# CARPENTRY AND BUILDING



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# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

232-238 WILLIAM STREET, NEW YORK.

JANUARY, 1905.

## Rigidity of Steel Frame Construction.

Ever since the towering office buildings have been taking such a conspicuous place in the architecture of the larger cities more or less curiosity has developed as to the effect upon them of terrific storms when the wind is blowing at cyclone velocity. Some of the buildings in New York City are so located as to present an unusually large percentage of their external area to the direct action of high winds, prominent among them being the well-known "Flatiron" Building, occupying the triangle at Broadway, Fifth avenue, Twenty-second and Twenty-third streets, and the new *Times* Building, now nearing completion, at Broadway, Seventh avenue, Forty-second and Forty-third streets. During the severe wind and rain storm of Sunday and Monday, November 13 and 14, observations were taken at the latter building with a view to determining the extent of the vibration, if any. When the gale was at its hight, and the velocity of the wind was between 48 and 50 miles an hour, the tower of the *Times* Building, which is 16 stories above the sidewalk, was found to be entirely free from motion. The only tremor observable was that traced to the swaying of the flag pole, 20 stories above the curb line, and that was limited to the metal superstructure of the tower above the cornice of terra cotta. This clearly demonstrates the rigidity with which tall buildings of steel skeleton frame construction are erected at the present day and the effectiveness of the methods of bracing to resist wind pressure, as illustrated and described in our issue of July last. It will be recalled that in connection with the article above referred to mention was made of the fact that the Subway recently opened to the public passed through the foundations of the *Times* Building, the pressroom being wholly beneath the Subway tracks. Where it passes through the structure the Subway is supported by columns wholly independent of those which carry the weight of the building, each Subway column resting upon a grillage of I-beams imbedded in a block of concrete. By this arrangement the weight is distributed over a relatively large area. The idea of the architect was to prevent any vibration of passing trains being communicated to the building proper, and to this end the concrete blocks were made to rest upon a sand cushion set in the solid rock. A few weeks ago tests were made by expert engineers to determine to what extent this method of preventing vibration being imparted to the columns sustaining the building was effective. The tests were made with a glass bowl filled with water so placed with reference to an arc light that any disturbance of the surface of the water by the formation of ripples would be magnified and readily discerned by the observer. The water in the glass bowl was sufficiently sensitive to record the jar caused by walking near it on the inelastic floor of the pressroom in the sub-basement, but when placed as near bed rock as the floor of the pressroom would permit and as close as possible to one of the main columns of the Subway the water in the test apparatus failed to record any vibration from the movement of express or local trains, whose passage was signaled, while it was noted that a street car or a loaded truck gave more evidence of measurable vibration than Subway trains.

## Close of St. Louis Exposition.

The Louisiana Purchase Exposition closed its gates on December 1, after what has probably been one of the most successful careers of any of the great latter day expositions. Financially the fair seems to have fared better than its immediate predecessors. With an appropriation of $5,000,000 by the Government and similar amounts by the city of St. Louis and the individual stockholders in the enterprise, it is believed that, after all expenses have been liquidated and the loan of $4,600,000 advanced by Congress repaid, a surplus of about $1,000,000 will be left to be divided between the three original subscribers of $5,000,000. Taking into consideration the fact that almost all of our recent expositions have closed with a deficit, this showing may be regarded as gratifying. The attendance at the Exposition is estimated at nearly 19,000,000, and about 14,000,000 tickets of admission were actually sold during the seven months that the fair was open. All things considered, the St. Louis Exposition may be set down as a decided success. It was one of the greatest, if not the greatest, of all our world's fairs; certainly so in extent and in the display of the highest examples of the world's progress in the arts and sciences as well as along industrial lines. It could not fail to be a splendid educational object lesson to the millions who visited it, and should prove a substantial benefit to American trade, owing to the host of foreigners who were there enabled to see and investigate the best and latest specimens of American manufactures and products. No doubt its benefit to the city of St. Louis has already been great from the large amount of money that must have been expended by visitors to that city. The Louisiana Purchase Exposition will go down in history as an event of prime importance in the commercial and industrial annals of the United States.

## Industrial Art.

One of the more important developments connected with the remarkable material progress of this country in the past decade has been the advance made along the line of the application of artistic principles to commercial products. Formerly American manufacturers were satisfied to copy the designs and patterns of European makers; and they generally succeeded in getting more or less poor imitations without the quality of the originals. Of late years, however, a distinct movement toward original domestic designing has been in progress, and has attained important proportions. This movement has extended to practically every kind of industry; and industrial art, with us, is now a substantial reality. Almost every center of population to-day is provided with schools designed to foster and extend a knowledge of industrial art. Institutions of this character are multiplying simply because hard headed business men are recognizing the material value of art and beauty as applied to commercial products. From a single school of design in New York City some 2200 pupils have been graduated in the past ten years; yet so large is the demand for competent original designers in every line of artistic manufacture that, according to those qualified to judge, it is not likely that this demand will be fully supplied for years to come. This development is perhaps most readily seen in the improved design and decoration of house furnishings and of such wares as one sees so lavishly displayed at this season in the department stores and in the show windows along the streets of any of our cities. But it can also be clearly traced in every line of modern industry, from the great engineering works to domestic architecture and from that down, through an infinite variety of manufactures, to articles of clothing and personal adornment. The artistic decoration of the stations of the new Subway in New York City is a case in point. Everywhere the man with eyes to see cannot fail to note the improvement of our products, not only in respect of durability and usefulness, but also in the beauty of design which comes from the employment of a high order of artistic skill. One of the most satisfactory features of this movement is the appreciation of the beauty of simplicity, which is shown in the adoption of pure lines and the absence of ornamentation merely for its own sake. That this spirit has inspired the manufacturers of goods in which our readers are interested is clearly evident in the designs of many of the products now being offered in the lines of stoves, radiators and interior sheet metal work, and especially in the goods that are being offered for the equipment of the modern bathroom and lavatory. The very catalogues, circulars and other trade literature that are being sent out to-day bear the imprint of artistic perception to a pronounced degree. This development indicates an alliance of craftsmanship and art which cannot fail to aid in establishing the industrial creations of this country in that high place among the world's products to which they are already entitled by their mechanical excellence.

## English and American Basement Houses.

From time to time the various types of private dwelling houses have been the subject of discussion in the trade press, and the question has been asked what are the distinguishing features of the American basement house as found in our larger cities, the English basement house and the old fashioned high stoop house, so popular many years ago. A recent issue of the *Record and Guide*, in pointing out the differences between these types of houses, says:

"A high stoop dwelling house is one where the basement floor usually is three or four feet below the sidewalk and the ceiling of the basement story is about five feet above the sidewalk. The first story, which is the parlor floor, is reached from the sidewalk by a front stoop having ten or eleven risers, the entrance being at one side of the house. A vestibule opens into a long hall, and in the latter is the main staircase. At the side of this hall is the parlor, usually a long, narrow room. Back of the parlor and running across the full width of the house is the dining room with an extension containing a butler's pantry, dumb waiter and back stairs connecting with the kitchen below. Frequently the dining room is placed in an extension of a lesser height than the main house, the room back of the parlor then becoming a back parlor or a library. Another variation in planning the parlor floor is to provide a foyer hall in the center of the house, thus separating the front parlor from the back parlor or dining room. The basement is entered from the sidewalk by steps in the front area leading to an entrance door under the stoop. The front room in the basement is sometimes used as a dining room, but more often as a servants' sitting room, and back of this are the servants' offices, consisting of kitchen, laundry, &c., with entrance to the rear yard.

"An English basement dwelling house, as usually constructed in this city, has the greater portion of the lowest story or cellar below the sidewalk. The basement or ground story has its floor about three feet above the sidewalk, the entrance being at one side of the house and reached by a low front stoop with four or five risers. A vestibule opens into a hall containing the stairway to the story above. A reception room is at the side of the hall, a dining room runs across the rear and between the reception room and dining room is the pantry. On the floor above the basement—that is, the first story above the ground story—the staircase hall is in the center of, and takes up the full width of the house, the front room being a parlor and the back room being also a parlor or a library. The cellar is entered from the sidewalk by a flight of steps in the front area and door under the stoop. The front portion of this lowest story contains the heating apparatus, coal bins, &c., and in the rear portion is the kitchen, laundry, &c., with entrance to the yard, which is usually excavated to the cellar level.

"An American basement dwelling house has its basement on the ground floor a step or two above the sidewalk. The front main entrance is through a centrally placed vestibule opening directly into a reception room or foyer hall through which the staircase hall, placed midway in the depth of the house, is reached. Back of the staircase hall is the kitchen, and a laundry in an extension. From the kitchen a separate passageway or hall runs to the sidewalk. A change in this plan is frequently made by putting the laundry in the cellar and using this room in the extension back of the kitchen on the ground floor as a servants' sitting room. Another change also is to make the entrance to the servants' quarters by steps through the front area and through a passageway taken off from part of the width of the cellar, and up a flight of stairs to the kitchen on the ground floor. By the latter arrangement the reception room or foyer hall on the ground story is left the full width of the house. The first story above the basement or ground story is the parlor floor, a foyer hall in the center, a front room the full width of the house being the parlor and the rear room the dining room with a butler's pantry in an extension. On the second floor the front room usually is the library. An American basement has one distinguishing outside mark from an English basement and a high stoop house when occupying a single lot, in that the main entrance is located at or near the center of the width of the front, instead of being at one side. In the case of an alteration of a high stoop house to an American basement, of which there are many examples, the main entrance is a little below the sidewalk level and at one side of the front, but the general outside appearance stamps it as an American basement house.

