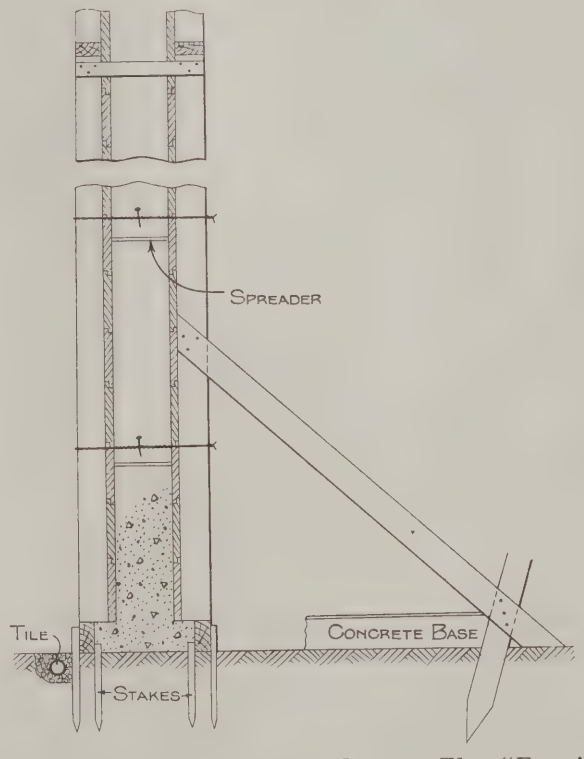
Of course the ordinary foreman will know that, in the absence of an instrument for laying off angles, a building is usually squared by the use of the old and well known "6, 8 and 10" rule. A very good way to either square the lines or to check the accuracy of the work is, where practicable, measure from corner to corner diagonally across the building both ways with a long steel tape or a wire can be used or a chalk line, although the latter is not so accurate as it likely to stretch unevenly.

In case concrete is used for the foundation the carpenters are of course called on to build the forms. A few suggestions and sketch, which will be self-explanatory, may be helpful.

It will usually be found both easier and cheaper to build forms for both sides of the foundation wall than to try to utilize the earth wall of the excavation for part of the form for one side as some advocate. The saving in the cost of excavation by the use of teams and scrapers instead of the shovel and pick will more than offset the saving in lumber, especially as the lumber used for forms can be used again in the superstructure with very little waste, and I think, after having tried both ways that there will be no saving of time in the use of the earth walls but rather the contrary if anything. Another advantage in having the excavation roomy enough for forms on both sides of the walls is that it gives an opportunity to apply a water-proofing coat of coal tar, asphaltum or cement plaster to the outside of the wall to prevent moisture from passing through to the basement, which is advisable, and in most cases necessary, as concrete, contrary to a somewhat common idea, is not water tight but, is equally, if not more, porous than soft brick.

A 2-in. or 3-in. tile (not sewer pipe) drain should also be laid around the outside of the wall below the level of the basement floor as indicated in the sketch, and be provided with an outlet either to a storm sewer or some equally free place.

The method of placing the sills for the forms shown in the sketch will give sufficient footing for the ordinary dwelling, but a stronger footing can be secured if desired by using 2 x 6 in place of the 2 x 4 shown. I think it will be found both easier and cheaper to use sills as shown, whether there is to be a basement or not than to sharpen the ends of the studdings and drive them into the earth, as some recommend. This is particularly true in the case of a basement, as the studding can be cut to the proper length for use in the partitions in the building and then there will be no waste of lumber at all. It will of course be understood that I am now speaking of ordinary dwellings only.



Concrete Foundations for Houses—The "Form" Used

Wherever lumber used in the forms or for runways for wheeling concrete in place, is intended to be used afterward in the building, it should be framed, as far as possible ready for its future utility before being used in the forms. This will be found to be a considerable saving in time, wear on tools and even more on the temper of the workmen. Too few foremen take pains to save time by taking time to do things now that seem to take time and hinder the progress of the work when in reality they can be done cheaper now than later and will save time in the end.

For the usual basement wall of not more than

8-ft. high studding 2 ft. on centers will be close enough if tied about twice between top and bottom with wire ties as shown. No. 14 wire will be strong enough, and the nails used for twisting the ties tight should be left in place, as otherwise the pressure of the concrete will tend to untwist them and allow the forms to spread. The forms should be braced at frequent intervals midway between the top and bottom to prevent them from springing, and the top should be braced sufficiently to keep it straight and in line. Where the forms are well tied they will need bracing only from one side. The top braces are not shown in the sketch.

Lumber used for lining the forms can be used afterwards for floor linings or for sheathing on the walls. It does not need to be very securely nailed to the forms, 6d nails once in every alternate stud or even less often is sufficient, all that is needed being just enough to hold it in place till the concrete is poured.

This is not a treatise on concrete, but the following simple rule for ascertaining the amount of material required for small jobs may be useful, and is easily remembered. It may not be accurate enough for jobs requiring some thousands of yards, but is accurate enough for the ordinary foundation of dwellings of average size.

"Divide 40 by the sum of the numbers denoting the proportions of sand, gravel and cement in the mixture to be used. The quotient will be the number of bags of cement for a cubic yard of the mixture." For example, for a mixture of the proportions of 1:3:6

$$1 + 3 + 6 = 10, \text{ and } 40 \div 10 = 4,$$

which is the number of bags of cement for one cubic yard of concrete. The quantities of sand and gravel follow easily.

Where a floor is to be laid with a surface coat of sand and cement it will require about the same amount of cement for a half-inch surface as for a base of four inches of concrete. Good cement well mixed and carefully placed will make a fair foundation used in the above proportions, but I prefer the stronger mixture of 1, 2½, and 5.

The forms should not be removed too soon nor should the earth be filled against the concrete too soon unless it is well braced from the inside, in fact it would be well to brace the walls inside and leave the braces for some time. I have seen walls give way, where loose earth was filled against them, three weeks or more after pouring, when there were heavy rains which saturated the earth. I would not like to use the walls for two weeks after pouring the concrete, though many put sills and joists on within a week, or even in four days.

"Individual" Garages

The construction of garages has now come to be an important feature of the building industry. "Individual" garages, a term now encountered in the details of high-grade apartment building projects, do not consist of separate buildings, for when the builder speaks of "individual" garages for each tenant, he means in effect one garage building, subdivided into the requisite number of spaces for as many automobiles as there are tenants, and each of the spaces separated from the other by partition walls which in some cases reach to the ceiling, while in others they are approximately of the height of an automobile with the top up, receiving light from a skylight or electrical fixture. These garages are "individual" to the extent that every tenant is enabled to reach the space allotted to him from a driveway nearest to the entrance to his apartment and that he has exclusive access to it, a key being furnished to him when he rents. The spaces are sufficiently large to allow room for the storage of oil and gasoline and to enable tenants to put their machines in shape. Plans for many high-grade apartments, especially in the West, include such "individual" garages.

The Element of Error in Estimating

Much has been written on the subject of estimating and the importance which it holds in the success of the building contractor. The element of error in estimating, due to carelessness or other mistakes not arising from inability is a recurring one, but among careful men this is far less frequent than commonly supposed. In a recent Monthly Letter of the secretary of the Master Builders' Association of Boston, the statement is made that "an estimate far below a group of figures—a frequent happening—can only mean one of three things:

"First: An error on the part of a man doing good work—and who will do the job properly and suffer by his error.

"Second: An honest price from an honest man who gives the best value of which he is capable, but whose work is low in quality.

"Third: A cut-throat price from a cheap man who will save or skimp where he can, trust more or less to luck to come out square, and who cares little for results if he can 'get by.'

"The two latter are the usual low bidders, and the last is the man commonly found surprising every one by his low figures until finally he is pushed to the wall and another of the same kind takes his place."

New Standard Building Contract Forms

After several weeks of careful study the joint committee representing the Cleveland chapter of the American Insitute of Architects and the Builders' Exchange of the city named have approved the new standard contract forms for builders' use recently adopted by national organizations in both branches of the building industry. The committee recommends that these forms be substituted for the old "Uniform Contract," used for many years past.

The Town Council of Miami, Ariz., recently voted that no more permits be issued for the erection of tents or tent houses within the limits of the town, and that all such structures now in existence be removed within six months from date of action.

The old grindstone is still good as a knife and tool-sharpener, but there are other and livelier grinders which have extensively replaced it.

A Two-Family House Heated by Furnace

A Typical Dwelling House Installation in Which the Design of the Heating Plant Was Carefully Carried Out

TO the architect and builder the proper heating of a dwelling house always presents interesting phases of installation work and the subject which we have taken for consideration at this time involves points of more than ordinary moment in this line. The solution of the heating problem was worked out in connection with a 14-room two-family residence of R. M. Thayer at Joliet, Ill. The floor plans presented in this installation is that the work exemplifies one of the few instances in which the heating contractors were called into consultation before the plans of the building had been completed so that the studding could be furred out at the proper places t oprovide for warm-air risers and ventilating flues. The plans and specifications for this portion of the work were prepared by the Barrett Hardware Company of the city named, and as the build-

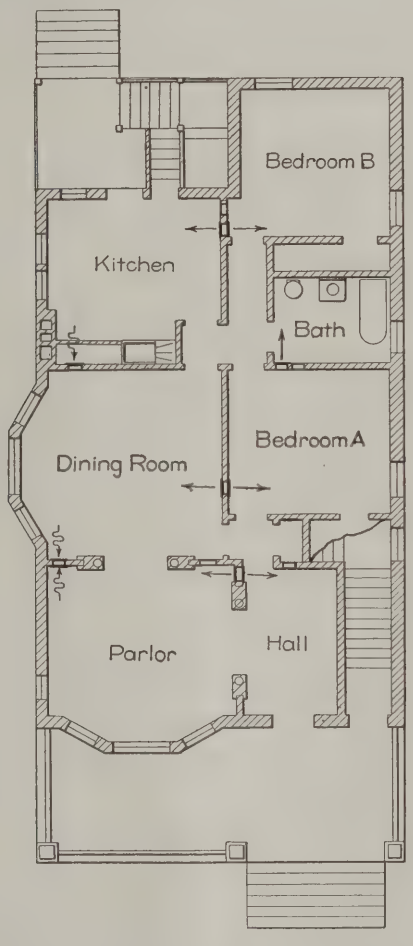


Fig. 1—Plan of First Floor, Showing Location of Warm Air and Vent Registers

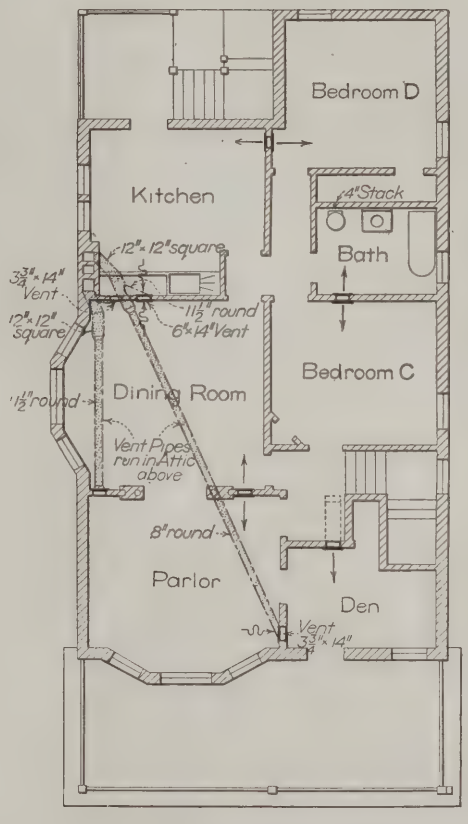


Fig. 2—Plan of Second Floor Showing Vent Pipes Above Ceiling

A Two-Family House Heated by a Furnace

Figs. 1 and 2 clearly indicate the location of the furnace in the basement, the run of the heater pipes and the position of the registers and vents in the rooms on the two floors.

The house is warmed by fresh air, has ventilating pipes leading from the principal rooms and has a double water service which supplies soft water from a cistern and hard water from the city mains.

Another interesting feature in connection with ing was to be occupied by two families it required a plentiful supply of fresh air.

Only one furnace was used to heat the building, so that it was impossible to use an inside return air supply, as that would involve a mixture of the air from the apartments of the two families. The accompanying table gives the dimensions of the various rooms.

The building occupies a ground space of approximately 28 x 50 ft. It contains something

over 18,000 cu. ft. of space and exposes approximately 936 sq. ft. of equivalent glass surface, assuming that 4 sq. ft. of wall surface has the same cooling effect as 1 sq. ft. of glass.

The furnace selected for the work was a No. 30-56 Modern Novelty, having a 30-in. firepot and a 56-in. casing, and was connected by means of a 9-in. smoke pipe with a 10 x 12-in. smoke flue, located at one side of the building with a 12 x 12-in. ventilating flue on each side of it. The purpose of this was to use the heat of the smoke flue to induce an upward current in the two ventilating flues and thereby cause an exhaust of air from the apartments to facilitate the inflow of fresh air.

This was taken from out of doors through a 24 x 30-in. galvanized sheet metal duct, having an area of 720 sq. in. and arranged with baffle plates for the double purpose of checking the entrance of dust and dirt to the house and preventing the force of a strong wind from driving through the furnace faster than would be desirable. At no point do the baffle plates reduce the area of the duct, which also has provision for cleaning.

The eight different warm-air pipes have a combined area of 686 sq. in. The metal fresh air duct runs along the ceiling to a point a few feet distant from the furnace, from which it drops on an angle to a boot at the bottom of the furnace, which was made 16 in. deep and 40 in. wide, to give the proper area and to insure the delivery of the fresh air to all sides of the furnace.

The basement plan, Fig. 3, shows the location of the furnace, the run of this galvanized iron cold-air supply and the run of the different warm-air pipes. The plan indicates these pipes with letters, and also gives their diameters. From the table can be seen the diameter and area of the pipes and also the area of the risers with which they connect and the area of the ventilation risers.

Fig. 4 of the illustrations shows the risers and the different kind and types of boot connections used between the pipes in the cellar. These boots are selected with the purpose of reducing friction to the minimum. At the left the boots are shown in side and front elevation. There are also shown the elevation of a center outlet boot and of a straight back boot.

The registers were made by the Hart-Cooley Co., New Britain, Conn., and are of wrought steel of the baseboard type. In the dining room and parlor on the second floor, a No. 13 wall stack 5 x 13 in. (inside measure), was used, the studding of the partitions being arranged to make this possible. It will also be noted that the registers for the kitchen and rear bedroom on the second floor have an 8 x 13-in. side wall register. A head was put in the bottom of the register box, and the No. 8 stack run into the bottom of it. The object of this was to allow a greater margin for a more free delivery of air when the fans on both registers were open. The first floor registers cut into the room more than an ordinary second-floor register.

Two separate metal ventilating ducts were run in the attic and were connected, one to each of the ventilating flues, as shown by the dotted line on the second-floor plan. The location of these vent registers is given on the first and second-floor plans, and it will be noted that an 8-in. round pipe connects with a 3¾ x 14-in. stack, which ventilates the parlor on the second floor, while a 6 x 14-in. stack connects with an 11½-in. round pipe which ventilates the kitchen and the dining room on the second floor. These lines connect with a 12 x 12-in. duct which leads to a flue of same size. A 6 x 14-in. vent stack runs to the dining room and parlor on the first floor and connects with a 11½-in. round pipe which runs over, receiving an 8-in. branch from the kitchen ventilator and then connects with a 12 x 12-in. square pipe which connects with the 12 x 12-in. square ventilating flue. The ventilating registers are 9 x 12 in. in size, of the single valve baseboard type, turned upside down when cased around by the carpenter. The fans were not removed from these ventilating registers so that the occupant might shut off all communication with the outdoor atmosphere when the furnace is not in use, if so desired.