"Each of the three above named types of private residences, ranging in width from say 18 to 25 feet, is variously modified in the planning of the floors, but the difference between them is quite noticeable, as the descriptions indicate."

THE Court of Appeals of the State of New York has handed down a decision declaring unconstitutional the State Labor Law which prohibits a contractor from employing men more than eight hours a day on city, county or State work. Since its enactment in 1897 this statute has been almost constantly before the courts, but this is the first time that the Court of Appeals has pronounced a definite decision on the eight-hour provision.

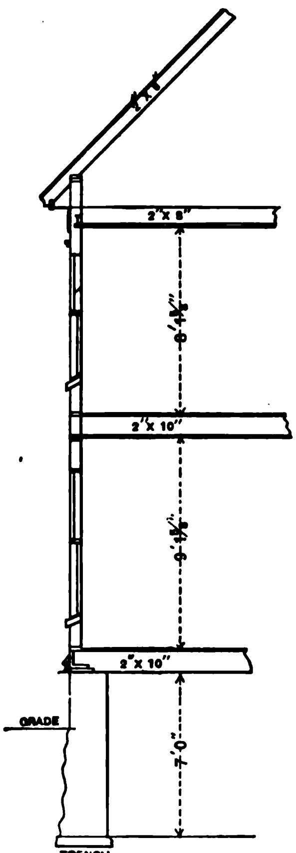
THERE are at the present time nearly six and a half million acres of forest reserves in New South Wales. In South Australia there are nearly 200,000 acres of forest reserves and plantations; in Queensland, where forest conservation is of recent date, the reserved areas form a total of over 3,000,000 acres; in Victoria the forest reserves cover a total area of 4,679,540 acres out of 11,797,000 acres of forest country, the balance being mostly timber country difficult of access.

# A RESIDENCE AT PENN YAN, N. Y.

WE have taken for the subject of one of our half-tone supplemental plates this month a frame residence erected two years ago on Main street, Penn Yan, N. Y., for the Misses Kate and Mary Dewan. The picture, which was made from a photograph taken especially for our purpose, shows the appearance of the completed structure, the small view in the upper right hand corner giving the reader an idea of its appearance when looking directly at the front of the house. The floor plans presented in connection herewith afford an idea of the interior arrangement, while the details indicate some of the features of construction. Since the building was finished there has been added at the rear the chamber opening from the dining room, while the entrance to the kitchen has been changed to the opposite side.

According to the specifications of the architect the cellar walls are of common field stone, the exposed portion on the front being faced with Warsaw bluestone laid in broken ashlar with cement mortar. The house is of balloon frame, with wind bracing where necessary. All corners, angles and each side of door and window openings are double studded and well spiked. The sills are of the box type, consisting of a 2 x 12 laid flat on the walls, bedded in cement and reinforced by a 2 x 8 set on edge even with the outside and a 2 x 8 laid flat on the first piece, all thoroughly spiked.

The first and second floor joists are 2 x 10 inches and the attic joists 2 x 6 inches, all doubled under bearing partitions and framed double at all stair and chimney openings. All wall and partition studding is 2 x 4 inches, spaced 16 inches on centers. The wall studding is cut at the different stories and finished with double plate and single shoe on each section. The entire exterior surface is covered with ⅞ x 10 inch surfaced and jointed hemlock sheathing boards placed close together and firmly nailed to each bearing. On top of this is placed a layer of sheathing paper, this in turn being covered where shown on the elevations with No. 1 pine siding. The walls and gables where shown are covered with Washington red cedar shingles, "all laid ½ inch less than one-third their length to the weather." The porches are ceiled with ⅝-inch Georgia pine, while the floors are of 1⅛-inch Washington red cedar. The columns are of white wood, turned. The front doors are veneered with red oak in pine cores, paneled, and glazed with bevel plate. All other doors in the house are of No. 1 Gulf cypress, blind tenoned, cross paneled and flush molded two sides. The sliding door is supported on Lane's parlor door hangers and furnished with molded friction strips all around. All Hardware for the doors and windows is of bronze, old copper finish.




Section.

Front Elevation.—Scale, ⅛ Inch to the Foot.

*A Residence at Penn Yan, N. Y.—D. P. Slitor, Architect.*

All interior trim shown in the hall, sitting room, dining room and in connection with the main stairs is of red oak. In the kitchen, scullery and side entrance it is Georgia pine; in the parlor white wood, and the balance of the house No. 1 cypress. The floor in the hall is of red oak, and in the sitting room, dining room and kitchen it is Georgia pine. The kitchen and bathroom are wainscoted 3 feet high with ⅝-inch beaded ceiling, finished with molded cap.

The bathroom is provided with a 5-foot cast enameled tub, a 14-inch porcelain basin, with marble slab at back, and a water closet, all connected with city water system. All exposed connections of nickel pipes and traps are connected with hot and cold water. A 30-gallon galvanized iron tank is connected with the kitchen range.

All interior walls and ceiling are lathed and plastered with three-coat work, the last coat of lime and plaster of paris mortar, troweled down smooth. The chimneys are of hard burned brick, selected where exposed above the roof, with brick arch thrown out to receive hearth for fire place and double rowlock arch over the fire place opening.

All interior wood work in hall, sitting room and dining room, including the stairs, is finished with one coat of paste filler, one coat of best white shellac and one coat of Murphy & Co.'s No. 1 transparent wood finish. The parlor is finished with six coats of white enamel. The balance of the house is finished with one coat of liquid filler and one coat of varnish. The floors in the hall, sitting room, bathroom and dining room are finished with one coat of Berry Bros.' paste filler and two coats of Berry Bros.' floor finish. The house is piped for gas and wired for electricity, with fixtures to correspond with other hardware. The mantel is of red oak, with club house grate, regular stock pattern and large bevel plate mirror. The house is provided with ample radiators for each room, connected with city steam.

All exterior wood work, including porch floors and excepting porch and balcony ceilings and shingle work, is painted two coats hand mixed lead and oil, while the shingles on the sides and gables are stained with Cabot's shingle stain dipped two-thirds their length before laying and then given one brush coat after laying. The porch and balcony ceilings are finished with one coat liquid filler and two coats spar varnish.

All tin work for valleys, gutters and balcony floor is N. & G. Taylor's "Old Style."

The residence here shown was built in accordance with plans prepared by D. P. Slitor, architect, of 133 South Avenue, Penn Yan, N. Y., and at a cost of about $3000, although at the present time, owing to the increased expense of material and labor, the work would probably cost in the neighborhood of $3500.

**Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.**

*A Residence at Penn Yan, N. Y.*

## Proposed New Organization of Workmen in the Building Trades.

The builders and contractors of New York City are watching with some solicitude a movement toward the formation of what is aimed to be the largest central body of workmen in the building trades that has yet been organized. The object of the promoters of the new Building Trades Board is to bring together in one body all wage earners in the building trades, both skilled and unskilled, with the view of presenting a united front to the employers' organization. To carry this movement to a successful issue, however, would seem to be a herculean task, owing to the internal dissensions which prevail among the various unions. Yet it is claimed that a substantial foundation for the organization has already been laid and committees are at work on the preliminaries, whose efforts are being directed primarily toward smoothing over the mutual antagonisms that exist between a number of the old unions and those new unions which have been formed in the past year or so to work in harmony with the Building Trades Employers' Association. This bitterness must be removed before any central organization can be established on a secure basis. It is planned to have the new organization in working shape before May 1, on which date a number of the agreements between the unions and the employers expire. It is announced that one of the first objects to be taken in hand by the proposed central body will be a revision of the arbitration plan under which a number of unions are now operating with the Employers' Association. It is claimed that the arbitration plan as now existing works out almost exclusively in favor of the employers and is too one sided. Another aim is to resist the movement toward the open shop. This, the union leaders think, will not be difficult, as the New York Employers' Association has not shown any special leaning toward the open shop, but rather seems to prefer to work in harmony with the unions on a closed shop basis.

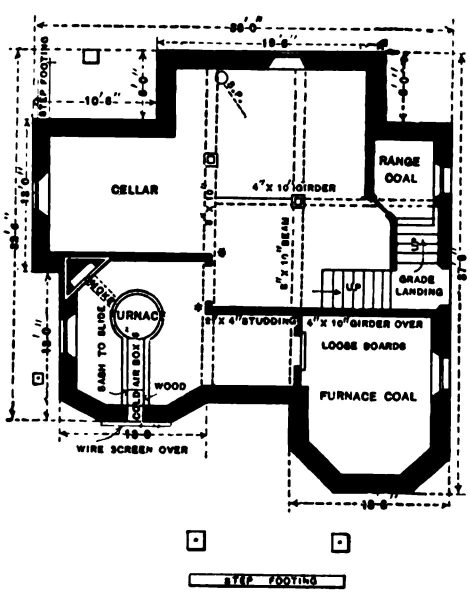
Leading members of the Building Trades Employers' Association who have been interviewed on the subject of the proposed new central body of workmen are generally of the opinion that the internecine strife and jealousies which prevail among the various unions in the building trades will make it difficult, if not impossible, to successfully carry out the plan for one great organization which will embrace all the trades that have connection with building operations. Nevertheless, a meeting of the new Building Trades Board was held in New York City early in December, at which 170 delegates, representing 34 unions, signed its roster of membership. These delegates, it is claimed, represented more than 70,000 men connected with the building trades, which is a larger number than formed the constituency of the old building trades organization under the leadership of Sam Parks and his successor, Philip Weinseimer. The unions that are claimed to be ready to affiliate with the new central body, with their membership, are as follows:

Amalgamated Sheet Metal Workers, 2500; Cement and Asphalt Workers' Union, 1200; Compact Labor Club of Marble Cutters' Helpers, 1200; District Council Housesmiths and Bridgemen's Union, 6000; Brotherhood of Plumbers, 6000; Brotherhood of Carpenters and Amalgamated Carpenters' Society, 14,500; Enterprise Association of Steam Fitters, 2800; Progress Association of Steam Fitters' Helpers, 1200; Empire Marble Cutters and Setters' Union, 900; House Shorers and Movers' Union, 600; Mosaic and Encaustic Tile Layers' Union, 700; Tile Layers' Helpers' Union, 700; Electrical Workers' Union, 2800; Local 15, International Association of Machinists, 4000; Journeymen Bluestone Cutters' Union, 1800; Journeymen Plumbers' Unions Nos. 1 and 2, 3900; Local 46, Wood, Wire and Metal Lathers, 900; Double Drum Hoister Runners' Union, 800; National Alliance of Painters and Decorators' Local 28, 4500; Plasterers' Society, 2500; Plasterers' Laborers' Union, 1700; Reliance Labor Club of Marble Cutters, 1500; Sign Painters' Union, 400; Salamander Association of Pipe and Boiler Coverers, 600; Tar, Felt and Waterproof Workers, 600; United Cement Masons' Union, 2000; United Portable and Safety Engineers, 1800; United Lumber and Iron Handlers, 1000; United Portable Hoisting Engineers (new union), 400; Wood, Wire and Metal Lathers' Union, 800; Whitestone Association of Marble Polishers, 1800; Wood Carvers and Modelers' Union, 500.

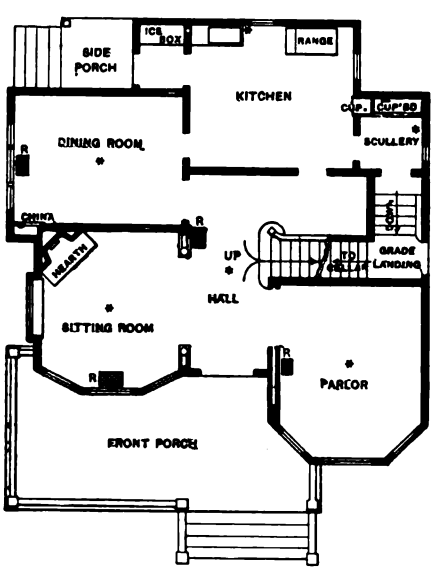
In this list are rival unions in the same trades. In this connection the statement is made that, prior to a permanent organization being effected, these warring unions must settle their differences and unite in order to become members of the central body.

## A Fifth Avenue Loft Building.

There is now in course of erection at the northwest corner of Fifth avenue and Thirty-second street, New York City, an 11-story structure, which, when completed, will be used partly as an office building and partly for loft or store purposes. It occupies a plot about 66 x 123½ feet in area, with an "L" in Thirty-second street 23½ x 33 feet. There will be three passenger and one freight elevator in the building, and the construction will be fire proof throughout. The ground floor will be used as one large store, while the second, third, fourth and fifth floors will be devoted to salesrooms, mercantile showrooms and to loft purposes. All the floors above the fifth will be divided into offices. Among other interesting features of the equipment will be a compressed air and vacuum sweeping system, so that every office and storeroom can be swept without the aid of brooms. Each floor will have tubes leading to the cellar through which the refuse will be conveyed. The plans of the structure were prepared by Architect Robert Maynicke, who intimates that the structure will be ready for occupancy early the coming spring.




Foundation.

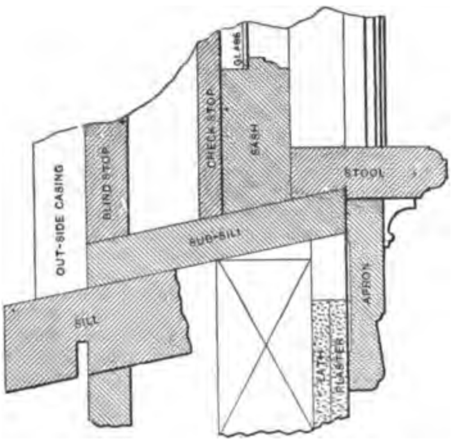



First Floor.

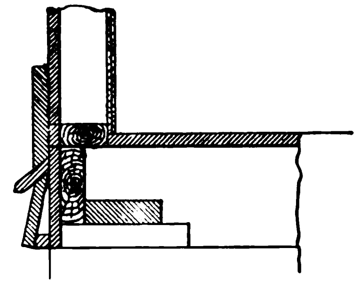

Second Floor.

*A Residence at Penn Yan, N. Y.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

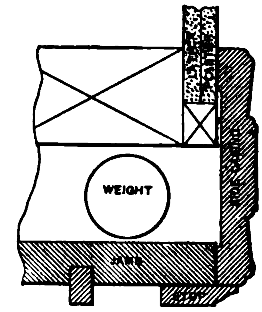
THE annual losses by fire in the United States, which have averaged as high as $100,000,000 a year at certain periods, were attributed during a single year to the following causes, the number of fires from each cause being given. Incendiarism, 1927; defective flues, 1309; sparks (not from locomotives), 715; matches, 636; explosions (of lamps, &c.), 430; stoves, 429; lightning, 369; spon-



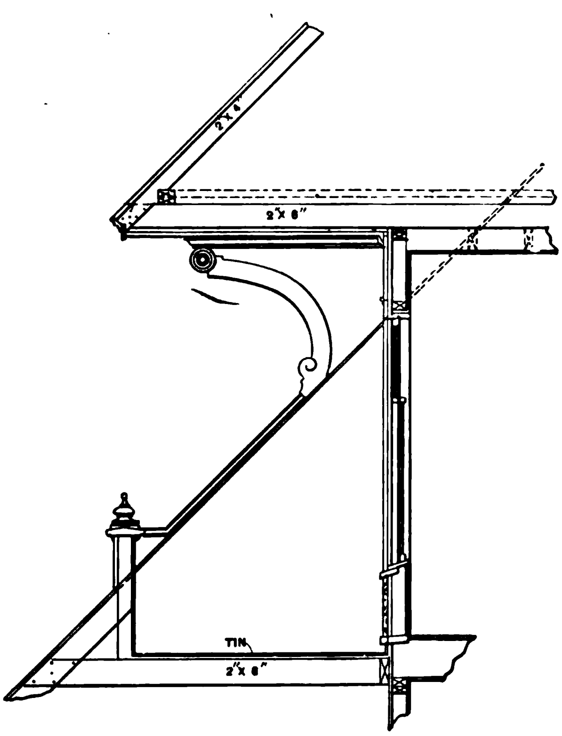

**Section through Window Sill.—Scale, 3 Inches to the Foot.**



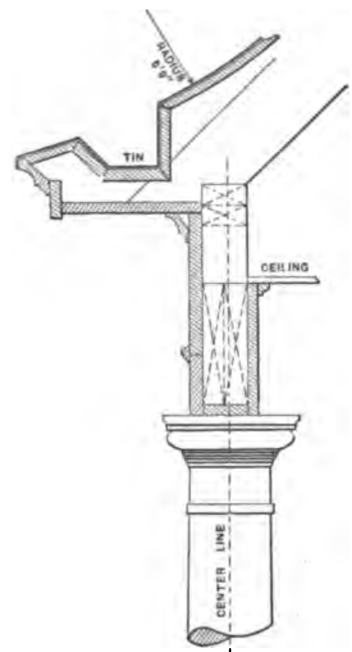
**Section at Sill Course.—Scale, ¾ Inch to the Foot.**