First Floor	Dimensions	Space	Glass Surface	E.G.S.	Warm Air Pipes Dia.	Warm Air Pipes Area	Pipe	Warm Air Riser	Vent Riser
Hall	7x12x10	840	21	60					
Parlor	12x14x10	1,680	50	100	12	113	A	6x12	6x14
Dining room	14x14x10	1,960	38	66					
Bedroom A	11x12x10	1,320	10	35	12	113	B	6x12	
Kitchen	12x13x10	1,560	51	106	10	78	E	5x13	3¾x14
Bedroom B	11x11x10	1,210	12	69					
Bathroom	6x 9x10	540	10	22	8	50	F	3x10	
Second Floor									
Den	7x11x10	770	31	78	9	63	H	3x10	
Parlor	12x14x10	1,680	38	100	12	113	C	5x13	3¾x14
Dining room	14x14x10	1,960	38	66					6x14
Bedroom D	11x12x10	1,320	10	35	10	78	D	5x13	
Kitchen	12x13x10	1,560	41	98					
Bedroom C	11x11x10	1,210	12	69	10	78	G	3x12	
Bathroom	6x 9x10	540	10	22					
		18,150		936		686			280

Table Showing Data Relating to the Various Rooms of the House

Inasmuch as the heating of the building has been very satisfactory, a few of the proportions may be of further interest.

The furnace grate has practically 5 sq. ft. of surface and has a proportion of 1 sq. ft. to 191 sq. ft. of equivalent glass surface and to 3,704 cu. ft. of space. The warm-air pipes have an area of 686 sq. in. and bear a proportion of 1 sq. in. to 1.36 equivalent glass surface and to 26.4 cu. ft. of space. Arriving at the size of the furnace and the pipe, the tax which the building puts upon the heating apparatus must be considered and, as the building exposes 936 sq. ft. of equivalent glass surface, with the outside air zero and a temperature of 70 deg. maintained inside, each sq. ft. of glass would lose 85 B.t.u. per hour. The 936 sq. ft. of equivalent glass surface would lose about 80,000 B.t.u. per hour.

This heat loss must be offset by the heat of the air that is brought into the building and with the generous provision of air supply ducts, warm-air pipes, and the ventilating system, it is quite possible that even in zero weather, the air in this building might be changed as often as four times per hour, and that 72,600 cu. ft. would be moved.

The number of heat units required to raise this air to 140 deg. can be determined by dividing the 72,600 by 55, the number of cubic feet which will be raised 1 deg. by 1 heat unit. This, it will be seen, will take 1,320 heat units to raise the 72,600 cu. ft. of air 1 deg., and if it is to be raised 140 deg. the temperature at which the air would be discharged from the register, it would take about 175,000 heat units.

Inasmuch as the air passes out of the building at a temperature of about 70 deg., only one-half of this would be available for offsetting the heat losses, or 87,500 heat units would be available for offsetting the loss of 80,000 that has been mentioned. The tax on the furnace, however, is the entire 175,000 heat units. With a grate of 5 sq. ft. and burning 5 lb. of coal per square foot, it is a simple matter in zero weather to burn 25 lb. of coal, and if 8,000 heat units were utilized from each pound of coal, a total of 200,000 B.t.u. would be available for heating the air, so it is evident that the heating apparatus has been conservatively designed.

In addition to the other work done by the furnace, there is a pipe coil placed in the combustion chamber made of 1-in. black pipe with a return bend. This is connected with a boiler to supply hot water when the laundry stove is not in use. The coil is supplied with unions so that it may be disconnected at convenience. Owing to the fact that the water in this section of the country carries so much lime in it that is precipitated on heating, after four or five months' service or more it is necessary to remove the pipe coil to get rid of the deposits in it. This reduces its efficiency, and the flow through it.

There is also a small water heater that is used when the furnace is not in service. They are connected with a 40-gal. hot-water storage tank suspended from the ceiling. This hard water makes it desirable also for the storage of rain water in the cistern for the convenience and comfort of the families. It requires that in addition to the cold-water line connecting with the street service, there is also a cold-water line leading from the cistern, so that soft or rain water is available for bathing and laundry purposes.

An automatic electrically driven air compressor pumps water from the cistern to a pneumatic water supply tank for distributing the soft rain water. From the hot-water storage tank or range boiler pipes are run across the basement to the bath rooms and then up to the second floor and over to the sink and down, returning again to the boiler. This keeps the water in continual circulation. Branches are taken off at the fixture so that as soon as a faucet is opened at any fixture, the hot water is at once available. This is important, as it avoids the waste of the rain water, which must be gathered as it falls.

These hard and soft water lines of piping are cross connected, so that either or both may be used at will. The plan shows the run of the main soil pipe, 2-in. extra heavy cast-iron pipe, being carried down from the sinks and laundry trays, and 4-in. extra heavy cast-iron pipe runs from the water closets and bath rooms. The 4-in. extra heavy cast-iron pipe runs through the building and outside the wall, connecting with a 6-in. vitrified sewer pipe, which connects with the sewer in the street. This 4-in. line also receives a floor drain connection and has on it a back-water trap to prevent an inflow of water from the sewer in case of storm. It also has a connection from the bottom of the cistern, so it may be flushed when desired, the valve being inserted for control.

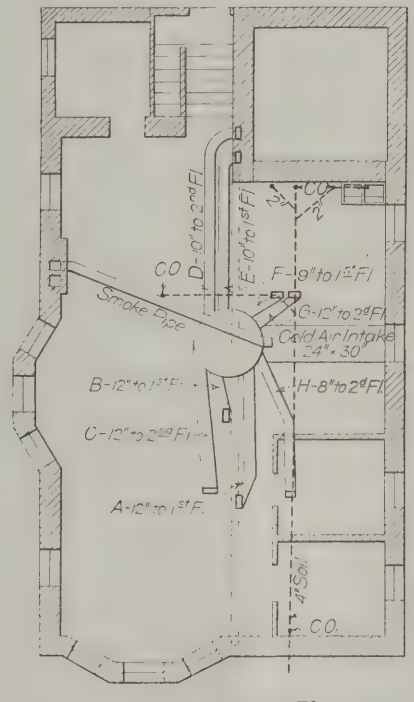


Fig. 3—Basement Plan

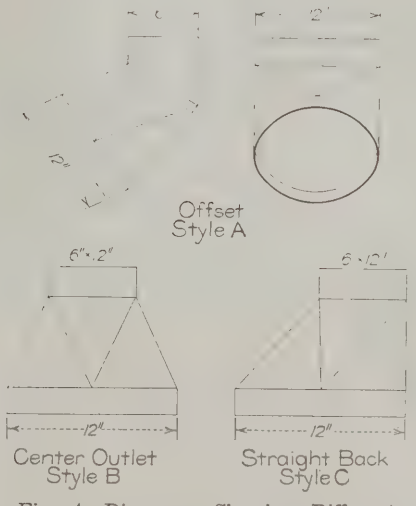


Fig. 4—Diagrams Showing Different Types of Boots for Risers

A Two-Family House Heated by a Furnace

The plans of the other floors show the location of the bath-room fixtures and the kitchen sinks. There are 5-ft. enameled bath tubs and 18 x 21-in. lavatories with aprons in the bath-rooms and the enameled iron sinks in the kitchens are all made by the Kohler Co., Kohler, Wis. The H. Mueller Mfg. Co., Decatur, Ill., supplied Fuller combination fixtures and connected the waste and overflow for the bath tubs, and the lavatories also have Fuller cocks with waste and supplies to the wall. The washdown syphon closet with a vitreous tank and golden oak seat were furnished by the Abingdon Sanitary Mfg. Co., Abingdon, Ill. The laundry trays were furnished by C. M. Wesley, Chicago, Ill. A drain board is supplied with the enameled iron sinks in the kitchens.

New Publications

Practical Surveying. By Ernest McCullough. 402 pages. Size 5¼ x 7½ in. 229 illustrations. Bound in boards. Published by D. Van Nostrand Company. Price $2.

This work is presented as a serious attempt on the part of the author, who is well known to the readers of The Building Age, to meet the needs of those whose mathematical preparation does not extend beyond the arithmetic given in the grade schools. It is, therefore, intended to be a textbook in vocational schools, high schools and evening classes, also as a text for self-taught men in the employ of surveyors who wish to follow that profession. The subject matter is contained in eight chapters, the first of which is introductory in character, while the second deals with general surveying, the third with leveling, following which attention is given to compass surveying, trigonometry, transit surveying, surveying law and practice and engineering surveying. There is an appendix on the essentials of algebra which serves as a useful introduction to the study of that subject. The chapter on trigonometry contains what should be properly considered the minimums a surveyor should possess, although it is a well-known fact that many surveyors do earn a living who are familiar with only a few of the formulas there given.

Hendricks' Commercial Register. 1600 pages. Size 7½ by 10 in. Bound in boards. Published by S. E. Hendricks Company, Inc. Price $10.

This is the twenty-fourth annual edition of the well-known Commercial Register of the United States for buyers and sellers with which has been incorporated "The Assistant Buyer," also a trade directory published for years by the Sullivan system. This trade directory is particularly applicable to the interests of the architectural, contracting, electrical, hardware, engineering, quarrying, iron, steel and kindred industries. The book just issued is approximately the same size as heretofore, but the binding is in du Pont Fabrikoid, a waterproof book binding material of the leather type. As an indication of the scope of articles listed it may be said that there are nearly 600 columns of index and over 1500 additional pages of matter with three columns to the page carrying headings which include a great variety of matter from A to Z. It is offered as a handy reference work for those engaged in the trades addressed and will be found particularly valuable for buyers and sellers in those lines.

As affording an indication of the value which such a work possesses for those connected with the building industry, it may be stated that the list of architects occupies twenty-five pages; that of building and general contractors thirty pages; that of lumber manufacturers and wholesale dealers twenty-five pages; that of masons' and builders' materials twelve pages, and so on all the way through the various branches of the trade. The work is in fact a complete and reliable annual register of producers, manufacturers, dealers and consumers connected with the industries mentioned, and products are listed from the raw material to the finished article with the concerns handling them from the producer to the consumer.

Treatise on Hand Lettering. By W. J. Linehan. 284 pages. Size 8¼ by 12½ in. Illustrated with 117 full-page plates. Bound in boards. Published by E. P. Dutton & Co. Price $3.50.

The author of this work is the head of the Engineering Department of the University of London, who points out that its object is to minister to the needs of drafting rooms by means of direct practice in the kinds of lettering most required by architects, engineers and surveyors. After the mastery of each form of lettering, its use is accentuated by the writing of phrases and titles from actual office drawings, while the architect-decorator, as he is termed, is similarly supplied with mottoes from actual friezes. In the arrangement of the matter the lettering and descriptive text run the long way of the page; that is, up and down rather than across from left to right. The examples of lettering occupy right-hand pages facing which is the descriptive text relating thereto. The size of the page is such as to permit of examples of liberal size for the reason that the author states he has found it best to give a pupil large lettering to do in the first instance so that he may acquire a free and certain hand. He points out that it is quite easy to decrease the size of lettering afterwards "for small letters are very much better made if preceded by large ones, but the converse is not true." The book is intended as much for students as for draftsmen, and especially for architects and engineers' apprentices. It is, therefore, likely to find favor with many readers of The Building Age who are architecturally inclined.

The Sheet Metal Contractors' Association of Cleveland, Ohio, has started a movement to bring about the placing of direct contracts for sheet metal work on buildings.

Loblolly pine is sometimes known as Oldfield, Rosemary or slash pine. It has many uses in connection with different forms of building construction.

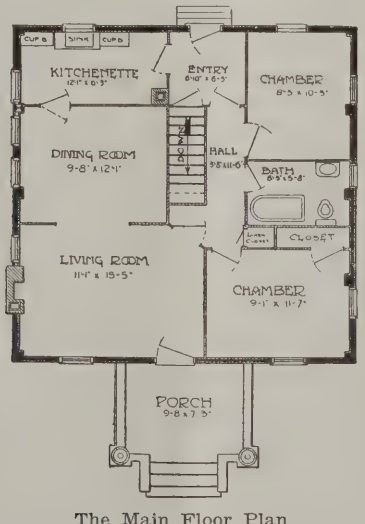
The Trend of Modern Home Building

Increasing Tendency Toward Fireproof Construction in Dwelling Houses — Two Interesting Examples

THE building operations of the country have undergone some vast changes in the last quarter of a century, and the tendency at the present time seems to be more and more in the direction of fireproof construction in connection with dwelling houses. While perhaps the idea of a fireproof home may impress the average man as somewhat novel, it is quite essential that he be educated to regard his house more and more in terms of safety. Satisfactory results along the line of publicity are being brought about through the combined effort of those concerned in the betterment of home building. There are several organizations which are cultivating this "safe-home" spirit, and are accomplishing much in having builders of attractive dwellings substitute fire-resisting materials for those which have been in such common use in the past in connection with moderate cost construction.

The building of the model fireproof house, as it might be termed, is of interest to every architect, contractor and builder in the country and the two examples of "houses that will not burn" here presented strikingly illustrate the type in question.

General View of One Side of Fireproof House Built of Cement and Steel



The Main Floor Plan

The Trend of Modern Home Building

The frame of the fireproof house is of steel, and all walls, partitions, ceilings, floors and roof are of steel and cement. The foundations carried to the grade line are of solid concrete 9 in. thick. From that point to the floor there is an 8-in. brick wall. The steel columns supporting the floors and roof are imbedded in the concrete foundation, thus reducing all chance of vibration to a minimum.

The side walls are formed of Trussit reinforcing material for concrete walls, partitions, etc. The Trussit is wired to the steel frame and plastered on both sides to a thickness of 2 in. with cement mortar. The finish coat on the outside is treated with waterproofing paste, and over the inside of the frame and fastened by wiring is "Self-Sentering" plastered with cement mortar on the inside only to a thickness of ¾ in. These two cement slabs—one on the inside and one on the outside—form a 4-in. air space.

The roof is of concrete applied over "Self-Sentering," which by the way, is a material used in the construction of light-weight thin slabs of concrete. The "Self-Sentering" is merely laid over the supports and 2½ in. of concrete placed on top of it. Over the concrete is a mastic waterproofing of a pliable and elastic nature, which is not affected by contraction and expansion.

The floors consist of 2½ in. of concrete over "Self-Sentering," the latter being placed directly over the I-beams. On top of the concrete is a composition flooring ½ in. thick, this being carried up over the sides of the wall and forming a base board ⅞ in. thick.

The partitions are 2 in. thick, consisting of solid concrete reinforced with Trussit, the sheets of the latter being merely fastened top and bottom and

plastered both sides, no permanent studding being required. The ceilings are of "Self-Sentering" fastened by clips to the under side of the I-beams and plastered with cement mortar.

The stairway, which is an important detail in the construction of any fireproof building, is proof against action of flames, as there is nothing in connection with it to burn. The interior trim is of wood fastened with screws, but metal trim can be utilized if desired.

The houses here illustrated were erected in Youngstown, Ohio, the architect of the one-story building being Louis Boucherle, and the architect of the two-story structure being Charles W. Owsley, both of the city named.

The cost of the fireproof house as built is estimated at approximately 21 cents per cubic foot.

If built with 12-in. solid brick walls with same interior it would cost 28 cents per cubic foot.

If built with stucco on hollow tile with same interior it would cost 26 cents per cubic foot.

If built with solid brick with wood interior it would cost 19 cents per cubic foot.

If built with veneered brick with wood interior it would cost 17 cents per cubic foot.

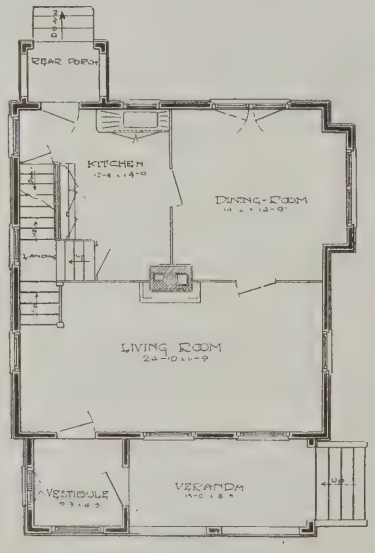
If built with stucco on hollow tile with wood interior it would cost 17 cents per cubic foot.

If built of stucco on metal lath with wood interior it would cost 16 cents per cubic foot.