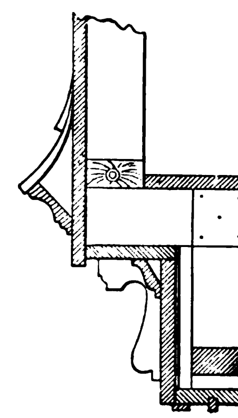



**Horizontal Section through Window Frame.—Scale 3 Inches to the Foot.**

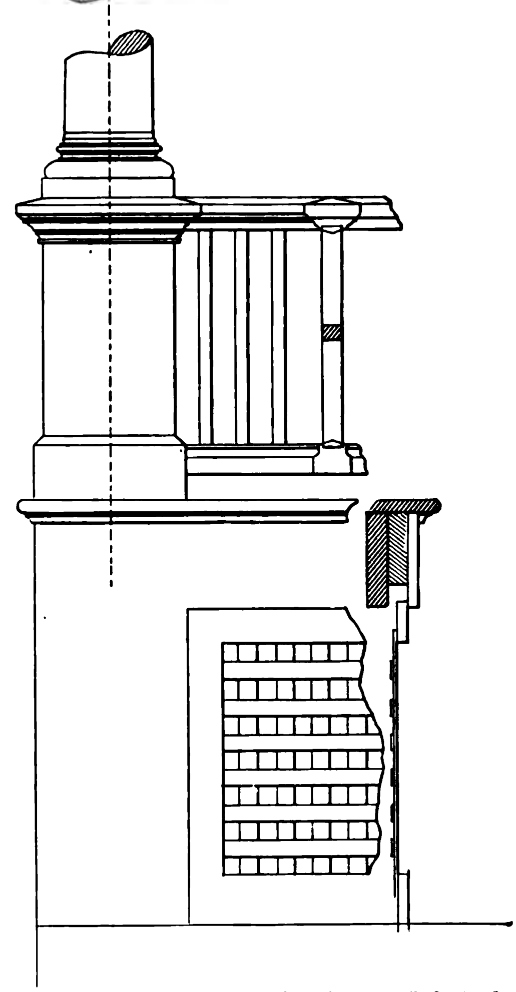


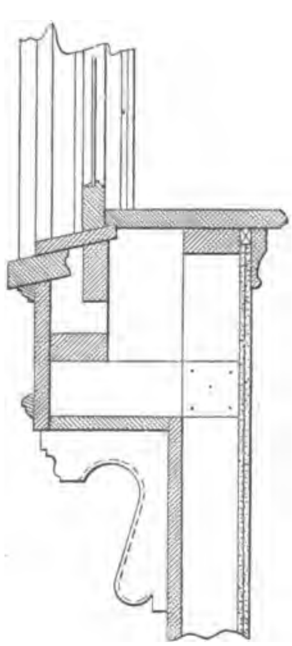

**Section through Balcony Over Front Porch.—Scale, ¼ Inch to the Foot.**



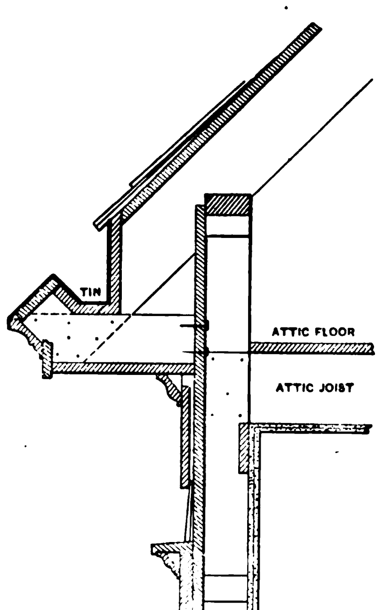



**Detail of Gable Window Heads.—Scale, 1 Inch to the Foot.**





**Section through Bottom of Leaded Glass Sash in Sitting Room.**




**Details of Main Cornice.—Scale, ⅜ Inch to the Foot.**

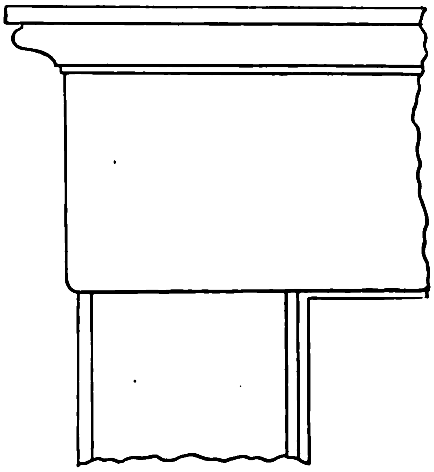
**Details of Porch Cornice, Column Balustrade, &c.—Scale, ¾ Inch to the Foot.**

*Miscellaneous Constructive Details of Residence at Penn Yan, N. Y.*

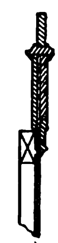
**taneous combustion, 826; prairie and forest fires, 280; lamp and lantern accidents (other than explosions), 288; locomotive sparks, 211; cigar stubs and pipes, 208; friction, 179; gas jets, 176; engines and boilers, 150; furnaces, 135, and from firecrackers, 105.**

## Red Gum Wood.

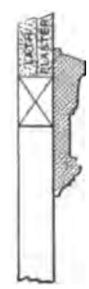
**Because it warps and stains in seasoning red gum was long neglected, but now 60 per cent. of the barrels and boxes made in the South are made of red gum, says a recent issue of the Birmingham *Age-Herald*. The wood is also shipped to Europe, where it is made into furniture, and it is also used there in paving blocks. When steamed, it is easily bent, and it thus becomes available for carriage rims and carriage wood stock. It has been found that lumber from logs that have been in water six weeks stains very little, and steam kilning prevents both warping and staining. The timber is thoroughly soaked in live steam for 48 to 72 hours, and is then dried by steam radiation. The boards are then air dried from two to three months. This method enables lumbermen to supply a good grade of red gum, and this is why the use of the once despised wood is extending. The Bureau of Forestry has a timber testing laboratory at Lafayette, Ind., and red gum has there been subjected to various tests. It has there been demonstrated that red gum has a high degree of strength. It is almost wholly free from knots, and a joist of red gum, it has been ascertained, will carry as great a load as a joist of North Carolina pine. At present its use is confined chiefly to narrow boards, but if in larger sizes warping and twisting can be prevented the wood will come into general use, supplanting in many cases hickory, oak and ash. The Bureau of Forestry says that swampy bottom lands should be kept planted in red gum trees. The tree is a rapid grower, is not subject to fire waste, and it is probable that no crop on lands subject to overflow will pay better, for it is already well established that red gum will soon** become commercially valuable. It will have to serve to lengthen out our stock of hard woods.



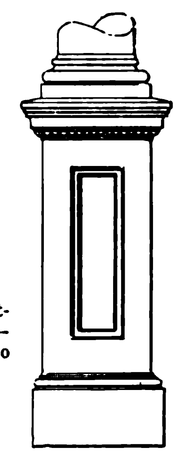
**Elevation of Trim in Kitchen and Second Story.—Scale, 3 Inches to the Foot.**



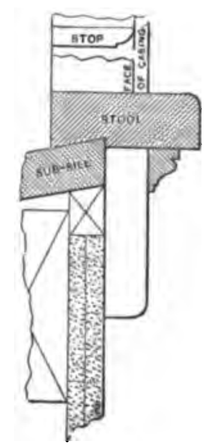
**Section through Main Staircase on Line A of the Elevation.**



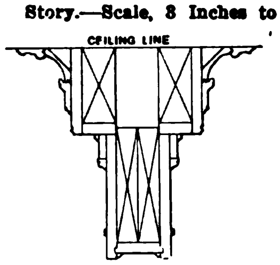

**Detail of Wainscoting and Cap.—Scale, 3 Inches to the Foot.**



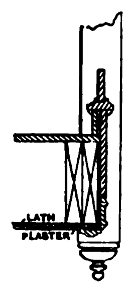
**End of Pedestal in Partition Between Hall and Sitting Room. — Scale, ¾ Inch to the Foot.**