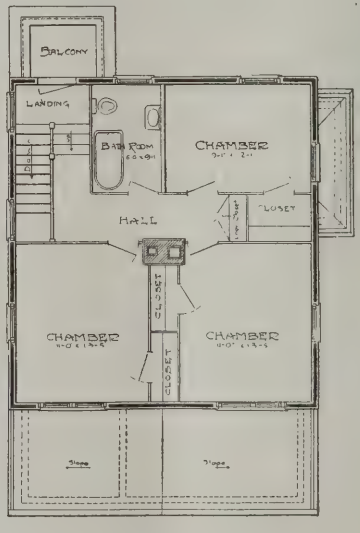
While these figures are approximate, they represent as accurately as can be estimated, the difference in cost between the various classes of construction and the proportions will be substantially the same in different sections of the country.

The model houses here shown were built by the General Fireproof Company, Youngstown, Ohio, in order to see what could be accomplished along the lines indicated.

A Two-Story Dwelling House of Freproof Construction



The Main Floor Plan



The Second Floor Plan

The Trend of Modern Home Building

Brief Review of the Building Situation

Marked Increase in New Work Planned in October as Compared with October Last Year

REPORTS of building operations which reach us from various sections of the country indicate a degree of activity which is in marked contrast with that which prevailed in October last year. In fact, the showing is the best of any month during 1915, and the feeling is growing among architects and builders that the industry is likely to witness an unusual amount of construction work during the coming season. The figures here presented cover ninety-eight cities of the country, of which seventy-two show increased planning of buildings as contrasted with October, 1914, while twenty-six show decreases, the resultant figures being a gain of 30.79 per cent.

In the eastern section of the country, thirty-six cities report a gain of 21.58 per cent, with Albany, Binghamton, Boston, Buffalo, Hartford, Jersey City, Philadelphia, Pittsburgh and Rochester contributing largely to this result. In Greater New York the Borough of Manhattan shows a falling off in the new work planned as compared with October last year, due in large measure to the decrease in the planning of loft buildings. There was, however, a gain in the amount of tenement house construction. The other four boroughs of the city show an appreciable increase over last year.

CITIES OF THE EASTERN STATES

	October, 1915	October, 1914
Albany	$705,365	$239,225
Allentown	154,720	156,975
Altoona	84,229	79,916
Binghamton	171,656	89,882
Boston	2,098,209	1,047,380
Bridgeport	532,409	168,487
Buffalo	856,000	604,000
East Orange	66,770	120,600
Erie	92,282	115,412
Harrisburg	158,400	53,475
Hartford	493,718	360,135
Holyoke	90,975	15,850
Jersey City	438,706	156,850
Manchester	290,779	197,499
Newark, N. J.	723,279	707,086
New Haven	280,120	231,315
New York:		
Manhattan	3,070,466	4,023,152
Bronx	2,304,664	1,292,080
Brooklyn	3,670,692	2,719,320
Queens	1,776,826	1,076,194
Richmond	213,680	131,894
Passaic	54,365	24,000
Paterson	90,496	50,836
Philadelphia	2,980,665	2,466,910
Pittsburgh	1,274,960	1,085,348
Portland	351,030	508,705
Rochester	784,969	401,192
Scranton	121,740	300,335
Schenectady	62,061	98,235
Springfield	386,792	228,825
Syracuse	392,240	293,080
Troy	65,059	64,178
Utica	283,880	279,925
Wilkes-Barre	40,283	58,173
Worcester	370,142	590,807
West Haven	53,075	26,100

In what may be designated as the middle section of the country thirty-three cities report an increase over October last year of 41.49 per cent, there being twenty-eight showing increases and five decreases. Here, the noticeable features are found in the figures for Chicago, Akron, Cleveland, Cincinnati, Detroit, Kansas City and Minneapolis. The amount of new work which is being planned speaks well for active employment in all branches of the building trades in the near future:

CITIES OF THE MIDDLE STATES

	October, 1915	October, 1914
Akron	$1,215,045	$304,815
Cedar Rapids	116,000	84,000
Chicago	12,479,250	6,774,200
Cincinnati	865,575	402,235
Cleveland	3,097,501	2,265,685
Columbus	390,685	649,220
Dayton	302,225	36,203

CITIES OF THE MIDDLE STATES (Continued)

	October, 1915	October, 1914
Des Moines	221,701	145,084
Detroit	2,611,500	1,120,270
Duluth	217,240	236,625
East St. Louis	85,000	48,000
Evansville	76,383	99,850
Fort Wayne	259,800	161,400
Grand Rapids	169,576	152,080
Indianapolis	532,777	338,089
Kansas City, Mo.	1,512,015	533,790
Lincoln	103,010	53,800
Milwaukee	747,169	668,413
Minneapolis	2,338,555	1,064,570
Omaha	360,225	157,675
Peoria	109,700	165,660
Salina	36,645	53,775
Saginaw	358,675	54,634
St. Joseph	61,818	25,100
St. Louis	1,214,618	1,115,874
St. Paul	739,308	1,100,000
Sioux City	147,950	52,950
Springfield	162,600	63,525
South Bend	38,235	25,153
Toledo	815,552	404,937
Topeka	55,759	50,855
Wichita, Kan.	41,440	8,100
Youngstown	341,685	203,690

There are some very notable gains in the southern tier of cities as contrasted with October, 1914, prominent among them being Baltimore, Nashville, Oklahoma, Richmond, San Antonio and Washington. The notable decrease in activity is found in New Orleans, which, of course, may be due in some measure to the recent devastating floods:

CITIES OF THE SOUTHERN STATES

	October, 1915	October, 1914
Atlanta	$257,251	$215,988
Baltimore	629,138	299,098
Birmingham	136,747	138,373
Chattanooga	90,440	77,387
Dallas	243,887	204,150
Houston	173,570	219,854
Louisville	304,040	336,736
Memphis	165,005	105,580
Nashville,	181,738	80,932
New Orleans	65,590	286,378
Oklahoma	424,925	19,975
Richmond	181,203	122,620
San Antonio	1,110,380	83,000
Shreveport	75,124	75,985
Tampa	158,210	125,442
Washington	1,344,999	407,411
Wilmington	30,000	16,000

The only section of the country reporting a decrease in the planning of new work is the extreme West, embracing the Pacific slope. With twelve cities reporting five show increases and seven decreases, with a resultant loss of 22.6 per cent. This is traceable largely to the heavy shrinkage in operations in Los Angeles, San Francisco and Seattle. Cities reporting increased activities include Denver, Salt Lake City, Spokane and Tacoma.

CITIES IN WESTERN STATES

	October, 1915	October, 1914
Berkeley, Cal.	$126,150	$132,950
Denver	192,450	177,985
Los Angeles	787,389	1,573,222
Little Rock	31,969	120,747
Pueblo	26,175	48,549
Sacramento	99,000	127,015
San Bernardino	31,027	14,000
Salt Lake City	167,655	107,605
San Francisco	1,236,249	1,479,518
Seattle	550,765	610,660
Spokane	162,998	60,050
Tacoma	70,000	46,563

For the ten months of the year the figures practically balance those for the corresponding period of last year, the very gratifying increases during the past three months offsetting the decreases of the first seven months of the year.

Current News of Builders' Exchanges

Annual Meeting of Cleveland Exchange and Other Items of General Interest to the Fraternity

Annual Meeting Cleveland Builders' Exchange

LIVELY interest was manifested in the annual meeting of The Builders' Exchange of Cleveland, Ohio, held in connection with a dinner at the Hollenden Hotel, on the evening of Nov. 10. Open house was kept in the Exchange rooms during the day and voting for directors was continuous from 11 o'clock until the time for the meeting in the evening. Cider, doughnuts and apples were served during the noon hour, bringing out a large attendance.

At the dinner the Exchange had as guests Abram Garfield, president of the Cleveland Chapter of the American Institute of Architects, Herbert B. Briggs, secretary of the Chapter, Virgil D. Allen, the Building Commissioner of Cleveland, Charles F. Laughlin, president of the Cleveland Rotary Club, and Frank L. Mulholland, former president of the International Association of Rotary Clubs who was the invited speaker of the occasion. The reports presented on behalf of the officers of the Exchange and the retiring board of directors indicated that the Cleveland organization is maintaining the high position it has always held among similar organizations of the country. The membership is now 420 and the Exchange has a cash surplus fund of nearly $30,000.

In his annual address President Arch C. Klumph congratulated the members upon the fine record of the building industry of the city for the present year, stating that the total value of permits issued would probably exceed $31,000,000. He said that although the year ending with the annual meeting had opened with gloomy forebodings on account of the European war, the situation had constantly brightened until it had proved itself one of the very best the city had ever had in building operations and in certain other lines of industry. The address of Mr. Mulholland aroused considerable interest and he was applauded for several minutes at its close. An orchestra furnished music for the evening and the members joined in singing a list of popular songs printed and placed at the tables.

The election resulted in the selection of the following well-known members to serve as directors for the ensuing year: Arch C. Klumph, Sam W. Emerson, Herman A. Harris, J. H. Wallace, J. J. Comerford, F. J. Dresser, William Flood, John Jaster, Jr., C. W. Lundoff and John A. Terwoord.

On the following day these directors elected Mr. Klumph as president, Mr. Emerson as vice-president, and Mr. Harris as treasurer. The board elected Edward A. Roberts as secretary and Charles D. Jamieson as assistant secretary, both of these being former officials of the Exchange.

Meeting of Canton Builders' Exchange

The fall and winter activities of The Builders' Exchange at Canton, Ohio, were formally opened in October when R. A. Rutherford, former president of The Builders' Exchange at Cleveland and now head of the R. A. Rutherford Company, building contractors of that city, spoke to the members on "System in Contracting and Fair and Unfair Competition." His remarks were illustrated by means of a series of charts. Following the meeting, the contractors, who composed the losing baseball team at the Builders' Exchange picnic last summer, entertained the members present at what they were pleased to term a "Dutch" lunch.

Edward A. Roberts, secretary of the Cleveland Builders' Exchange, delivered an interesting address to the builders on the evening of Nov. 3.

Convention of the Associated Builders' Exchange of Michigan

The third annual convention of the Associated Builders' Exchange of Michigan was held in Grand Rapids and officers for the ensuing year were elected as follows:

President—W. S. Wilcox of Lansing.
First Vice-President—George Schroeder of Grand Rapids.
Second Vice-President—Clifford Wheeler of Flint.
Secretary-Treasurer—Charles A. Bowen of Detroit.
Assistant Secretary-Treasurer—Robert Orr of Lansing.

It was voted to hold the convention next year in the city of Lansing.

Nebraska Master Builders' Association

An organization has just been effected in Omaha which is known as the Nebraska Master Builders' Association, with Grant Parsons, 601 Barker Block, president; Ray Gould, 1137 City National Bank Building, secretary, and K. M. Bickle, field secretary. It is expected that headquarters will be established in the rooms of the Omaha Builders' Exchange, which are in the Barker Block.

Revised Constitution of Quad City Builders' Exchange

The Quad City Builders' Exchange of Davenport, Iowa, Rock Island, Moline and East Moline, Ill., has just issued copies of the Constitution and By-laws which were revised and adopted Aug. 23 of the current year. The Exchange is incorporated and the object, among others, of the organization is, "for the advancement of building; the encouragement and improvement of building laws and appliances, and the furthering of the commercial and social interests of its members."

"Smoker" for Youngstown Builders' Exchange

The members of The Builders' Exchange of Youngstown, Ohio, held a smoker in the rooms of the organization in the Chamber of Commerce on Tuesday evening, Nov., 9, which was a most enjoyable affair. Each member was privileged to bring a guest, and in addition to interesting talks the evening's entertainment was made up of legerdemain, and music, while refreshments were served to members and guests.

A Waterproofing for Concrete

The following wash is recommended by a writer in *Concrete-Cement Age* as effective waterproofing for cisterns, silos and similar structures.

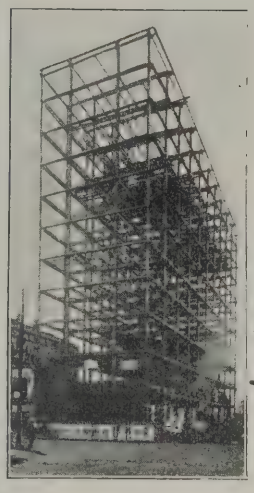
A stock solution is made of 1 lb. lye, 5 lb. alum and 2 qt. water. A pint of this solution is added to a bucket of water and 10 lb. of cement, making a paint-like mixture to be applied with a brush.

This is a modification of the well known Sylvester process and depends on the precipitation within the pores of the concrete of insoluble alum soap or alumina hydrate, or both together.

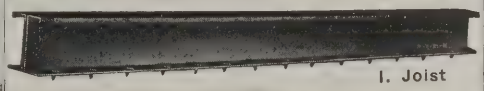
The forest products laboratory at Madison, Wis., has made 4000 tests on the strength of woods.

Our Factory, Canton, Ohio

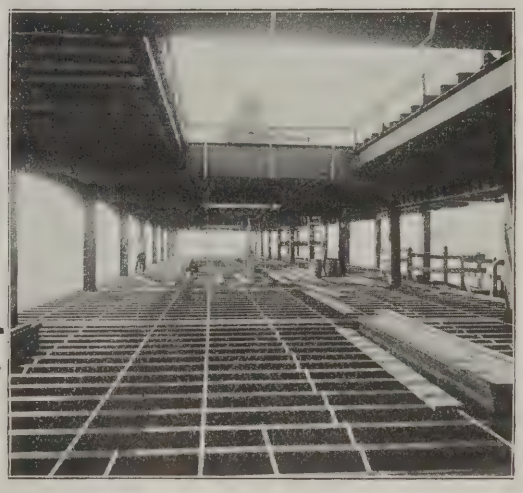
Eleven Floors Installed in Seven Weeks With Berger's *Metal Lumber* (Patented) System of Pressed Steel Construction



Renkert Bldg., Canton, O.
Walker & Weeks, Archts.
Cleveland, O.



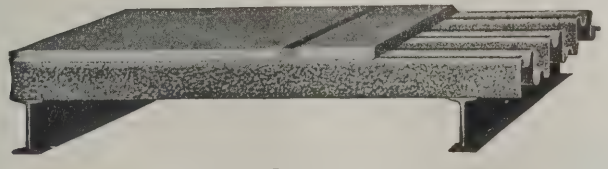
I. Joist



View of Eleventh Floor and Roof

Our Metal Lumber System is very easy to install, goes in like wood. It is just as practical for the smaller as for the larger building. More and more fire-proof construction is being demanded, and our Metal Lumber gives you a particular opportunity to profit by this trend of the times because it is an *economical* construction. Builders can afford to use it. Write for information about any building you are planning. You will incur no obligation. *Ask for Fire Test Report L. B.*

You Can Use These to Advantage in Your Business



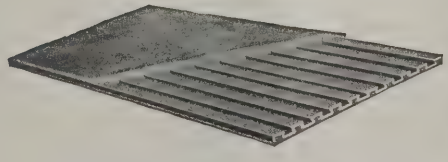
No Centering

MULTIPLEX STEEL PLATES are especially adapted for heavy service floor, roof, bridge and sidewalk construction. Easily installed with unskilled labor.

Save Material

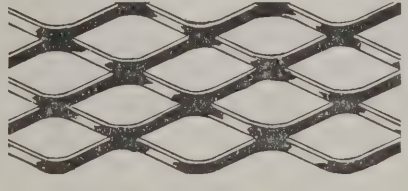
RIB-TRUS PLATES are expanded vertically so that concrete does not drip through to any extent. Especially adapted for reinforcing thin concrete slabs.

Berger's Metal Building Materials



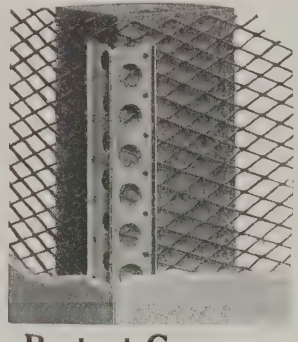
A Dry Roof Even Before Concreting

FERRO-LITHIC dovetail members give stiffness and provide key for perfect bonding of concrete and plaster. Used for floors, sidings and roofs.



Keeps Plaster From Cracking

EXPANDED METAL LATH* keeps plaster from cracking, stiffens the building, saves plaster. *Ask about our Toncan Metal (Anti-Corrosive) Lath.*



Protect Corners

CORNER BEADS, we have them in all styles to meet all specifications. Give perfect protection to exposed corners.

The Berger Mfg. Co., Canton, Ohio

Address Our Nearest Branch for Best Service:

Boston New York Philadelphia Chicago St. Louis Minneapolis San Francisco

Export Department: Berger Building, New York City, U. S. A.

Builders' Appliances and Equipment

Some Things of Special Interest to Those Having to do with the Various Branches of the Building Business

The Bessler Movable Stairway

Not long since we published in the correspondence columns a picture and brief account of what was designated as "a disappearing stairway," the idea being to provide a stairway leading to the attic or loft of a

Fig. 1—View of Bessler Movable Stairway

building and yet when not in use the stairway could be swung or pushed up out of the way and at the same time leave the ceiling in such shape as to give little or no indication of the presence of a stairway. This idea has also been carried out in a commercial way by the Bessler Movable Stairway Company, Department No. 1, Akron, Ohio, the result being the construction illustrated in Fig. 1. Briefly stated, the stairway is intended to replace the stationary type leading to attics, lofts or to any upper room where a stationary flight of stairs would occupy valuable floorspace in the room below. When in position for use the stairway slopes at an easy angle and is provided with a hand rail. When not wanted it is easily raised up on a panel by means of a powerful spring barrel, thence swung up into the ceiling. The spring barrel, in conjunction with a simple system of counterbalance, renders the operation exceedingly simple and easy. When the movable stairs are swung up out of the way the space below is clear and there is nothing visible but a neat panel to match the rest of the woodwork in the room. When it is desired to use the stairs it is only necessary to give a slight pull on a chain to bring the stairway down, and a touch of the hand slides it into position on the floor. The picture which we present affords an excellent idea of the general arrangement and shows the stairway partially swung down. We understand that the company is meeting with an increasing demand for this construction and that when the stairway is shipped into a community other orders quickly follow. The statement is made that it has been specified and indorsed by some of the country's leading architects and that its use extends from the low cost cottage or bungalow to imposing dwellings, lofts, hospitals, schools, and other public buildings.

Catalog of Millwork

The Chicago Millwork Supply Co., 1424 West Thirty-seventh Street, Chicago, Ill., has recently issued Building Material Catalog No. 317, a 250-page book, profusely illustrated, measuring 11 in. long by 8½ in. wide. The catalog is divided into twenty-eight departments covering a very complete line of building materials and equipment. In the introductory emphasis is laid upon the fact that by eliminating the middleman the carpenter and builder is able to save considerable money by dealing direct and securing wholesale prices. It is suggested that as a matter of economy stock designs and sizes be ordered wherever possible. Since this class of work is manufactured in large quantities the cost is reduced to a minimum and prompt shipments can be made at a very low price. The company also calls special attention to the fact that it employs a corps of trained men well versed in the intricacies of home building, and they are at the service of all carpenters and builders in supplying estimates and solving problems. Contractors can secure a free book of house plans which is well illustrated from cover to cover with modern designs of bungalows, suburban and town houses, country homes and barns. Accompanying each plan is a price which covers all materials for the construction of the building, with the exception of labor and masonry.

Edwards' Metal Tile for Waiting Station

The city of Cincinnati, Ohio, has erected the waiting station shown in Fig. 2 facing the Government Building. It is said that over 90 per cent of the street cars of the city pass this point. It is the first of a number of such stations which are to be erected at different points in Cincinnati for public convenience. The roof

Fig. 2—Trolley Station Covered with Edwards Sheet Metal Tile

of this shelter is covered with Edwards' metal Spanish tile made by the Edwards Mfg. Co., 423 to 443 Eggleston Avenue, Cincinnati, Ohio, and it is stated that all of the structures contemplated will utilize this tile as the roof covering.

Facts About Roofing for the Builder

The tendency toward co-operation between manufacturer and builder is well illustrated in the attitude taken by some of the leading concerns turning out

materials used by the building trades. Perhaps one of the most striking examples of a manufacturer supplying building contractors with complete detailed facts concerning the superior merits of his merchandise is that of the Heppes Company, 1011 South Kilbourne Avenue, Chicago, Ill., widely known as maker of the Flex-a-Tile line of asphalt shingles, rolled roofings, and Utility board. In a recent interview, O. A. Heppes of the concern said: "We are willing to go the limit to give everyone who deals with us full knowledge as to the reasons for the quality of our goods. We know that this policy does more than get us business—it helps the contractor, it helps the building owner and it helps the entire building industry. Every ounce of material we use is the finest that money can buy. Our asphalts are oil-free—but we make assurance doubly sure; it takes a heat of 290 deg. Fahr. to melt them; and so, through every step we take, so with every material we use."

"Globe" Galvanized Wall Tie

We take pleasure in bringing to the attention of the readers a galvanized wall tie which has been placed upon the market by the Globe Iron Roofing & Corrugating Company, Eighth Street and Licking River, Cincinnati, Ohio. These ties, which are offered under the name "Globe," are made from galvanized steel in No. 24 gage and lighter. They are offered in one size only, being 1 in. in width by 7 in. in length—this being regarded by the trade as standard. The company states that unless otherwise specified, No. 26 gage ties are furnished. These weigh approximately 5 lb. per hundred and are packed in boxes containing 1000 ties. The company states that it can also furnish a 3/16-in. crimped wall tie in No. 24 gage and lighter and in any width or length. For many purposes the crimped tie is regarded as very satisfactory and is lower in price than the Globe wall tie, a view of one of which is presented in Fig. 3.

Fig. 3—General View of the "Globe" Wall Tie

Burt's Sliding Sleeve Damper Ventilator

The double advantage that attends the use of the glass top sliding sleeve damper ventilator is that it not only removes foul air and fumes, but also aids in lighting the building and has a skylight effect. One type of Burt ventilator put out by the Burt Mfg. Company, Akron, Ohio, is made round and has a round sliding sleeve damper, which is operated by means of a cord. When the damper is entirely closed, the light through the glass top is not shut off, as when a butterfly valve damper is used. The Burt ventilators are made with condensation troughs to carry away the moisture that forms on the glass and also on the sides of the cylinder, so that it cannot annoy by dropping down into the building. The company also provides a special clip for catching the rope, so that it is not necessary to climb up to the ventilator or to tie the cord at some point. It is only necessary to release the cord from the clip by a pull and when the damper has been moved as desired, the cord can be drawn into the clip and the damper will be held as it has been placed. The sliding damper has no place on which dust can collect, so there is no danger of dust falling and causing discomfort.

Facts Concerning "Sterling" Transits and Levels

The Warren-Knight Company, 136 North Twelfth Street, Philadelphia, Pa., has just issued from the press an attractively printed pamphlet containing information which is of special interest to builders, architects, contractors and engineers. As its title indicates, these facts concern "Sterling" transits and levels, which are made in different styles and sizes adapted to meet varying requirements. The pamphlet contains photo-reproductions and brief descriptions of several of the company's latest models, and we understand that a copy of the little work will be sent free of charge to any reader who may make request for it.

New Combination Machine for Carpenters and Builders

Now that the winter months are at hand and carpenter-contractors and builders are cleaning up their contracts for 1915, they will soon be giving attention to any additional equipment that may be required for their shops in order to handle the business for the coming season. The increasing demand for combination machines has proven their usefulness to the small contractor, and one of the latest additions to this line which is designed especially to meet the requirements of carpenters who desire a complete equipment at a reasonable price is the machine just brought out by the Parks Ball Bearing Machine Company, Station A, Cincinnati, Ohio. In Fig. 4 we present a general view of it. Attention is called to the fact that there are some features which are distinctive, as, for example, the upright hollow chisel mortiser, the swing cut-off saw and the double tenoner. The power required to operate the machine is about 5 hp. and can be furnished with either gasoline engine or electric motor, which may be mounted on the bases with the machine, thus permitting the entire outfit to be taken out on a job if such a procedure would seem to be necessary or desirable. The company has issued a new catalog in

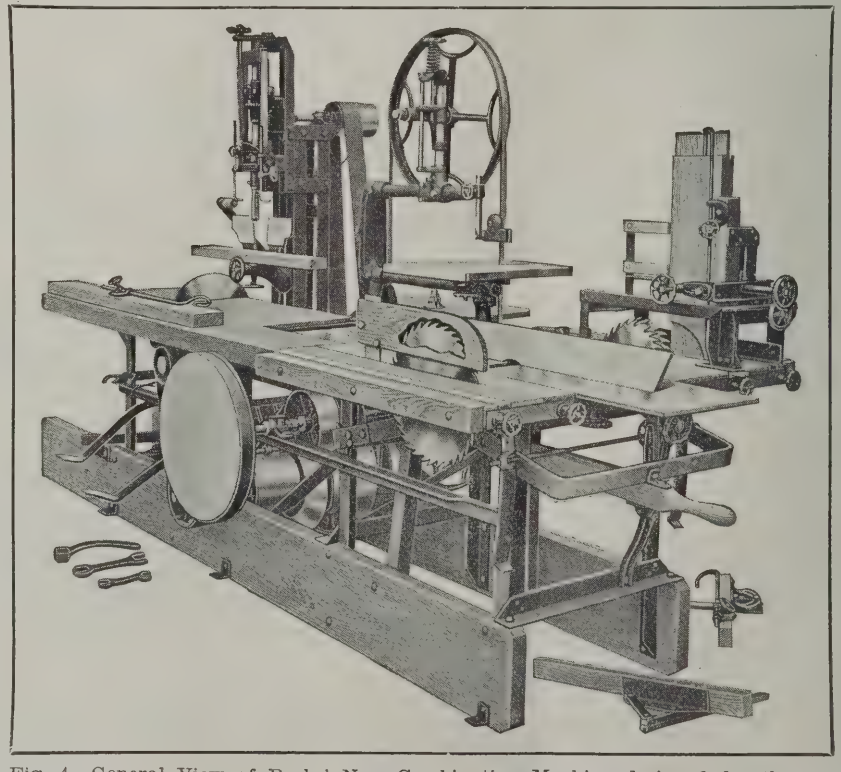


Fig. 4—General View of Parks' New Combination Machine designed for the use of Carpenters and Builders

(*Continued on page* 80)

HAVE YOUR MATERIALS DELIVERED ALL AT ONCE

Don't Be Delayed By Odd Lot Deliveries!

TIME lost through delayed deliveries of material cuts into the profits you had **estimated.** Your men wait doing time-filling jobs; your **expenses** run on. **Don't** be held up. Have **everything** delivered right on the spot **before you start work.** Buy it **all** from Gordon-Van Tine at **"direct-to-builder"** prices. Save money at **both** ends—get your material at **rock-bottom** figures and **abolish broken** time. We can give you **perfect** service on

A Whole House, Or Any Part of a House—Wholesale!

You can make money by having our Contractors' Service Bureau working for **you.** It is already increasing profits for over **10,000 other Carpenters and Builders in every State.** It is furnishing **free** "Guaranteed Right Estimates." It is assuring **prompt deliveries, cutting out lost time and labor costs.** It is **drawing plans** for them—far cheaper than local architects could. And it is doing a hundred and one other things. Make the Gordon-Van Tine Expert Service Department work for you. You will find we sell

Everything Standard Quality — All Shipped Anywhere — Safe, Prompt Delivery and Satisfaction or Money Back!

Buy on our **wholesale "mill-to-you" prices.** It is profitable for you to pay about **3½% for freight** and to **save 25% to 50% on your bill.** You are the **sole judge** of quality. Everything new and in latest designs. Hundreds of special patterns of millwork ready for immediate delivery—the kind of work your local yard takes from one to three weeks to turn out. Over 95% of our orders are shipped same day order reaches us.

Get This Book of 5000 Building Material Bargains FREE!

This book is a **money-saver for** over 100,000 **regular, satisfied customers** throughout America! Packed from cover to cover with bargains. **Everything you need for building or remodeling.** Lumber, Millwork, Builders' Hardware, Glass, Paints, Roofing, Wall Board, Doors, Windows, Screens, Porches, Moulding, Storm Sash, Stair Work, Flooring, Shingles, Nails, Enamels, Varnishes and **over 5000 other tremendous money savers.** Costs you nothing to get this great book. Yours **free** for the asking. Send us the coupon with your name and address and we will send **your** copy to you **at once.**

GORDON-VAN TINE CO.

794 Federal St. Davenport, Iowa

Established Half a Century!

GORDON-VAN TINE CO.,
794 Federal St., Davenport, Iowa
Gentlemen—Please send the books checked below:
☐ Building Material { Lumber, Millwork, Hardware, Paints, etc. ☐ Plan Book

Name .....
Address .....
Occupation .....

which this and many other improved machines are illustrated and described in a way to interest the carpenter-contractor and the builder, and we understand that a copy of it will be sent to any reader of THE BUILDING AGE who may make application for it.

New Acme Level

The Acme Level Company, Toledo, Ohio, has recently brought out a new level known as No. 400. It is made in lengths of 24, 22, 20, 18, 16 and 14 in. It is 2 in. wide, and the frame is 1⅛ in. The frames are electrically welded and nickel-plated. and the webs are of oxidized copper. This level is intended to take the place of cheaper wood levels. Both of the vials are easily adjusted and securely held by the brass screws shown in the photographs. The company states that these levels are very light and strong and that they will stand exceptionally hard use. It is claimed that they will not warp or get out of true, and will give entire satisfaction.

A Twin Disk Surfacing Machine

A twin disk surfacing machine, the details of which are well brought out in Fig. 5, has recently been placed upon the market by M. L. Schlueter, 225 West Illinois Street, Chicago, Ill. The machine is of such construction as to be always under the perfect control of the operator, this being a feature specially emphasized by the maker. This is brought about by providing two sets of carborundum blocks, each of which is 3 x 2 x 3 in. On the outer disk there are four blocks which revolve in an opposite direction to three blocks in the center. The machine is specially adapted for efficiently refinishing, waxing and polishing wood floors and also for surfacing and polishing marble, terrazzo, mosaics, cement, tile, concrete and composition floors of all kinds. Two scrubbing brushes may be used in place of the blocks to scrub and clean floors. The disks are operated by a 1/3-hp. motor which may be connected to an electric light fixture to insure a speed of 200 r.p.m. The machine, exclusive of the handle, is 12 in. high and 13 in. diameter, and the installation of ball bearings makes the disks revolve very easily when the current is on. The assembled equipment is very rigid and portable and weighs only 100 lb.

Fig. 5—Twin Disc Surfacing Machine

Titelock Metal Shingles and Spanish Tile

Bearing the above title, there has just been issued from the press by the Milwaukee Corrugating Company, Milwaukee, Wis., a very attractive publication of forty-four pages known as Catalog No. 17. Among the opening pages are views of the company's extensive plant, together with some comments on first cost when roofing with Titelock metal shingles or Spanish tile. The printing is in colors showing the various styles and patterns as they would actually appear upon a roof. There are also halftone engravings of some

(*Continued on page 82*)

of the different types of buildings which have been roofed with the company's product. Not the least interesting feature of the material presented are directions telling how to apply Titelock metal shingles, ridge and hip coverings, valleys, etc. The point is made that any good mechanic can apply these metal shingles and only a pair of snips and hammer are required. The information scattered through the catalog is of a nature that cannot fail to interest the architect, the builder, the sheet metal contractor and the owner. The closing pages are given up to designs of steel ceilings with invisible joint.

The "Roper" Shingles

Some very interesting information regarding the merits of Southern white cedar shingles is contained in an attractive booklet sent out by the John L. Roper Lumber Company, Norfolk, Va. This Southern white cedar is locally known as "Juniper" and comes from the dismal swamps of Virginia. It is a very fine grain wood and somewhat similar in texture to white pine. The attractive feature of the wood in shingles is that it is free of shakes and splits, lays flat, and after being exposed to the weather a few months assumes a beautiful silver gray color which is much desired by architects. The company states that government tests have proven it equally as durable, if not more so, in exposure than other woods. In the accompanying illustration, Fig. 6, we show a piece of white cedar taken from a house now standing at Tuckerton, N. J., and which was built in the year 1816. This board was sent by the company to the Forest Products Exposition in Chicago, where it attracted considerable attention, for the board was perfectly sound, although showing wear, but in all other respects being as good as though it were cut this year. The John L. Roper Lumber Company states that it has any number of evidences as to the durability of this wood, among which is the Cross Arms, which have been in actual service throughout New England for twenty-five years and are still in a good state of preservation.