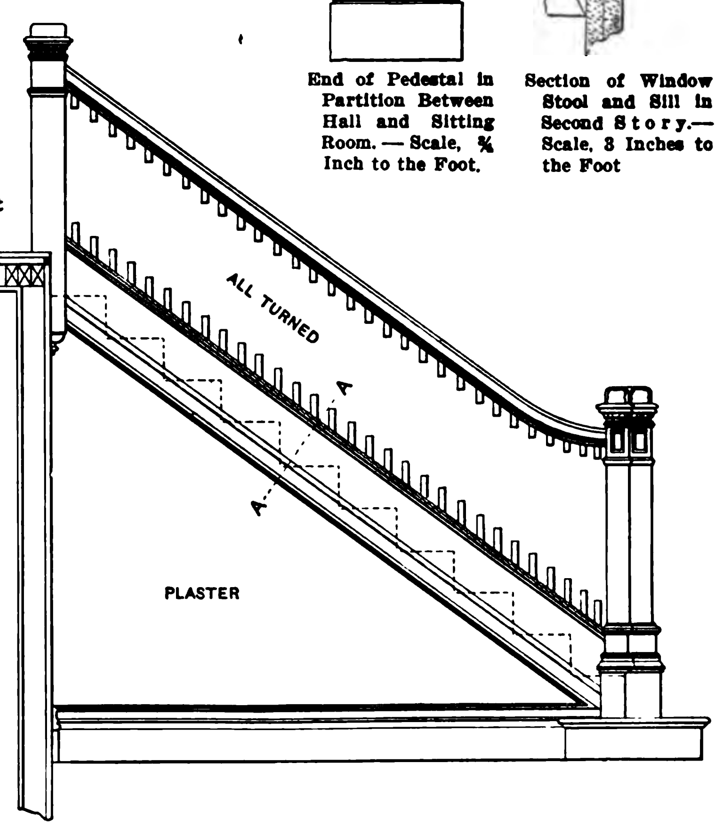

**Section of Window Stool and Sill in Second Story.—Scale, 3 Inches to the Foot**



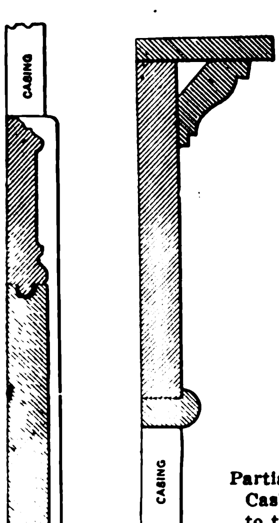

**Section through Partition at Ceiling Line Between Hall and Sitting Room.—Scale, ¾ Inch to the Foot.**



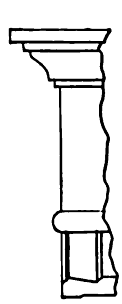

**Stair Construction at Second Floor.**




**Elevation of Main Stairs from First Floor to Landing.—Scale, ¾ Inch to the Foot.**




**Base. Section of Head Casing. Scale, 3 Inches to the Foot.**



**Partial Elevation of Head Casing.—Scale, 1½ Inches to the Foot.**

***Miscellaneous Constructive Details of Residence at Penn Yan, N. Y.***

AT the one hundred and nineteenth annual election of the General Society of Mechanics and Tradesmen, held at Mechanics' Institute, 18-24 West Forty-fourth street, New York City, on the evening of December 7, the following officers were chosen for the ensuing year: President, William E. Strauch; vice-president, Niles G. White; second vice-president, Hugh Getty; secretary-treasurer, Richard T. Davies.

# Convention of Pennsylvania State Association of Builders' Exchanges.

THE third annual convention of the Pennsylvania State Association of Builders' Exchanges was held in Harrisburg, Pa., on December 6 and 7, representatives being present from the leading cities of the State. The delegates were called to order at 1.30 o'clock on the afternoon of December 6 in the rooms of the Harrisburg Board of Trade, President Edwin S. Williams of Scranton, who was in the chair, extending a cordial greeting to the representatives of the various builders' exchanges. More or less routine business was then conducted, committees were appointed, and the Executive Committee, which held meetings on the evening previous and during the forenoon of the day named, presented a report showing the work which had been accomplished during the past year.

In the evening there was an open meeting attended by a large number of local builders and contractors, a most interesting feature being an address of welcome by Mayor Vance C. McCormick, who complimented the visitors and called attention to the large amount of building which was going on in and about the city. In referring to the new Capitol building he expressed the view that "it will be one of the most beautiful structures in the United States when completed." The address of the Mayor was cordially received, and a rising vote of thanks was tendered. President E. S. Williams of Scranton briefly responded. In the discussion which came up after the speech making was over, manual training schools as State institutions were considered, and several of the younger members of the organization expressed the view that the association should take action before adjournment recommending to the Legislature the establishment of these schools throughout the State.

On Wednesday morning, December 7, the sessions were resumed, when the Committee on Resolutions reported a number of questions for discussion, many of them dealing with future action to be taken in connection with labor troubles. Several amendments were made to the constitution and by-laws and other matters of interest to the trade came up for discussion.

The officers for the ensuing year were then elected as follows:

President, Robert K. Cochrane of Pittsburgh.
First Vice-President, C. E. Woodnutt of Williamsport.
Second Vice-President, Col. G. C. Richards of Oil City.
Secretary, E. J. Detrick of Pittsburgh.
Treasurer, William Hanley of Bradford.

The Executive Committee for the new year consists of the following members: Robert K. Cochrane of Pittsburgh, E. J. Detrick of Pittsburgh, William Hanley of Bradford, Edwin S. Williams of Scranton, Harry T. Bales of Harrisburg, T. H. Snell of Pittston, Albert E. Wales of Sharon, J. E. Huffman of Williamsport and W. L. Campbell of New Castle.

From the above list it will be seen that Pittsburgh builders were signally honored, as both the new president and secretary are prominent in the Master Builders' Association of that city, and Mr. Detrick, the new secretary, also fills the same office in connection with the Builders' Exchange League.

It was not decided where the next meeting of the association would be held, but it will be considered at a meeting of the Executive Board in the course of the next few weeks.

At 3 o'clock in the afternoon the members were shown about the new Capitol building by Samuel B. Rambo, engineer in charge of construction.

The convention was brought to a close with a banquet held in the evening at the Hotel Columbus, speeches being made by some of the most prominent builders in the State and by local men. The *menu* cards, which were of dainty design, carried a reproduction of the old and new Capitol buildings. The toastmaster of the evening was S. S. Kline, who called upon Charles E. Pass, president of the Common Council, who in a few well-chosen words welcomed the visitors to the city. The response was made by Edwin S. Williams of Scranton, who was followed by F. H. Hoy, who spoke on a variety of topics and in a way to command close attention. John S. Elliot of Pittsburgh pointed out the advantages of organization, while W. L. Campbell discussed constitutional liberty. R. K. Cochrane of Pittsburgh, the newly elected president, responded to the toast, "Unity of Action," while H. J. Gunster of Scranton made some very pertinent remarks touching the question of the "Open Shop." Other speakers of the evening were Charles H. Bernheisel, president of the Select Council, and Thomas F. Ferree, building inspector.

# BEVELS USED IN CARPENTRY.

## A Short Treatise on the Principles of Geometrical Drawing.

BY GEORGE W. KITTREDGE.

WITH regard to the method of drawing the lines and the instruments necessary for the work a few words may be said: Aside from drawing boards, paper and pencils, which scarcely need to be described, the instruments most used and with which the carpenter may be supposed to be the least familiar are the T square and the triangles, or set squares, as they are sometimes termed, shown in Fig. 3. While the carpenter can if he chooses make his own drawing board, these particular instruments should be purchased from a dealer, since the greatest care and exactness are necessary in their manufacture. The head of the T square is made to slide along the edge of the drawing board, while the blade, which is fastened on top of the head (not let into it), slides over the paper and serves as a rule against which to draw the lines. If the edge of the drawing board be perfectly straight (which, of course, it must be) all the lines drawn along the blade of the T square while in different positions along the edge will of necessity be parallel; hence the utility of this instrument in the operations of projection. As it is customary to operate the T square with the left hand (using the pencil in the right), it is especially important that the edge of the board at the left should be kept in as good condition as possible. T squares of the larger sizes are made of hard fine grained wood, but in the smaller sizes those having blades of hard rubber or celluloid are very desirable. The two triangles shown at B and C are used to slide along the blade of the T square, and, since each has one right angle, both may be used to draw lines at right angles to those made with the T square. The oblique side of the triangle B is at an angle of 45 degrees to either of the other two sides, and is therefore useful in drawing the miter lines, octagonal figures, the plans of hips and valleys, &c., while the oblique side of the triangle C is at an angle of 30 degrees to the long side and 60 degrees to the short side, thus adapting it to the construction of hexagonal (six sided) figures, and it is sometimes used in drawing the sides of a bay window or the pitch of a roof. Those made of rubber or celluloid are preferable to wooden ones.

From the methods which were described in the December issue it will be easily seen that the relative positions which the several elevations and the plan should occupy to one another in a complete set of drawings may be deduced by supposing the object to be placed inside of a hollow cube whose sides and top are transparent surfaces, and that projections of its several sides, as well as of the top and bottom, be made each

* Continued from page 335, December issue.

upon the adjacent side of the cube in the manner previously illustrated in Fig. 1. Let it be further supposed that three of the planes, those forming the two sides and the top of the cube, be hinged at the edges to the plane, forming the front, and upon which the front or principal elevation has been projected, and that the sides and top be now turned upon their hinges as shown by the dotted curves in Fig. 4, which shows a top view of the arrangement. To complete the illustration, the plane at the back is supposed to be hinged to the back edge of one of the side planes, whence it, too, is turned first to line with the side and afterward along with the side plane to a position in line with the front and shown in Fig. 4 at the extreme right. All this having been done, the several elevations and the top view will, when seen from the front, be arranged in proper relation to each other, as shown in Fig. 5. This idea should never be carried so far as to turn the base of the cube downward to a vertical position, as such an operation would thus produce a plan as seen from below. Plans so drawn are only used to show the designs of ceilings or soffits and are then termed inverted plans.

The arrangement of the several views is important, first, because there is only one right way and, second, being the accepted way, it will be understood by every draftsman into whose hands the drawings may chance to fall. Thus, for example, when a drawing containing two elevations, drawn side by side, is presented for inspection, it is immediately understood that the elevation at the right is a view of the right side of the object shown in the left hand view, and that, conversely, the elevation at the left is a view of the left side of the object shown in the right hand view, the views being thus identified by their juxtaposition, which would not be the case were the positions of the two elevations reversed.

In the construction of sections, a line is first drawn across the plan at the desired point, representing the plane of the section or cutting plane, as *n o* of Fig. 2.

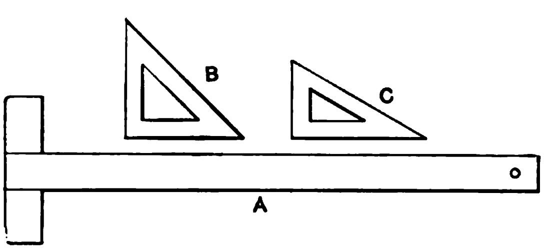



**Fig. 3.—T-Square and Triangles Used in Mechanical Drawing.**

In working out the details of cornices, window jambs and casing, &c., the section must be constructed first and the elevation projected therefrom. In obtaining the elevation of the cornice shown in section at the left in Fig. 6, a horizontal line is projected from each angle of the profile, or section, as shown by the dotted lines connecting the two.

All of the operations described in the foregoing, it may be remarked, come within the field of the architect's labor rather than that of the carpenter. It is important, however, that the carpenter should study and understand the principles of descriptive geometry for three reasons: First, the intelligent carpenter often aspires to become an architect, in which case all this and much more must be learned; second, only with this knowledge is he able to understand or "read" correctly the drawings furnished him, and third, the application of these principles fur-

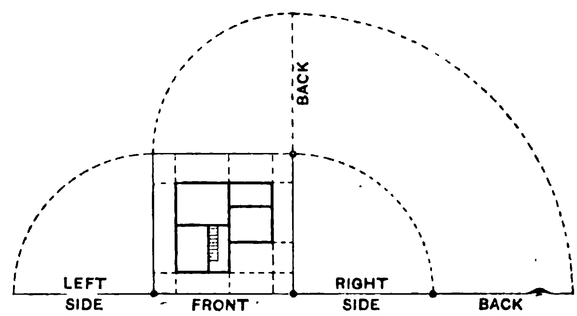



**Fig. 4.—Plan of Mechanical Device Explaining the Proper Relative Position of the Different Views.**

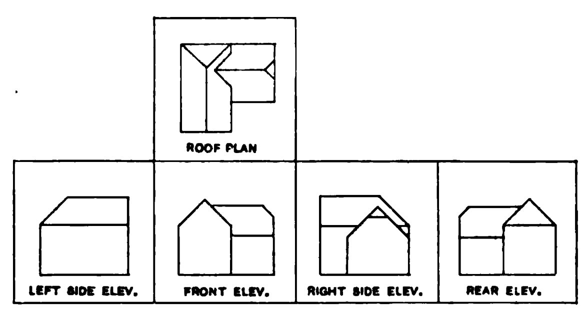



**Fig. 5.—Front View of Device Illustrated in Fig. 4, Showing the Proper Position of the Several Views of an Object with Reference to Each Other.**

*Bevels Used in Carpentry.*

From the intersection of this line with the various walls, chimneys, &c., through which it may pass, lines are projected upward, as in the case of an elevation, upon which, from any assumed horizontal line as a base, the several hights are set off according to requirements and the lines of floors, roofs, &c., are drawn. In bringing the line of the section to a horizontal position on the board, as explained above, before making the projections it will be noted that the plans may occupy either of two positions—that is, in the case of the line *n o* of the plan A, it may be placed so as to look toward the back of the house, or toward the front. A section on the line *n o* is called a transverse section. In the case of a longitudinal section—that is, one cutting the subject from front to back the longer way—the section may be made—that is, the plan may be turned—so as to look toward the right side or toward the left, at pleasure. When the section includes, in addition to the walls or other parts cut, a view of what would appear beyond, as stair, doors, &c., and the farther wall, it is properly termed a *sectional elevation.*

Those portions of the drawing which show the surfaces produced by cutting through solid material, as timbers, plaster, brick, &c., should be ruled with parallel oblique lines, taking care that adjacent pieces are lined in different directions, as shown in Fig. 6. Such ruling is sometimes spoken of as cross hatching, and different styles of cross hatching are chosen to represent different materials, small parts, especially if of metal, being sometimes shown solid black.

nish him with simple and infallable means of finding the angles of all the bevels and oblique cuts known in carpentry, the explanation of which forms the principal purpose of these articles.

An oblique elevation of an object may be obtained by first turning the plan upon the drawing board to the angle required, being sure that the parts or sides of which the view is required are turned downward, and then proceeding as in the case of other elvations. Projections may also be taken off obliquely from an elevation as, for instance, if it be required to obtain such a view of a roof surface as will give its true dimensions in every direction. Let it be required, for example, to obtain such a view of that portion of the roof marked *r* on the roof plan D of Fig. 2. This portion of the roof would naturally appear in only two views, viz., the rear elevation (not shown in the drawings) and in the roof plane, neither of which gives its full surface since it is oblique to the plane of both those views. Its profile, however, appears in the right side elevation from which its true dimensions from ridge to eave may be obtained, and its lengths appear on the plan. The desired view may therefore be obtained by projection from either the plan or the side elevation, as shown in Fig. 7.

From each of the several points in the profile of the roof A B, project lines indefinitely at right angles to the roof line as shown, and from the corresponding points in the plan of the roof below, project lines to the right or left, according to convenience, at right angles to the ridge or eave of the roof, continuing them till they cut any vertical line, as C D. Now upon any one of the oblique lines first drawn or upon any line parallel thereto, as C′ D′, set off the distances obtained on C D, and from the several points thus obtained on C′ D′ project lines at right angles, cutting those lines upon which corresponding points are to be found. In order to make this correspondence clear, the several points upon the plan and on the profile of the roof have been numbered correspondingly. Thus points 3 and 4 of the plan both fall at the same point (A) of the profile, and therefore. upon the line projected from A will be found the points 3 and 4 of the new view, their position being determined as aforesaid by projections made from points 3 and 4 on line C′ D′ all as shown at 3′ and 4′. The true surface of the roof may also, and perhaps more easily, be obtained by continuing the projections from the plan indefinitely to the right, instead of intercepting them on line C D as before explained, and then transferring the distances on A B to any horizontal line, as A′ B′, conveniently near. Vertical lines erected from the points in A′ B′ to intersect with the horizontal lines of corresponding number will then give the same result as before obtained, all as shown by the shaded portions of the drawing, which may for convenience be termed the true face of the roof.

An inspection of this development or true face will now reveal the fact that not only are the true dimensions

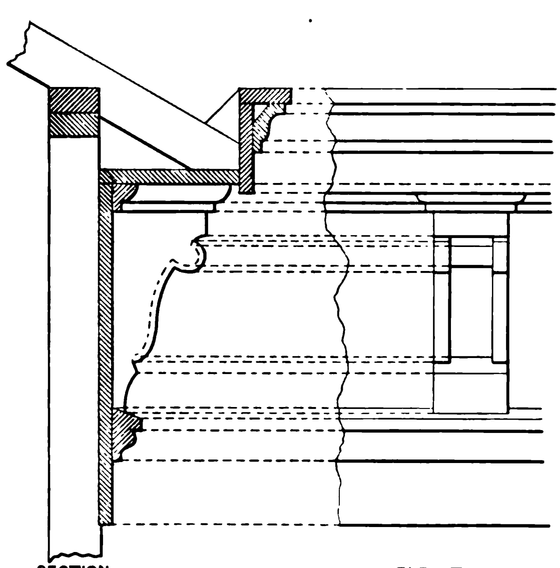


Fig. 6.—Lines of Elevation Obtained from a Section.

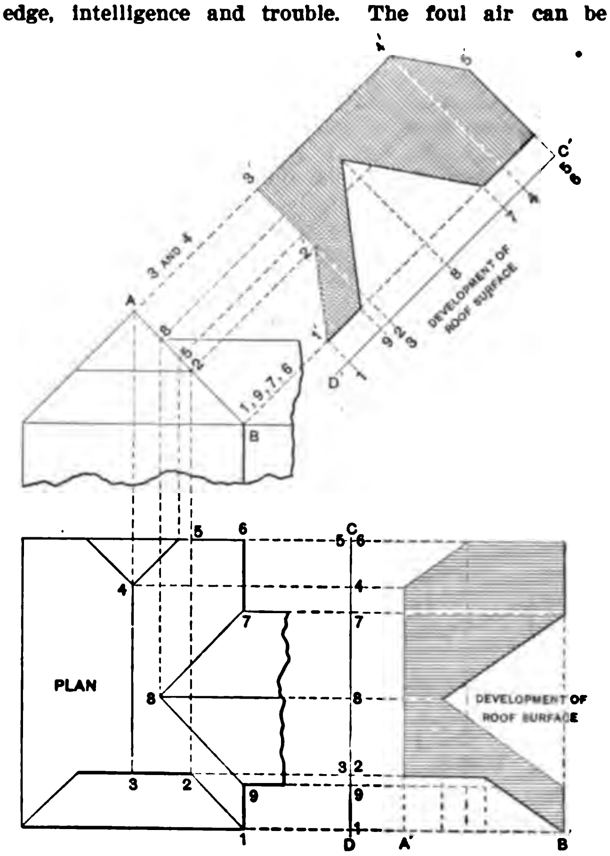


Fig. 7.—Method of Developing an Oblique Surface from Plan and Elevation.