Fig. 6—A Piece of White Cedar Taken from an Old House

In the booklet relating to Roper shingles is an illustration of the old Masonic Temple at Williamsburg, Va., which was built prior to 1751 with roofing and siding of Southern white cedar. The building is consequently 164 years old and the cedar is said to be in sound condition. The comments in regard to Roper shingles cannot fail to prove interesting, as several reasons are given why it pays the purchaser to insist upon shingles made by the company named.

Stearns & Co. Now Control "Incinerite" Garbage Burner

For some time past what is known as the "Incinerite," a gas-burning device for the disposal of garbage and other household waste, and largely used by hospitals and other public institutions, has been manufactured by E. C. Stearns & Co., Syracuse, N. Y., for the National Incinerator Company of New York City. Announcement is now made that the device has been taken over entirely by Messrs. Stearns & Co., and it will therefore be manufactured and sold by the same

(*Continued on page* 84)

concern in the future. A novel feature of the apparatus is that it serves not only as an incinerator but as a waste receptacle as well. All garbage and household refuse, wet or dry, is placed in the "Incinerite" then the burners are lighted and the combustion soon reduces the entire mess to a handful or two of fine sterile ash. We understand that this device is employed in the kitchens of the White House at Washington and in other prominent residences, in hospitals, restaurants, hotels, school buildings, etc., throughout the country. It is also made in sizes suitable for ordinary family use.

Reynolds Asphalt Shingles

In a recent issue of what is known as "Reynolds Asphalt Shingles," the house organ of the H. M. Reynolds Asphalt Shingle Company, Grand Rapids, Mich., there appeared a number of finely executed halftone engravings of buildings, the roofs of which were covered with the shingles of this concern. In connection with the illustrations appears more or less descriptive matter of interest to architects, builders, roofers and house owners generally regarding the merits of these shingles.

Taintor Saw Set as a Christmas Gift

The unique method adopted by a manufacturer to contribute his share toward giving the carpenters of the country a "Merry Christmas" is by reducing the price of his product during the holidays. In order that carpenters may have the opportunity of obtaining a practical Christmas gift at the lowest price and with the least trouble, the Taintor Mfg. Company, Department A, 113 Chamber Street, New York City, is offering its latest model—a No. 7½ saw set—at a special price. The tool will be sent by parcel post C. O. D.

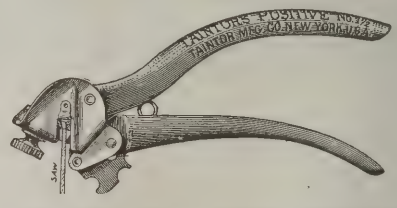


Fig. 7—New Model of the Taintor Positive Saw Set

and the offer expires Dec. 31, 1915. The Taintor Positive Saw Set embodies features which render it an exceptionally desirable tool both by reason of its accurate workmanship and the satisfaction which it gives in setting saws. The construction is such as to give two plungers in one, there being one side for fine teeth and the other for coarse. In Fig. 7 is shown a general view of the saw set in question.

Sweeping Injunction in Favor of the Upson Company

The Upson Company, Lockport, N. Y., maker of dependable board products and special fiber things, is sending out copies of what it designates as its "Injunction Broadside," setting forth an injunction which has just been granted in the United States Court against a dealer who endeavored to substitute an inferior board with a blue center for "Dependable Upson Board." In other words, the company states this dealer tried to sell an inferior board at a lower price on the strength of the reputation the company has spent thousands of dollars and years of hard work to build up for "Upson Processed Board." The injunction is perpetual and prohibits the sale or offering for sale of board with a blue center not made by the Upson company. The folder which is being sent out contains the letter of Charles Upson, president of the company, fully explaining the case, and there is also an interesting talk on "Fair Trade."

The blue center in Upson Processed Board is an arbitrary feature purposely incorporated therein as a ready means of identification or trademark, and it stands as a guarantee of quality and dependability from the Upson company.

(*Continued on page* 86)

Large Business in Fenestra Solid Steel Windows

For the purpose of celebrating a record-breaking September business, about thirty members of the Detroit Steel Products Company, Detroit, Mich., were guests of General Manager J. G. Rumney at a banquet given Oct. 19 in one of the private dining rooms of the Detroit Athletic Club. During the evening stereopticon views reproduced from photographs taken by Mr. Rumney on a recent business and pleasure trip through the West were thrown on the screen. The September output of the company, including both fenestra solid steel windows and self-lubricating springs was the biggest in the history of the concern. The September record is said to have been a combination of a series of record-breaking months throughout the year.

New Drum and Disk Sanding Machine

Realizing the great amount of time that can be saved to carpenters and builders in the finishing up of inside work by sandpapering, and taking into consideration also the various kinds of sanding that the average carpenter and builder is called upon to do, the J. A. Fay & Egan Company, 221 to 241 West Front Street, Cincinnati, Ohio, has designed the machine which we illustrate in Fig. 8 and which is intended to take care of the different kinds of sanding work that arises, while at the same time, it is offered at a price well within the

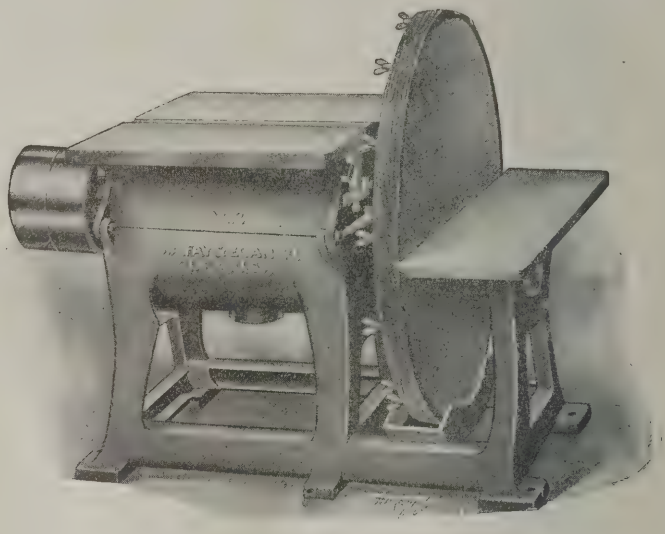


Fig. 8—Drum and Disk Sanding Machine

means of every such shop owner. It is in reality a universal sander but is designated by the company as its No. 2 iron frame hand feed drum and disk sandpapering machine. Flat pieces must be sandered over a solid table with revolving drum set between the table openings, and the way it has been worked out is clearly shown in the illustration. It will also be noted that tables are on hinges so that they can be thrown back, exposing the surface of the curved drum so that any kind of curved work may be sandered as readily as flat work. A large flat disk with the angling table is provided for taking care of irregular shapes, extra large pieces, drawer ends, etc. The entire machine occupies a small floor space and can be driven from a line shaft or from an individual electric motor. We understand that the company has placed a large number of these machines with carpenters and builders throughout the country and in every case the greatest satisfaction has been reported as well as increased profits to the users.

The "Crescent" Rule Gage

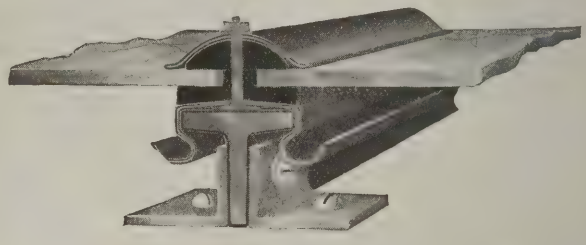
What is known as the "Crescent" rule gage, and made to slide on an inch-wide 2-ft. carpenter's boxwood rule, has been put on the market by Dodd & Tucker of Williamsport, Pa. It is stamped from a single blank of spring sheet steel and nickel plated. It is 1¾ in. wide, and the length from rear to point is 1⅝ in. As

(*Continued on page* 88)

an attachment on the rule it is always usable as a try square, and in numerous ways enables the mechanic to lay out countless kinds of work of diverse character. As it is in one piece there are no joints to fail or impair its accuracy. The gage is convenient for determining 45 deg. miters, and square ends of floor and siding planks, to insure perfect joints, and is especially handy for mitering generally as well as for straight, inside and outside arch and depth gaging. It may be slipped off the rule instantly as there are no levers, set screws, cams or other distinct parts to hold it; neither are there any sharp edges or protruding points to wear holes in clothing.

The "Waugh" Glazing Construction

One of the latest developments in connection with roof lighting problems is that designated by the name of "Waugh" glazing construction and brought out by



The "Waugh" Glazing Construction—Fig. 9—General View

the Asbestos Protected Metal Company, Pittsburgh, Pa. This system as applied to skylights is illustrated in the accompanying cuts, Fig. 9 showing the appearance of the glazing, while Fig. 10 represents a vertical cross-section with the details of construction clearly indicated. Referring to the latter, *A* is a rolled steel bar beam sufficiently stiff to carry its load without deflection; *B* is a coating which is claimed to preserve the steel beam from corrosion and loss of stiffness; *C* is the asbestos protected metal gutter; *D* the asphaltic glass cushion which it is claimed keeps the glass from contact with hard substances and avoids destructive strains; *E* is the asphaltic cap filler which follows the contour of the glass surface and excludes water; *F* is a cap, and *G* a cap-bolt which clamps the glass between the flexible cushion and filler, thus insuring permanently waterproof joints. In saw-tooth and continuous monitor sash the condensation gutter *C* is omitted and clamp clips are substituted. In Bulletin No. 56, an advance copy of which is before us, the company illustrates and describes this new system of glazing con-

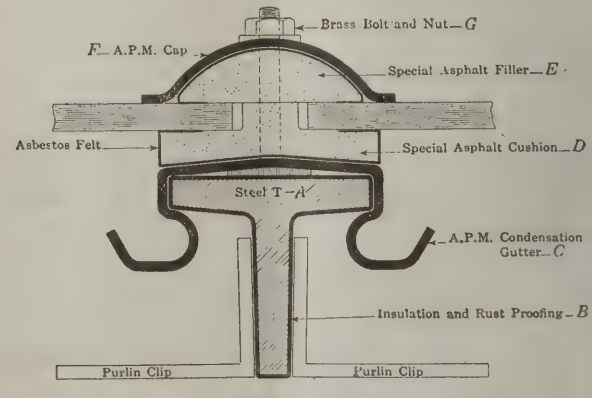


Fig. 10—Section Showing Details of Construction

struction at considerable length and presents numerous halftone engravings of buildings of various kinds making use of the "Waugh" glazing construction. The latter is also illustrated in detail upon several pages at the close of the Bulletin, and there are also "suggested specifications for skylights" which cannot fail to prove interesting in this connection to both architect and builder.

(*Continued on page 90*)

Shingles That Are Impervious to Moisture

In order to render its asphalt shingles absolutely impervious to moisture, the Heppes Company, 1011 South Kilbourne Avenue, Chicago, Ill., observes extreme precaution in their preparation. Each Giant Flex-A-Tile Shingle is composed of four different materials—pure wool felt; oil-free, liquid asphalt; gilsonite and slate or granite. The wool felt used for a base is thoroughly impregnated with a saturation of an oil-free liquid asphalt, on top of which is placed hot gilsonite, and into this, while still hot, is embedded under high pressure the surfacing of slate or granite. The result of this process is a roofing that is very strong and capable of withstanding hard service.

Pullman Unit Sash Balance

The Pullman Mfg. Company, 8 Industrial Street, Rochester, N. Y., is sending out copies of its new catalogue known as No. 24, which in many ways is unique as a trade publication. In its arrangement the leaves are bound together at the top and the page numbers are at the bottom. In examining the matter, therefore, the pages are lifted from the bottom instead of turning them as in the case of an ordinary book. Another interesting feature is found in the fact that the first page consists of a typewritten letter addressed to the architect personally, while another feature is a large blue print sheet which is folded and pasted inside the back cover, this showing various details of a window frame for Pullman sash balances. The first printed page of the catalogue bears the suggestion "Specify Pullman Unit Sash Balances and Insure Perfect Working Windows." This balance is noiseless as all the parts are contained within a housing and all are carefully fitted so that there is nothing to rattle or squeak. The coil spring being three times the length of the sash movement, the company claims that there is sufficient spring tension to balance the sash perfectly at aay point, even to the last eighth of an inch. The unit feature makes the installation of the balance a very simple matter and by reason of the fact that the face plates are all the same size in a given unit the mortises for them may be cut at the mill as for ordinary sash pulleys. In Fig. 11 is presented an illustration showing the extreme simplicity of this unit sash balance. For concrete buildings the company has provided a convenient and economical way of making the recess for the balances by means of a pressed steel housing. The latter is nailed or screwed to the back of the pulley stile and when the frame is set into the wall the concrete flows around the housing embedding it in the mixture. In the catalogue in question are tables showing weights, lengths, prices, code words, etc., of the various sizes of balances and illustrations are given of various forms of special balances which the company manufactures.

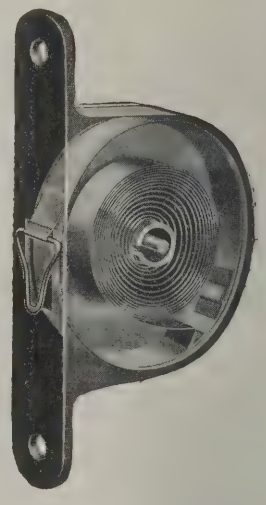
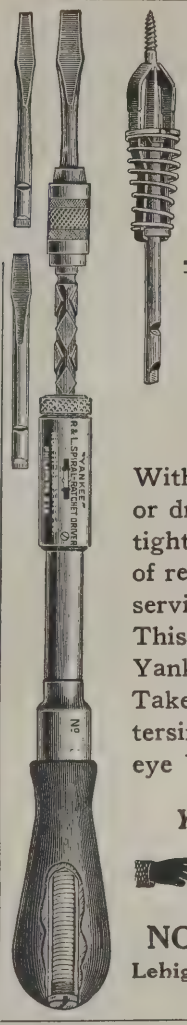


Fig. 11—The Pullman Unit Sash Balance

Mathews Gravity Lumber and Brick Conveyors

Some very attractive literature relating to the above devices is being distributed by the Mathews Gravity Carrier Company, Ellwood City, Pa. In presenting the catalogue of gravity lumber conveyors to the trade the company does not wish it to be understood that it is introducing something new and untried, for the devices have stood the test of more than ten years of practical service. Various changes and improvements have been incorporated from time to time as seemed necessary to meet all conditions under which they are required to serve. The illustrations presented are taken from

(*Continued on page 92*)



Look at This

"YANKEE" No. 131

Large Size

QUICK RETURN

With Spring in Handle

A quick and powerful tool for house carpenters. Drives most any size screw, large or small, and in about one tenth of the time of an ordinary driver. With the screw holder you can drive or draw a screw 3 feet overhead, in tight corners or most any place out of reach. Besides, you get the same service as with the Yankee No. 31. This is the quickest and strongest Yankee Driver made.

Takes the drilling attachment, countersink, screw holder bit and screw eye bit used in the No. 31.

Your dealer can supply you

Let us send you the "YANKEE" Book. A postal brings it

NORTH BROS. MFG. CO.

Lehigh Ave. Philadelphia, Pa.

Handles Easily

—saws clean and smooth, no shrinking or warping to allow for when you are nailing it on, does not crack or break like wood paneling, always lies flat and straight,—these are some of the many strong features that our patented construction gives to

Compo-Board

Trade Mark Reg. No. 94745

It's a "right hand" material for any carpenter.

There are 1001 jobs that can be done with Compo-Board more satisfactorily, quicker, and with less muss, fuss and worry.

But do not get the impression, as many folks have, that "Compo-Board" is a popular name for "wall board." Compo-Board is our trade mark name for our distinctive kind of a wall board,—the kind with our patented centre core of wood slats, as illustrated in the border of this ad.