*Bevels Used in Carpentry.*

of the roof in every direction given, but that the angles of all the oblique edges, each of which forms one side of a hip or a valley, are also correctly given. In applying these principles to the cutting of rafters it will be seen that the upper edges or surfaces of the rafters, when placed in position on the building are in reality parts or strips, as it were, cut from one large plane, whose surface has been developed in Fig. 7, and that, therefore, the lines 1′ 2′ and 4′ 5′ of the development, give correctly the top cuts on the edges of the jack rafters which come against the hips 1 2 and 4 5 of the plan. These lines also give the angles for the sheeting boards, while the lines of the development corresponding to 7 8 and 8 9 give the bottom cuts on the edges of the jacks which come against the valley rafters 7 8 and 8 9 of the plan Fig. 7. Of course, a development such as that shown in Fig. 7 can only be made to a scale on a drawing board of ordinary size; but while all dimensions obtained from such a drawing must be measured by the scale, it should be noted that the angles thus obtained will be exactly the same as though the drawing were made full size. In other words, while drawings may be enlarged or reduced any number of times angles cannot be.

*(To be continued.)*

## Ventilation of Office Buildings.

The discomfort due to lack of ventilation in large office buildings in the winter season, when the customary methods of heating are direct radiators, has evidently been the inspiration for the following article by George Hill, reprinted from the *Architectural Record:*

The heating of offices is well enough, but the ventilation is very largely neglected. These two are so closely related that they should be considered together. Present practice is to provide a radiator for heating controlled either by hand or by thermostat for each office unit, and to provide ventilation by opening the window, the foul air passing into the hall. The ideal arrangement would be to introduce a fixed amount of warmed, fresh clean air to each office unit at any determined temperature automatically. In fact, there may be said to be no existing way of properly warming the bulk of the offices of an office building without the constant use of a little knowledge, intelligence and trouble. The foul air can be drawn off into a vent shaft placed at any convenient place. For banking and similar large rooms on lower stories the standard hot air heating system, with either exhaust or blast fans, works with entire satisfaction and but little loss of valuable room, but the air inlets should always be 8 feet above the floor and at least 5 feet from the ceiling, and the outlets for foul air should be near the floor and large enough to have a very low velocity (less than 10 feet per second). Then the occupants will not feel a draft. The inlet radiators must not be high up, because it is at times necessary to introduce the fresh air at a temperature lower than 100 degrees F. when it feels cold and produces the effect of a draft. If the fresh air forms a current flowing always in one direction surfaces near it will get very dirty, and we are therefore compelled to keep away from the ceiling.

Plans have been filed for the remodeling of the famous Richardson "Spite House," at the northwest corner of Lexington avenue and Eighty-third street, New York City. The building is a four-story dwelling, 102.2 feet on the avenue, but only 5 feet wide on Eighty-third street. The present owner intends to build six stores on the ground floor, while the three upper stories will as heretofore be occupied as a dwelling for one family.

# NOTES ON LAYING BRICK.*

BY FREDERICK W. TAYLOR AND SANFORD E. THOMPSON.

MORTAR made of pure cement and sand does not work so smoothly as lime or lime and cement mortar, but sets up quicker, and requires constant tempering in the mortar bed or tub until it is used.

The bricklayer will lay from 5 to 25 per cent. less bricks, varying with the character of the work, if laid in mortar of natural cement than if laid in lime or lime and cement mortar.

Pure Portland cement mortar is apt to be harder to work than natural cement mortar because a larger proportion of sand is generally used with the Portland cement, and the mortar is therefore less fat. In ordinary work it may be assumed that a bricklayer will lay in walls from 5 to 10 per cent. less bricks with mortar made with Portland cement and sand than with Rosendale cement and sand. This presupposes, as stated above, that the Rosendale mortar is made richer in cement.

More bricks can be laid on face work if the mortar is the same color as the brick than where it is a different color, because irregularities in the joints show so much more plainly where the color is different.

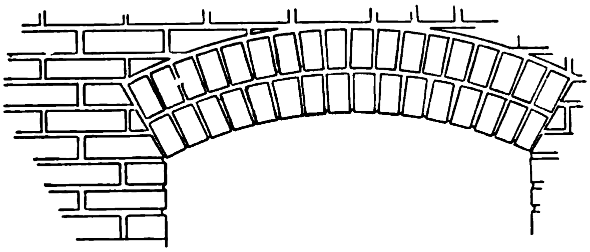


Fig. 6.—Rowlock Arch.

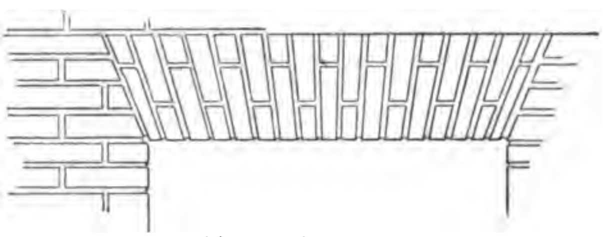


Fig. 7.—Flat Arch.

It is not within the scope of this article to enter into the engineering or the architectural construction of arches. In walls the arches most frequently used are the rowlock arch for common brick, and for face brick the flat bonded arch with bricks laid as vertical stretchers, and the circular arch where the bricks are laid radially or else radially in combination with rowlock rings. A relieving arch, built sometimes above a lintel to aid in supporting the wall above it, is constructed on the rowlock pattern. For a rowlock arch the springing line is formed by cutting the regular course brick to a beveled surface at right angles to the curve. The arch bricks are then laid in whole brick, except where half bricks are needed to break joints, on edge. If several concentric rings are built, they are not generally bonded together in the same course, although it is possible to insert bricks laid in a radial position, if desired; in the usual construction the second ring bonds the first.

For the best arch face work the bricks should be prepared before bringing them to the wall. A pattern is made and the bricks are gauged so that each piece will fit in its proper position. For this the pieces have to be carefully cut with a hammer and set and then rubbed down by a grindstone or by hand with a piece of broken brick to a perfectly smooth surface. It is possible to have the bricks for an arch molded to the wedge shape required. Such bricks usually need some cutting as they are laid, but much less labor is required than where they have to be cut entirely by hand. A third method, where a very smooth soffitt is not needed, is to cut or "axe," as it is called in England, with the peen of the mason's hammer each brick as it is laid. This gives the best effect if done properly, as it shows the skilled handicraft of the artisan as does wood carving over sandpapered work.

In laying out a flat arch the top of it—that is, the extrados—is made of such a length as to correspond to the thickness of a certain number of uncut bricks plus their joints. The board upon which the arch is to be laid, or the intrados, is then divided off into the same number of spaces as the extrados, and the bricks cut to a wedge shape.

For laying the bricks of a circular arch to exact radial lines a square can be made, one leg of which is a curve fitted to the curve of the center. Where the bricks for a circular arch are cut as they are laid a method sometimes employed is to locate the center or axis of the curve, attach one end of a string at this point, and, after placing the bricks for one radial course of the arch on the center without any mortar, the string can be held up against them so as to give the exact radial line and the brick marked on the face with a pencil for cutting. After the bricks are laid the joints can be tried in the same way, instead of using a square with a curved leg, as described above.

Flat arches are usually backed up with rowlock arches.

The more usual methods at the present time of constructing floors in a fire proof building are by the use of hollow tiling or terra cotta and cinder concrete. Both of them have the advantage over brick of forming a surface for the plastering of the ceiling below.

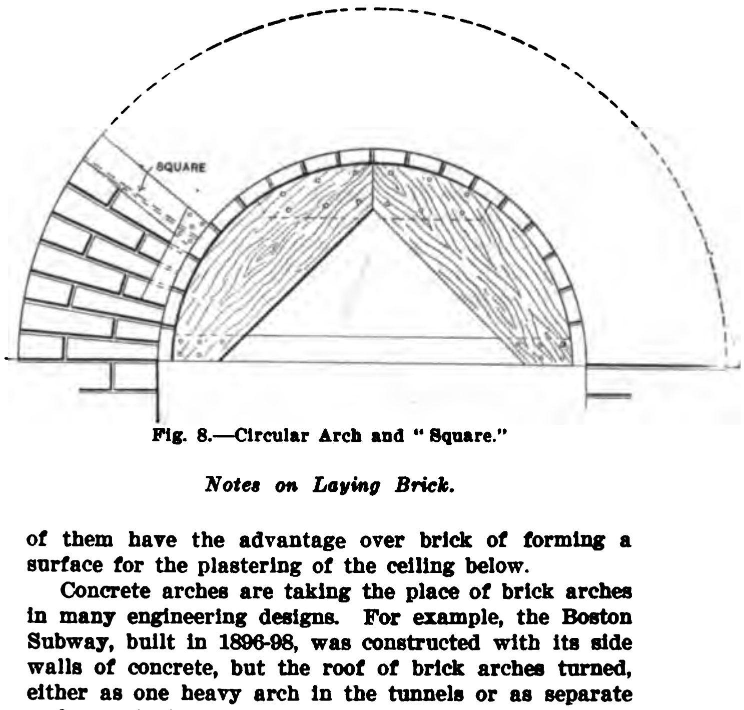



Fig. 8.—Circular Arch and "Square."