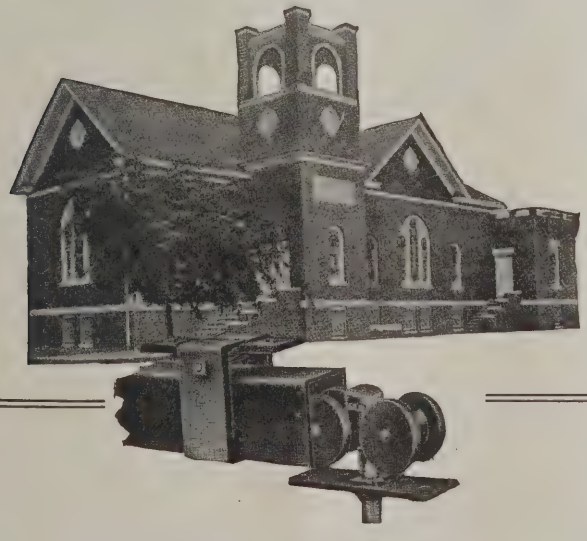
The wood core is the feature that gives Compo-Board so many strong advantages over other kinds of wall boards, and also the feature that makes "Compo-Board" so easily identified.

Sold by dealers everywhere in strips four feet wide and in lengths of one to eighteen feet, as desired,

Write for interesting book and sample.

The Compo-Board Co.

5778 Lyndale Ave. No.
Minneapolis, Minnesota



Double the Floor Space

Gives separate rooms for class purposes and a big "roomy" room for general meetings.

R-W Accordion Door Hangers

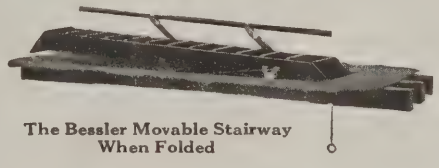
No. 135 Hanger, shown above, and No. 335 Hanger are four-wheel hangers, and are placed on every other door. No. 137 Hanger is a two-wheel hanger and is placed on every full sized door; not needed when the four-wheel hangers are used. These hangers have metal or fibre wheels, ball-bearing or roller-bearing.

A Hanger for Any Door That Slides

Richards-Wilcox

MANUFACTURING CO.
AURORA, ILL. U.S.A.

Send for New No. 12 Catalog.



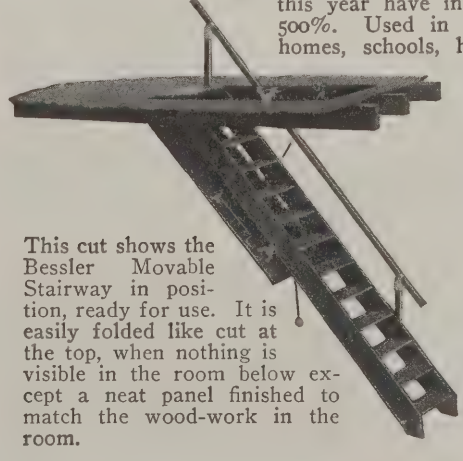
The Bessler Movable Stairway When Folded

A Practical Stairway

Designed by a PRACTICAL Builder for the PRACTICAL Purposes of Saving Space and adding convenience.

The Bessler Movable Stairway was designed to replace the stationary stairway leading to upper rooms where the space in the room below is valuable—and where is this not the case?

That it is successful is attested by the fact that sales this year have increased over 500%. Used in all types of homes, schools, hospitals and other public buildings.



This cut shows the Bessler Movable Stairway in position, ready for use. It is easily folded like cut at the top, when nothing is visible in the room below except a neat panel finished to match the wood-work in the room.

Write us for our booklet explaining the stairway in detail.

The Bessler Movable Stairway Company

Dept. No. 1
Akron, Ohio

photographs of conveyors in actual every day use and serve to prove their extreme practical value in handling the various products shown. In the gravity brick condevice on which brick, cement blocks, tiling, paving blocks, etc., will travel by their own weight any desired distance on a 4 per cent. grade. The conveyors are made of solid steel in 4 and 8 ft. lengths coupled together. Brick travel over cold drawn seamless steel rollers 2¼ in. in diameter, and in widths varying from 8 to 16 in. The company states that from numerous records furnished by actual users it has been found that the saving in time and labor equals approximately 33 1-3 per cent. over the old wheelbarrow method.

The Hartman Universal Woodworker

A new woodworking machine known as the "Universal" and containing many features of interest to readers of THE BUILDING AGE has been placed on the market by the Hartmann-Greiling Company, Green Bay, Wis. The equipment completely assembled ready for many operations is shown in Fig. 12. One of the best features of the machine is the main arbor frame arrangement which enables the operator to lower and raise the saw. Where it is essential to cut long material the workman simply raises the main frame from underneath the table and the cut is rapidly made. The company also points out that the arrangement of the power transmission is also important and that all parts of the equipment are readily adjustable. The provi-

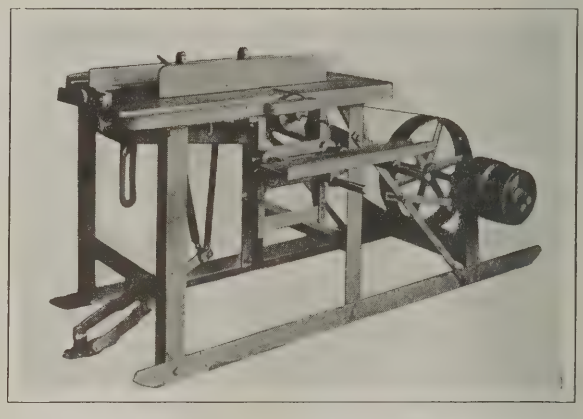


Fig. 12—The Hartman "Universal" Woodworker

sion of a long belt gives more power to the saw or cylinder head. When cutting grooves or dado work the depth of the cut can be adjusted and locked to any desired height. The frame, skids, braces, etc., are constructed entirely of steel angles and bars, which insure rigidity and durability, and there is no danger of warping. The frame is 36 in. high and can be easily taken apart to facilitate shipment. The table top is built of cast iron, 32 x 44 in., securely bolted to the frame. The jointer head and saw arbor are forged from one solid piece of best billet steel. With this arrangement there is no danger of the saw collar or jointer head coming loose from the arbor. Both the saw and jointer head may be operated simultaneously. In front of the jointer head an adjustable table is furnished which can be raised or lowered to suit the convenience of the workman. The jointer head is the latest safety cylinder type, 5 in. diameter by 6 in. long, equipped with four tool steel knives and a safety guard is provided. The equipment has a boring attachment, and one 14-in. rip saw and a 16-in. cross-cut saw are furnished to cut 4-in. material. Five gages consist of two miter gages, one right and one left, cut off gage, rip gage and jointer gage. The different attachments for providing power include counter shaft, electric motor or gasoline engine. The machine fully equipped and crated weighs approximately 1200 lbs.

Berger's Conductor Pipe and Eaves Trough Catalog

There has just been issued from the press a booklet of a size convenient to carry in the pocket covering the

(*Continued on page* 94)

conductor pipe and eaves trough accessory products of the Berger Mfg. Company, Canton, Ohio. The little work is profusely illustrated and the engravings are accompanied by ample descriptive text so that the builder or sheet metal worker is able, almost at a glance, to note the salient features. Not only is a brief description of each article given but there are also price lists of direct interest in this connection. The little work is known as booklet No. 894 and a copy of it can be secured by any reader of the paper on application to the address given above.

Eclipse Machinery and Equipment

We have received from the Eclipse Machine Mfg. Company, Kendallville, Ind., a copy of an attractive catalog of fifty-four pages relating to Eclipse machinery and equipment which includes concrete block machinery, hand and power batch mixers, fence post molds, continuous mixers, drain tile machines, hoists, wheelbarrows, sidewalk finishing tools, etc. The company emphasizes the fact that it sells direct from factory to consumer; that no agents are employed to annoy and there are no commissions to pay. The catalog is profusely illustrated showing the machines in question and the various accessories while the descriptive text covers all the leading features.

Two New Wall Boards

A folder which is being sent out by the Armor Board Company, for which the Upson Company, Lockport, N. Y., is the exclusive selling agent, makes announcement of two new low-priced boards which are likely to prove of more than usual interest to the trade. One of these, the Square Deal Board, is the newest product of the company named and is made of good wood fibers and "double sized" so that it is not affected by ordinary leaks and moisture. It is made only in panels 48 in. wide and in length ranging from 6 to 16 ft. The other new board, known as the "Armor," is a four-ply board made of strong pure wood fibers and is a high-grade product in all respects. It is waterproof and costs a little more than the Square Deal Board and a little less than the Upson Board. The new Armor board is made in panels 42 and 48 in. wide and in length ranging from 6 to 16 ft. We understand that samples of these boards will be mailed to any builder on request.

TRADE NOTES

In mentioning in our last issue the fact that Buck Brothers had purchased the business of Charles Buck Edge Tool Company, the location was inadvertently given as "Millburg" instead of Millbury, Mass. Buck Brothers, however, are so well known to the trade that it is probable none of our readers were led astray by the misspelling of the word.

Bridgeport Wood Finishing Company, New Milford, Conn., is distributing a folder calling attention to a book which it offers to send free to any builder or carpenter-contractor who may make application for it. It is entitled "Modern Wood Finishing with Bridgeport Standard Wood Finishers," and is referred to as an "encyclopedia of wood-finishing knowledge." The work is illustrated in colors showing forty-eight standard and popular finishes and the suggestions cannot fail to prove of value to the practical man.

"Huber Building Material" is the title of an attractive catalog known as No. 136 being sent out by the Huber Builders' Material Company, 48-50 Vine Street, Cincinnati, Ohio. The information contained is of special interest and value to carpenter-contractors and builders, including as it does illustrations of all sorts of millwork accompanied by sizes, prices and brief descriptive particulars.

(*Continued on page 96*)

The Crescent saw guard which we illustrated in the November issue of THE BUILDING AGE and which is made by the Crescent Machine Company, 206 Main Street, Leetonia, Ohio, is proving very popular with the trade, and we understand that the company is doing a very satisfactory volume of business in connection with it.

The Pacific Mutual Door Co., Tacoma, Wash., is sending to carpenters and builders an attractive twenty-two-page catalog showing designs of "Pamudo" fir doors, which are said to be made from selected old-growth fir. Nineteen excellent illustrations are shown and the company states that each door is carefully machined by efficient workmen. The data presented covers full specifications and the number of sizes carried in stock. The company maintains branches in New York City and Chicago.

The Diehl Novelty Co., Glenbuelah, Wis., maker of hardware specialties, is distributing a thirty-six-page illustrated catalog likely to interest readers of THE BUILDING AGE. Each product is numbered, and in the front of the book is a table of comparative weights of the articles. The line shown includes storm sash and screen hangers, hooks, hinges, catches, latches, etc.

James L. Taylor Mfg. Company, Poughkeepsie, N. Y., is distributing among the trade a very attractive folder entitled "They Know" and relating to the clamps made by this concern. "They" in this case refers to the U. S. Navy Department, and the following appeared in a recent U. S. Navy Yard proposal, signed by the commander of the yard: "As the clamps made by the James L. Taylor Mfg. Company are capable of doing work that can be done by no others that I know of, this design and no other will meet our requirements."

The October issue of the *Disston Crucible,* a magazine for the millman, and the house organ of the Henry Disston & Sons, Philadelphia, Pa., is more than usually attractive in its illustrations and technical information. Among the early pages is a list of the prizes awarded the company by the Panama-Pacific International Exposition, there being twelve in all; another feature is an article dealing with the sanitary arrangements in logging camps by Dr. Austin, camp physician for the Fernwood Lumber Company.

The Gum Lumber Manufacturers' Association, 1339 Bank of Commerce & Trust Building, Memphis, Tenn., has just issued an attractive pamphlet giving interesting technical information about red gum. The illustrations show the effect produced by different methods of manufacturing this material and terms are given, which when used in specifying individual requirements, should avoid misunderstanding and confusion. Special emphasis is laid upon red gum as a cabinet wood, than which there is said to be none more attractive.

The Cleveland Galvanizing Works Company, Cleveland, Ohio, has just acquired additional property adjacent to its present works which will enable it to greatly enlarge its plant and output, which consists of sash chain in four patterns—Samson, Bull-Dog, Cleveland and Hodell—weldless wire chain, etc.

Eugene H. Knight, formerly chief draftsman for William C. Weston, has opened an office for the practice of architecture in 1134 Brown-Marx Building, Birmingham, Ala. Mr. Knight assisted Mr. Weston in designing the Jefferson County Bank Building, Temple Emanu-El, the Hann Shoe Store, also some of the handsomest residences in the city.

The Lehigh Portland Cement Company announces under date of Chicago, Nov. 15, that Harold M. Scott has been made assistant secretary of the company and B. H. Rader has been appointed as Western sales manager.

(*Continued on page* 98)

Berger Mfg. Company, Canton, Ohio, is distributing among the trade an illustrated Bulletin devoted to technical data regarding tests of Berger's metal lumber pressed steel construction. The book is of interest to all connected with the building trades, and a feature to be noted is that it contains none of the usual advertising matter, but the text is confined exclusively to information likely to prove valuable to those interested in fireproof construction. The tests were designed to produce as near as possible the maximum conditions which prevail in large conflagrations, and at the same time provide means of accurately recording the action of the material at all times. We understand that a copy of this Bulletin entitled "The Tests" will be sent free of charge to any reader of the paper who may apply for it.

"Medusa Waterproofed White Portland Cement" is the title of an exceedingly attractive publication sent out by the Sandusky Portland Cement Company, Cleveland, Ohio. The illustrations are halftone engravings of buildings in connection with which this product of the company has been used, and the descriptive text is of a nature to interest every builder and contractor having to do with concrete work.

The Grand Rapids Fire Proofing Company, Fourth National Bank Building, Grand Rapids, Mich., has just been organized as a contracting firm for the purpose of erecting fireproof interior wall partitions of gypsum stucco blocks, tile, metal lath and wood construction. The president is C. M. Emerson, who is also president of the Builders' and Traders' Exchange of that city; the vice-president and general manager is W. H. Carl; the treasurer is L. Z. Caukins, and the secretary is M. B. Mathews.

The latest issue of "Graphite" published regularly by the Joseph Dixon Crucible Company, Jersey City, N. J., contains the usual amount of interesting information regarding the products of this concern. Among other things the reader may learn that 88 years ago Joseph Dixon founded the business now known as the Joseph Dixon Crucible Company and the statement is made that "there is not a civilized point in the entire world that does not make use of a plumbago crucible which was one of the inventions of Joseph Dixon.

"Plastergon Wall Board, Its Application and Decoration," is the title of an exceedingly attractive booklet which is being sent out by the Plastergon Wall Board Company, 102 Fillmore Avenue, Tonawanda, N. Y. The illustrations are halftone engravings of interiors showing the appearance of rooms finished with Plastergon wall board. There are comments on the selection of wall board and one of the tables presented is designed to enable the carpenter and builder to figure the quantity of board necessary for any size of room. There are instructions for applying the board, also how to decorate it, together with brief painting specifications.

The Department of Mines and Metallurgy of the Panama-Pacific International Exposition has just awarded a gold medal to Frank D. Lambie, 299 Broadway, New York City, for his interchangeable steel house "forms" which are used in the construction of concrete houses. They are of a nature to permit the "pouring" of a story at a time for any size building and hundreds of houses have recently been erected by their use in various parts of the United States.

Many of our readers will be interested in learning of the free course in carpentry at the Murray Hill Evening Trade School, 237 East Thirty-seventh Street, New York City. The sessions are held Monday, Tuesday, Wednesday and Thursday evenings of each week.

In his testimony before the Federal Trade Commission in Chicago a short time ago, George E. Watson, secretary of the Southern Cypress Manufacturers' Association, told the commission how a vigorous advertising campaign had assisted the Cypress Division to combat hard times.

Universal Portland Cement Company, Chicago, Ill., is sending out an eight-page booklet entitled "Concrete Septic Tanks for Farm Houses and Dwellings in Small Towns." The matter is illustrated by means of sectional views of septic tanks, clearly indicating the internal arrangement, and the matter is such as to appeal to those interested in the sanitary aspects of the subject.

CONTAINING COLORED SUPPLEMENT WITH PLANS

BUILDING AGE

DECEMBER, 1915

PRICE 20 CENTS

"HARD KNOCKS"—of Centuries

have not destroyed the principle of the dovetail or, the preserving qualities of creosote and Asphalt

Time, the great destroyer, deals "knock-out" blows to inferior building materials. The stucco finished house with any but *the best background* for stucco, cement or plaster is short-lived.

THE DOVETAILED KEY LOCKS THE PLASTER
BISHOPRIC STUCCO OR PLASTER BOARD
TRADE-MARK REGISTERED

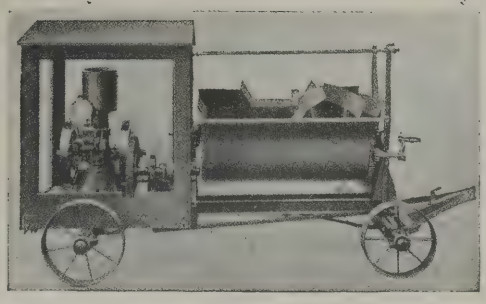
Write for our free book, "Built on the Wisdom of Ages," illustrating homes, apartments, factory and public buildings finished in stucco on Bishopric Board — containing letters from architects, builders, and users, and extracts from reports of scientific tests, also free samples of Bishopric Board.

Write *today*, investigate for yourself, be convinced.

is a modern combination of material and principles that centuries of actual use have proven the most efficient in building construction. The dovetailed creosoted lath *clinching* the stucco, backed by Asphalt Mastic over heavy fibre-board, absolutely weather and water proof, withstand the vibrations from storm, the extreme changes in temperature and all the hard knocks of time, more successfully than any known background for stucco made—and *it's the most economical.*

The Mastic Wall Board & Roofing Co.

700 Este Avenue **Cincinnati Ohio**



Blystone Batch Mixer

For Plaster-Concrete-Mortar

A saving of $25.00 per day was made in mixing hardwall plaster for the big Machinery Palace for the Panama Pacific Exposition.

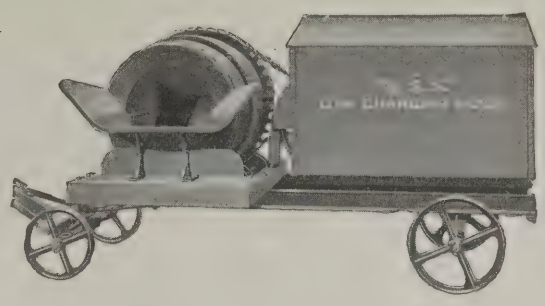
The Cement Tile & Block Mfg. Co., of Osgood, Ohio, paid for their Blystone in three months work in their block plant.

One man slaked lime and made mortar for ten masons and had time to spare for other work on a job recently done by G. Ed Berry, of Harrisburg, Ill. Mr. Berry also says he got 10% more mortar per barrel of lime.

H. A. Farmer, St. Petersburg, Fla., recently wrote us as follows: "I am so well pleased with mixer, I want another just like it. Ship me another one as soon as possible."

Write for Catalog Today

Blystone Manufacturing Co.
1115 Day St., Cambridge Springs, Pa.



"S. S. S." Low-Charging Concrete Mixer

The Low-Charging, Light Weight, Compact Design of the "SSS" Mixer may enable you to complete your concrete work before freezing weather, or it can be placed inside the building or from floor to floor when doing concrete work in Winter.

The mixer is charged direct by wheelbarrows from platform only 20" high and the semi-automatic dumping device discharges the concrete in a few revolutions.

The "SSS" Mixer is built in four sizes having capacities of 4, 6, 9 and 11 cu. ft. with steel truck, gasoline engine, enclosed in steel house, complete.

LOW CHARGING SAVES ⅓.

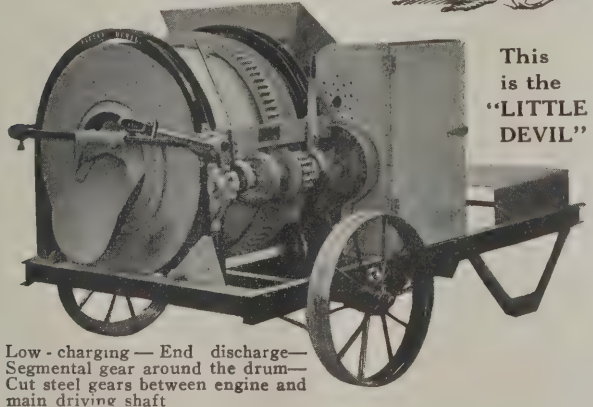
Complete Catalog No. 48-12 and prices on request.

The Standard Scale & Supply Co., Mfrs.

1345-47 Wabash Ave. Chicago	243-45 Water St. Pittsburgh	136 W. Broadway New York
35 So. 4th St. Philadelphia	1547 Columbus Road Cleveland	

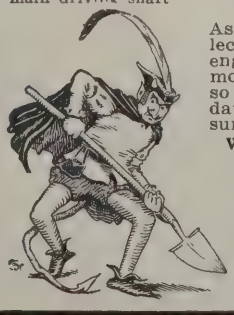
Take a Look at the "LITTLE DEVIL"

If you want to see a real honest-to-goodness concrete mixer. Did you ever see a more business-like, more compact or more efficient mixer?



This is the "LITTLE DEVIL"

Low-charging — End discharge— Segmental gear around the drum— Cut steel gears between engine and main driving shaft



As strong as careful workmen and select materials can make it; a reliable engine; light in weight and easily moved from job to job; end discharge so that it will dump directly into foundation forms—and a price that will surprise and please you.

WHAT MORE DO YOU WANT?

Send for complete specifications

Chicago Builders' Specialties Co.
1415 Lumber Exchange
Chicago, Ill.

THIS MACHINE WILL EARN $20 to $50

Daily Profit for You

Making Cement Bricks and Blocks

Factory owners are the biggest money makers in America and this machine will place you in their ranks. You can start with little capital and even without experience. This machine makes pressed cement bricks and blocks under **80,000 pounds pressure.** No tamping and easy work. It makes 1,000 blocks or 10,000 bricks daily. No burning required. Ready for the market in a few days' time. They are necessary for the

Helm DRY WALL Building System

This is the system that appeals to builders, contractors and architects. It overcomes the opposition to concrete because it offers absolutely **DRY WALL** construction. It saves money for builders, as **no furring and lathing are required,** and it makes **rigid walls and fireproof walls.** This is the system which is bound to get you business and give you the advantage over all other products. **$50 and up starts you.**

Send for This FREE CONCRETE BOOK

Tear off the corner coupon right now before you turn the page. Let this free book tell you all about this great opportunity which is open to you today. It will tell you all the details of this system, about the Helm Press and the DRY WALL building system. It will show you how easy it is to start a profitable business. It tells how each product is made, how it is cured and sold. Write today. Do it now.

Helm Brick Machine Co.
3 Mitchell St.
Cadillac, Mich.

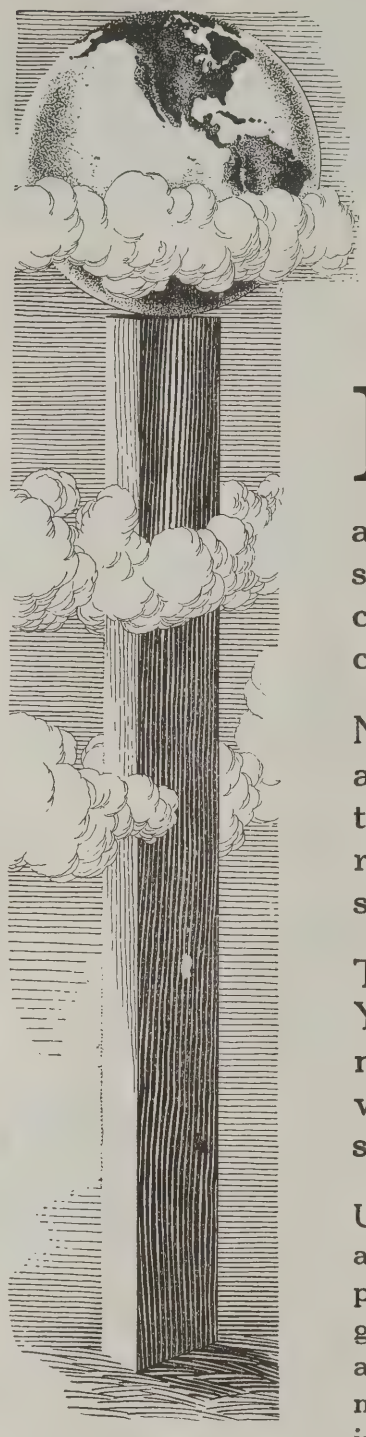
Helm Brick Machine Co.
3 Mitchell Street
Cadillac, Mich.

Please send FREE the book on concrete and Helm Presses.

Name.....

.....

Address.....



GETTING WHAT YOU SPECIFY—

EVERY ARCHITECT AND STRUCTURAL ENGINEER KNOWS the superlative qualities of sound, dependable Southern Yellow Pine used as beams, studding, sills, sleepers, joists, girders, trusses, columns—in heavy construction of every character.

NO OTHER MATERIAL combines in such a happy degree and in such perfect proportion the properties of cross-breaking strength, resistance to impact, strength under compression, and resistance to shear.

THE ONLY INSTANCES where Southern Yellow Pine timbers have failed under legitimate maximum working stresses have been where inferior grades of material have been substituted for material specified.

UNDER THE NEW RULES for standardizing sizes and grades in Southern Yellow Pine timbers, recently perfected and adopted by the Southern Pine Association, grading is reduced to an exact mathematical calculation and assured absolute dependability in quality. That means the complete elimination of future uncertainty in specifying Southern Yellow Pine for exacting use.

THE SOUTHERN PINE ASSOCIATION'S MANUAL OF STANDARD WOOD CONSTRUCTION, revised and enlarged, with new Grading Rules, Building Codes, Working Formulae, Effects of Creosoting, etc., is now in press and practically ready for delivery. Send for your copy.

SOUTHERN PINE ASSOCIATION

New Orleans, La.

Building Material PRICES SMASHED

Builders, Carpenters Roofers, Contractors, etc.

All know when we say Building Material Prices Smashed, they are to have a buying treat, such as only we could offer.

As prices of all materials jump skyward, we content ourselves with a small profit, and pass on the benefits of our Price Wrecking ability to our customers.

$769 Buys This House

Sensibly Cut-to-Fit The Harris Way

For this price we furnish all lumber, millwork, hardware, guttering and spouting to build this house (Design 161) complete. We also give free, complete blue prints, material lists and specifications.

Build the most economical of all Cut-To-Fit Ways, the Harris Way—*Sensibly Cut-To-Fit.* Profit by our 23 years of designing and scientific study; and profit by our money-saving machinery. The Harris Way eliminates all waste, prevents shortage and guarantees perfect material.

The Sensibly Cut-To-Fit method is the most profitable and economical for **both contractor and builder,** because it is based on the tried and proved building principles.

Free Book of Plans

Our new Illustrated Plan Book, of over 100 Harris Homes, Barns, Garages, Apartments, etc., shows floor plans, material lists, etc., and explains **the Harris Way** and *Sensibly Cut-To-Fit* in detail. It is mailed free anywhere. Write now to Dept. AN 154.

BLUE PRINTS and Specifications FREE

We will give complete working blue prints, specifications, material lists and illustrations of every item furnished for this or any other Harris Home, for $1.00. All free if you purchase material from us.

Roofing Bargains

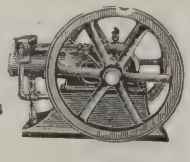
Our Roofing Department recognizes no competition on quality roofing. Builders and contractors everywhere have saved thousands of dollars by purchasing our quality roofing, wallboard and sheet metal decorative plates, slate coated shingles, etc.

Galvanized roofing $1.95 per square of 100 feet.
Ajax 2-ply 86c. per roll of 108 square feet.
Ajax 3-ply 96c. per roll of 108 square feet.
Send to Dept. AN 154 for our Big Roofing Book.

OLDS Gasoline Engines

A recent big pur- chase enables us to offer these brand new perfect "Olds" Engines at less than dealers used to pay wholesale. Stocks include stationary and portable, direct connected to pumps, hoists and saws, etc. All sizes. Write to Dept. AN 154 for Olds Engine Book.

$45 Buys a **3 h.p. Olds**



—Get These FREE Books Now—

Every prospective builder, every carpenter, con- tractor, roofer, plumber, painter, etc., should have these free books.

Write private letters to Dept. AN 154

HARRIS BROTHERS COMPANY
35th and Iron Streets Chicago

What Will this House Cost?

A Knowledge of Plan Reading and Estimating Means MONEY FOR YOU

Could You

—**estimate** the cost of this building
—**draw the plans** for this building
—**superintend** the construction of this building
—**take the contract** to build this building

?

Successful men don't guess, they *know!* To succeed in any branch of the building business you must have a complete knowledge of plans and specifications. You must be able to estimate closely the cost of material and labor. Guessing won't do—you must *know.* This knowledge is what makes successful *foremen, superintendents* and *general contractors.* This knowledge means money—thousands of dollars—to any builder—to you!

Learn at Home *Your spare time is enough* to master these subjects by our new, easy, quick method. The same expert instructors who are so successful with hundreds of men in our Day and Evening Classes will guide you to a larger success. These instructors are among Chicago's leading Architects, Engineers, Estimators and Contractors. *They* prepare your instruction matter; *they* examine and approve your work. *They* are themselves in charge of real work—big work—and know exactly the training you need.

A Practical Course For BUILDERS

Carpenters **Foremen**
Bricklayers **Superintendents**
Plasterers **Contractors**
and all other men in Building Lines

Read This!

Any man in the building lines can save many times the cost of this course on one job alone.

Plan Reading, Estimating, Architectural Drawing, Contracting, etc.

This is a course for practical men. We send you actual blue print plans of buildings now being built or recently completed. Practical training, not book knowledge, is what you want—it's what we give. When you think of the opportunities this training offers you will take time—right now—to mail the coupon for full information.

This elegant $15 Drawing Outfit and all Blue-Print Plans are furnished FREE

With Instructions In Plan Reading, Estimating, Drawing, etc.

Free Information Coupon—Mark and Mail Today

Mark "X" opposite work in which you are interested. No obligation for full information.

- ☐ Builders' Course
- ☐ Plan Reading
- ☐ Estimating
- ☐ Architectural Drafting
- ☐ General Contracting
- ☐ Building Superintendence
- ☐ House Planning
- ☐ Structural Steel Drafting
- ☐ Machine Drafting
- ☐ Electrical Drafting
- ☐ Sheet Metal Drafting
- ☐ Surveying

Name _____

Address _____

Town _____ State _____

College or Home Study Course _____

Chicago Technical College

1020 Lake View Building, Chicago, Ill.

Mechanical and Technical Books at Special Prices

CONTINUED

HINTS FOR PAINTERS. 76 pages; cloth..... .50

HODGSON'S A B C OF THE STEEL SQUARE. 136 pages, 95 figs; cloth..... .50

HODGSON'S BUILDERS' ARCHITECTURAL DRAWING. Cloth 2.00

HODGSON'S CARPENTRY AND JOINERY—VOLUME 1. 192 pages; 204 figs.; cloth..... 1.00

HODGSON'S CARPENTRY AND JOINERY—VOLUME 2. 389 pages, 385 figs.; cloth..... 1.00

HODGSON'S COMMON SENSE STAIR BUILDER. 190 pages, 187 figs.; cloth 1.00

HODGSON'S CONCRETE CEMENT, MORTAR, ETC. 509 pages, 150 figs.; cloth 1.50

HODGSON'S CARPENTERS' STEEL SQUARE AND ITS USES, VOLUME 1. 112 pages, 90 figs.; cloth ..... .50

HODGSON'S HAND SAWS. 96 pages, 76 figs.; cloth ..... .50

HODGSON'S LIGHT AND HEAVY TIMBER FRAMING. 384 pages, 420 figs.; cloth..... 2.00

HODGSON'S MODERN ESTIMATOR. 318 pages, 100 figs.; cloth 1.50

HODGSON'S PRACTICAL BUNGALOWS. 420 pages, 400 figs.; cloth 1.00

HODGSON'S PRACTICAL BRICKLAYING. 277 pages, 300 figs.; cloth 1.00

HODGSON'S PRACTICAL UP-TO-DATE FINISHER. 320 pages, 117 figs.; cloth 1.00

HODGSON'S PRACTICAL STONEMASONRY. 300 pages, 500 figs.; cloth 1.00

HODGSON'S PRACTICAL TREATISE ON STEEL SQUARE, VOLUME 1. 234 pages, 177 figs.; cloth 1.00

HODGSON'S PRACTICAL TREATISE ON STEEL SQUARE, VOLUME 2. 221 pages, 160 figs. cloth 1.00

HODGSON'S PLASTER AND PLASTERING. 108 pages, 25 figs.; cloth ..... .50

HODGSON'S SLIDE RULE. 29 pages; paper.... .25

HODGSON'S STAIRBUILDING MADE EASY. 128 pages, 111 figs.; cloth ..... .50

HODGSON'S STEPS IN ARCHITECTURE. 96 pages, 150 figs.; cloth..... .50

HODGSON'S WOOD CARVING. 284 pages, 200 figs.; cloth..... 1.50

HODGSON'S TWENTIETH CENTURY BRICK AND MASON'S ASSISTANT. 305 pages, 450 figs.; cloth 1.50

HODGSON'S STAIR BUILDING AND STEEL SQUARE. 103 pages, 181 figs.; cloth..... 1.00

HOUGHTON'S CONCRETE WALL FORMS—VOLUME 1. 60 pages, 16 figs.; paper..... .50

HOUGHTON'S CONCRETE FLOORS AND SIDEWALKS—VOLUME 2. 60 pages, 8 figs.; paper .50

HOUGHTON'S CONCRETE SILOS—VOLUME 3. 60 pages, 18 figs.; paper..... .50

HOUGHTON'S CONCRETE CHIMNEYS, SLATE AND ROOF TILES—VOLUME 4. 57 pages, 15 figs.; paper ..... .50

HOUGHTON'S MOLDING AND CURING ORNAMENTAL CONCRETE—VOLUME 5. 56 pages, 5 figs.; paper ..... .50

HOUGHTON'S CONCRETE MONUMENTS, MAUSOLEUMS AND BURIAL VAULTS—VOLUME 6. 63 pages, 18 figs.; paper..... .50

HOUGHTON'S CONCRETE BATH TUBS, AQUARIUMS AND NATATORIUMS—VOLUME 7. 62 pages, 16 figs.; paper ..... .50

HOUGHTON'S ARTISTIC CONCRETE BRIDGES—VOLUME 8. 55 pages, 14 figs.; paper..... .50

HOUGHTON'S CONSTRUCTING CONCRETE PORCHES—VOLUME 9. 59 pages, 18 figs.; paper ..... .50

HOUGHTON'S CONCRETE FLOWER POTS—VOLUME 10. 50 pages, 8 figs.; paper..... .50

HOUGHTON'S CONCRETE FOUNTAINS—VOLUME 11. 53 pages, 14 figs.; paper..... .50

HOUGHTON'S CONCRETE FROM SAND MOLDS. 135 pages, 12 figs.; cloth..... 2.00

INEXPENSIVE BUNGALOWS. 95 pages, 99 figs.; paper ..... .50

ISOMETRIC DRAWINGS. Paper. (Pads 6¼ x 9, 50 sheets per pad)..... .25

JENNINGS' PAINT AND COLOR MIXING. 186 pages, 14 plates; cloth..... 2.50

JENNINGS' HOUSE PAINTING AND DECORATIONS. 177 pages, 18 figs.; cloth..... 1.00

KIDDER'S BUILDING CONSTRUCTION AND SUPERINTENDENCE, No. 1. 992 pages, 628 figs.; cloth 6.00

KIDDER'S BUILDING CONSTRUCTION AND SUPERINTENDENCE, No. 2. 910 pages, 830 figs.; 50 tables; cloth 6.00

KIDDER'S BUILDING CONSTRUCTION AND SUPERINTENDENCE, No. 3. 300 pages, 306 figs.; cloth 3.00

KIDDER'S STRENGTH OF FLOORS AND BEAMS. 230 pages, 164 figs.; cloth..... 2.00

KING'S CARPENTRY TEACHER'S HAND BOOK. 119 pages, 46 figs.; cloth..... 1.00

KITTREDGE'S PRACTICAL ESTIMATOR. 96 pages; cloth ..... .50

KROFFT'S HOMES AND HOTELS IN PARIS. 112 pages, 112 plates; cloth 3.00

LESLIE'S CONCRETE FACTORIES. Cloth..... 1.00

LEWIS POPULAR HANDBOOK FOR CEMENT AND CONCRETE USERS. 421 pages, 126 figs.; cloth 2.50

MAGINNIS HOW TO MEASURE UP WOODWORK FOR BUILDINGS. 79 pages, 161 figs.; cloth.. .50

MAGINNIS ROOF FRAMING. 164 pages, 97 figs.; cloth 1.00

MARKS' CONSTRUCTION OF CRANES. 254 pages, 202 figs.; cloth 1.50

MARKS' CONSTRUCTION AND WORKING OF PUMPS. 250 pages, 159 figs.; cloth..... 1.50

MAURER'S STRENGTH OF MATERIALS. 144 pages, 58 figs.; cloth 1.00

MCCULLOUGH'S ENGINEERING AS A VOCATION. 201 pages; cloth 1.00

MENKEN'S BUNGALOW CRAFT. 122 pages, 248 figs.; paper 1.00

MERRIMAN AND JACOBY'S ROOFS AND BRIDGES, PART NO. 1. 316 pages, 211 figs.; cloth.... 2.50

MERRIMAN AND JACOBY'S ROOFS AND BRIDGES, PART NO. 2. 234 pages, 138 figs.; cloth... 2.50

MERRIMAN AND JACOBY'S ROOFS AND BRIDGES, PART NO. 3. 414 pages, 185 figs.; cloth... 2.50

MERRIMAN AND JACOBY'S ROOFS AND BRIDGES, PART NO. 4. 374 pages, 181 figs.; cloth... 2.50

MERRIMAN AND JACOBY'S ELEMENTS OF MECHANICS. 172 pages, 142 figs.; cloth..... 1.00

MISSION FURNITURE, PART NO. 1. 96 pages; cloth ..... .50

MISSION FURNITURE, PART NO. 2. 128 pages; cloth ..... .50

MODERN HOMES OF CALIFORNIA. 94 pages, 103 figs.; cloth ..... .50

MODERN SCHOOL HOUSES. 249 pages, 112 plates; cloth 7.50

MONCKTON'S STAIR BUILDING. 216 pages, 169 plates; cloth..... 4.00

MONTEL'S BUILDING STRUCTURES IN EARTHQUAKE COUNTRIES. 126 pages, 42 figs.; cloth 3.00

Sent prepaid by

Building Age Book Department, 239 West 39th Street, New York

Mechanical and Technical Books at Special Prices

CONTINUED

MOORE'S SCHOOL HOUSES. 201 pages, 44 plates; cloth $2.00
MURRAY'S PROBLEMS IN WOODWORKING. 40 plates; paper 1.00
NEWBERRY'S HOW TO USE PORTLAND CEMENT. 29 pages; cloth ..... .50
NICHOL'S ESTIMATING. 128 pages, 22 figs.; cloth 1.00
ODELL'S LAYING AND FINISHING HARDWOOD FLOORS. 50 pages, 13 figs.; cloth..... .50
PALISER'S CEMENT SIDEWALK CONSTRUCTION. 57 pages, 9 figs.; cloth..... .50
PALISER'S CONCRETE BLOCK MAKING. 66 pages, 19 figs.; cloth..... .50
PASSMORE'S BOOK OF TECHNICAL TERMS USED IN ARCHITECTURE. 380 pages; cloth 3.50
PAYNE'S MODERN HOMES. 245 pages, 673 figs.; cloth 1.00
PEOPLE'S POCKET STAIR BUILDER AND CARPENTER'S HAND BOOK. 265 pages, 516 figs.; cloth 2.50
PHIN'S HOW TO BECOME A GOOD MECHANIC. 65 pages; cloth ..... .25
PLANT'S CONTRACTS AND SPECIFICATIONS. 128 pages, 10 figs.; cloth..... 1.00
POPPE'S HOUSE WIRING. 100 pages, 74 figs.; cloth ..... .50
PRACTICAL BUNGALOWS. 96 pages, 198 figs.; cloth ..... .50
PYNE'S PERSPECTIVE FOR BEGINNERS. 165 pages, 37 figs.; cloth ..... .80
RADFORD'S AMERICAN HOMES. 256 pages, 100 figs.; cloth 1.00
RADFORD'S ARTISTIC HOMES. 280 pages; cloth 1.00
RADFORD'S BUILDING DETAILS. 200 pages, 1800 figs.; cloth 1.50
RADFORD'S BRICK HOUSES. 219 pages, 669 figs.; cloth 1.00
RADFORD'S BUNGALOWS. 96 pages; cloth..... 1.00
RADFORD'S CEMENT HOUSES. 158 pages, 258 figs.; cloth 1.00
RADFORD'S CEMENT AND HOW TO USE IT. 369 pages, 153 figs.; cloth..... 1.00
RADFORD'S GARAGES. 158 pages, 165 figs.; cloth 1.00
RADFORD'S HOUSE, BARN AND ROOF FRAMING. 338 pages, 182 figs.; cloth..... 1.00
RADFORD'S MODERN HOMES. 210 pages, 558 figs.; cloth 1.00
RADFORD'S PRACTICAL BARN PLANS. 287 pages, 310 figs.; cloth 1.00
RADFORD'S PRACTICAL CARPENTRY AND JOINERY—VOLUME 1. 234 pages, 207 figs.; cloth 1.00
RADFORD'S PRACTICAL CARPENTRY—VOLUME 2. 220 pages, 338 figs.; cloth 1.00
RADFORD'S STEEL SQUARE—VOLUME 1. 243 pages, 144 figs.; cloth 1.00
RADFORD'S STEEL SQUARE—VOLUME 2. 247 pages, 189 figs.; cloth 1.00
RADFORD'S STORES AND FLATS. 82 pages; cloth 1.00
REINHARDT'S LETTERING. 46 pages, 52 figs., 13 plates; cloth 1.00
RICHARDS AND COLVIN'S PRACTICAL PERSPECTIVE. 56 pages, 62 figs.; cloth..... .50
RICHEY'S BUILDING FOREMAN'S POCKETBOOK AND HANDY READY REFERENCE. 1118 pages, 656 figs.; cloth 5.00
RICHEY'S CARPENTERS' AND WOODWORKERS' EDITION. 226 pages, 118 figs.; cloth..... 1.50
RICHEY'S CEMENT WORKERS' AND PLASTERERS' EDITION. 458 pages, 193 figs.; cloth..... $1.50
RICHEY'S HANDBOOK FOR SUPERINTENDENTS OF CONSTRUCTION. 742 pages, 357 figs.; cloth 4.00
RIDDELL'S HANDRAILING. 41 plates; cloth.... 5.00
RICHEY'S STONE AND BRICK MASONS' EDITION. 251 pages, 232 figs.; cloth 1.50
RICKER'S CONSTRUCTION OF TRUSSED ROOFS. 158 pages, 115 figs.; cloth 2.00
RICKER'S DESIGN AND CONSTRUCTION OF ROOFS. 419 pages, 644 figs.; cloth..... 5.00
ROSENGARTON'S ARCHITECTURAL STYLES. 501 pages, 638 figs.; cloth 1.75
SCOTT-MITCHELL PRACTICAL GILDING. 171 pages, 12 figs.; cloth 1.25
SCRIBNER'S LUMBER AND LOG BOOK. 190 pages, 19 figs.; cloth ..... .25
SNYDER'S BUILDING DETAILS, PART 2. 10 drawings, 16 x 22 in.; cloth 2.50
STATHAM'S CRITICAL HISTORY OF ARCHITECTURE. 565 pages, 583 figs.; cloth..... 3.75
SQUIRE'S HOLLOW TILE HOUSE. 208 pages, 215 figs.; cloth 2.50
STODDARD'S STEEL SQUARE. 109 pages, 112 figs.; cloth ..... .50
SUBURBAN HOMES WITH CONSTRUCTIVE DETAILS. 200 pages, 474 figs.; cloth 1.50
TAYLOR'S BACKBONE OF PERSPECTIVE. 56 pages, 40 figs.; cloth 1.00
TAYLOR'S CONCRETE EXTRACTS. 319 pages; cloth 2.00
TAYLOR AND THOMPSON'S CONCRETE, PLAIN AND REINFORCED. 821 pages, 249 figs.; cloth 5.00
TAYLOR AND THOMPSON'S CONCRETE COSTS. 709 pages, 82 figs.; cloth 5.00
TAYLOR'S PRINCIPLES OF SCIENTIFIC MANAGEMENT. 144 pages; cloth 1.50
TAYLOR'S SHOP MANAGEMENT. 202 pages; cloth 1.50
THAYER'S STRUCTURAL DESIGN—VOLUME 1. 228 pages, 310 figs.; cloth 2.00
TOWNSEND'S CARPENTRY. 258 pages, 368 figs; cloth 1.50
TURNEAURE AND MAURER'S PRINCIPLES OF REINFORCED CONCRETE CONSTRUCTION—SECOND EDITION. 429 pages, 164 figs.; cloth 3.50
TYRRELL'S ARTISTIC BRIDGE DESIGN. 287 pages, 242 figs.; cloth 3.00
TYRRELL'S MILL BUILDINGS. 500 pages, 650 figs.; cloth 4.00
UNIFORM CONTRACT BLANKS. 4 pages; paper $3 per C; dozen .50; each..... .05
VERRILL'S KNOTS, SPLICING AND ROPE WORK. 128 pages, 150 engravings; cloth ..... .60
H. VON HOLST'S MODERN AMERICAN HOMES. 108 pages, 428 figs.; cloth 2.50
WARREN'S STEROTOMY. 125 pages, 10 plates; cloth 1.50
WEBB AND GIBSON'S REINFORCED CONCRETE. 140 pages, 60 figs.; cloth..... 1.00
WILSON'S BUNGALOW BOOK. 159 pages, 279 figs.; cloth 1.00
WILSON'S CALIFORNIA BUNGALOWS. 128 pages, 236 figs.; paper ..... .50
WOODSEND'S PRACTICAL WOOD CARVING. 86 pages, 108 figs.; cloth 1.00
HENLEY TWENTIETH CENTURY BOOK OF RECEIPTS, FORMULAS AND PROCESSES. 800 pages, 20 figs.; cloth 3.00

Sent prepaid by

Building Age Book Department, 239 West 39th Street, New York

ALPHABETICAL LIST OF ADVERTISERS

Bungalow of Chas. S. Bux, Harrisburg, Pa., Roofed with Ambler Asbestos "Century" Shingles.
Architect, H. F. Conover, Washington, D. C. Contractor, John Meyers, Harrisburg, Pa.

Ambler Asbestos "Century" Shingles

Competition Stimulates the Sales of this Artificial Roofing Slate

THE success of Ambler Asbestos "Century" Shingles is a striking illustration of the truth that competition can never hamper a business that can deliver values.

Here is a roofing material that is right in line with the sound judgment of property owners—their ability to see the facts and their insistence in getting value for their roofing investment.

To-day the roofing business has passed the stage where the property owner is willing to try anything once. He knows the facts about Ambler Asbestos "Century" Shingles—their durability, permanence—freedom from painting and repairing—a roofing material to be depended upon.

Ambler Asbestos "Century" Shingles enjoy a larger market than ever before, and one that is steadily increasing. Every day, contractors all over the country are taking up these Shingles and cashing in on their extensive popularity.

If you do not handle these Shingles, write us immediately for the facts. We will furnish you information about these Shingles—samples, terms and trade prices.

KEASBEY & MATTISON COMPANY, Factors

Dept. E, Ambler, Pa.

Branch Offices in Principal Cities of the United States