*Notes on Laying Brick.*

Concrete arches are taking the place of brick arches in many engineering designs. For example, the Boston Subway, built in 1896-98, was constructed with its side walls of concrete, but the roof of brick arches turned, either as one heavy arch in the tunnels or as separate arches springing from I-beams in the sections nearer the surface of the ground. On the other hand, in the New York Subway, now being built, while the specifications permitted either concrete or brick arches, concrete was finally used throughout.

Brick arches used for flooring are built upon centers and spring from the lower flanges of the I-beams of the floor. The centers are marked off by snapping lines for the courses in the same way that the arches in best quality of sewer work are laid out, and the joints at the intrados are arranged to be not over ¼ inch. The bricks are laid whole, rowlock fashion, except where they have to be cut for iron rods and at the springing line where skewbacks are split from the brick.

An average bricklayer at work by the day upon floor arches of about 5 feet span will lay about 700 bricks in eight hours. A first-class man, or even a good average

 Concluded from page 841, December issue.

bricklayer working with some special incentive, may lay as many as 1050 bricks in eight hours.

## Heating and Ventilating Foundries and Shops.

The proper method of heating and ventilating buildings, whatever may be their nature, is a matter in which a large class of our readers is more or less interested, and as bearing upon the subject we present herewith an abstract of a paper by W. H. Carrier of Buffalo, read before the recent Milwaukee Convention of the American Foundrymen's Association.

The paper sets forth the nature of the difficulties to be overcome in the satisfactory heating of shop buildings, and shows the adaptation of the fan system to the solution of these difficulties.

Heat losses occur in the building from two causes: First, by the direct transmission of heat by radiation, through the walls and exterior surfaces of the building, and, second, by the infiltration of cold air from without. In designing a heating plant the first of these losses may be very accurately determined by referring to tables which have been prepared showing the amount of heat radiated under different conditions through various thicknesses of walls, windows, doors, roof, &c. The heat lost through infiltration varies so greatly in various sizes and constructions of buildings that no definite rule can be given. The allowance to be made for this is necessarily a result of experience and a careful test of previous installations.

In either fan or direct radiation systems difficulty is liable to be experienced from the heated air immediately rising and forming a stratum of heated air just beneath the roof. In machine shops and foundries, owing to their hight and to the great amount of skylight surface which is always provided in the best modern construction, the loss occasioned by this action of heated air may be considerable, and its prevention is a serious problem. With the fan system, however, the distribution of the heated air is entirely mechanical and affords an opportunity for utilizing its heating effect to the very best advantage. Various methods of distribution have been devised with the fan system whereby the effect of a rising current of heated air is almost entirely avoided. These systems, in general, depend upon securing a perfect diffusion of heated air along or near the floor line, and will be described in detail later.

A second difficulty experienced in high buildings is the effect due to outward leakage of the heated air at the upper part of the building and a consequent inward leakage of cold air along the floor line. In large shops this layer of cold air may frequently be found to extend from 4 to 6 feet above the floor, while the amount of heat lost due to the high temperature in the upper part of the buildings may be much more than sufficient to secure a satisfactory heating effect throughout if properly applied. The most effective remedy for this evil is to maintain a slight pressure within the building by means of a fan, which takes a portion of its air from without.

A third difficulty presenting itself in buildings covering large area and having a large amount of skylight is the cold down draft, which the cooling effect of the skylights has a tendency to produce. In very wide buildings where heat is distributed only along the walls this effect is noticeable, and as it comes directly upon the heads and shoulders of the workmen and is in the part of the building most used, it is very objectionable.

#### Methods of Heating.

In general, buildings may be heated in two ways: First, by keeping the walls and roof warm. This is accomplished in direct radiation system by placing coils along the walls, and in the fan system by blowing the heated air toward the walls. A second method is to heat the air within the building directly. This can be accomplished in a satisfactory manner only by an indirect or fan system. Of these two systems it may be said that if either is used exclusively the second method is preferable, since it is the more economical. In the first method it is quite evident that if the walls be kept warm radiation will not occur to any great extent from the interior of the building, and the heating effect will be satisfactory. On the other hand it is equally evident that the radiation through the walls caused by heating them to a higher temperature occasions a much greater radiation loss than would occur if the room temperature had been secured by heating the air directly. Since the heat transmitted by wall coils is chiefly direct radiation the loss occasioned by the direct transmission of heat through the walls with this system is very great and may be as high as 25 per cent. or more of the total radiation.

With the fan system the method of supplying and distributing the air in the building is the consideration of chief importance. The usual methods of supplying heated air, are, first, where the air is taken entirely from without doors and is forced directly into the building through distributing ducts. This method is generally known as the plenum system, and the pressure produced in the building causes a continuous exit of air from the building, either through the natural openings, as is usually the case in factory and other large buildings, or through special vent openings provided for the purpose, as in public buildings.

A second and more common method for shop buildings where forced ventilation is not a necessity is to draw the supply of air entirely from within the building and again forcing it through the distributing ducts. This causes a continuous circulation of the air within the building, and when properly applied secures excellent results.

The first of the above methods has the advantage of securing an excellent ventilation, and in the instance of foundries this is often desirable. Another advantage possessed by the plenum system is that it produces a continuous outflow of air through all the crevices and openings in the building, which would otherwise be admitting cold air from without to settle along the floor and prevent satisfactory heating. In buildings of loose construction this is frequently the only system which can be successfully operated.

The air return system often has an advantage over the plenum system, in that all the heat supplied to the air is effective in heating the building, but does not possess the advantage of producing a plenum in the building.

#### Ideal System.

The ideal system is a combination of the plenum and return systems and should always be used where possible. In this system the great portion of the air is returned to the apparatus, but sufficient air is continuously taken from without through a fresh air connection to create a plenum within the building and prevent the inward leakage of the cold air along the floor. In this manner the natural leakage is supplied, not by inflow of cold air through the crevices around the doors and windows but by air passed through the apparatus and heated to an effective degree. This system has been found by test to be more economical than air return alone. The proper amount of air to be introduced from without is determined by securing a point where the noticeable inward flow of air around the doors or windows ceases. If the plenum is carried beyond this point there will be a loss due to unnecessary heating of the outdoor air.

(*To be continued.*)

## Meeting of American Institute of Architects.

Secretary Glenn Brown has issued an announcement to the effect that the Board of Directors of the American Institute of Architects having determined that January 11 will be the best time for holding the thirty-eighth annual convention a limited number of local members, in order to comply with the constitution, met December 15, 1904, and, no quorum being present, adjourned until January 11, 1905. Delegates who have been elected and other members who expect to attend the convention are advised that the actual proceedings and all business will take place between January 11 and 13, 1905.

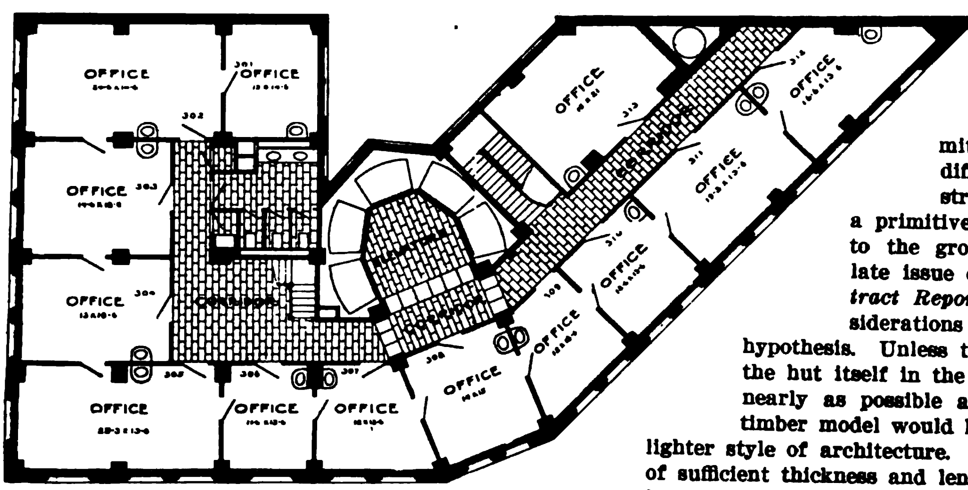
On the night of January 11, 1905, a formal dinner will be given by the Institute, with invited guests of those distinguished in art, literature, education and of the Government.

# PITTSBURGH'S NEW BANK BUILDING.

*(With Supplemental Plate.)*

An interesting example of steel skeleton frame construction, and which represents one of Pittsburgh's leading bank buildings, has been taken as the basis of one of the half-tone supplemental plates which accompany this issue. The structure is notable in many respects, not the least important of which is the elegance of its finish and the rapidity with which the work of erecting the skeleton iron cage was carried to completion. It is known as the Diamond Bank Building by reason of the fact that the ground floor will be occupied by the Diamond National Bank and the Diamond Savings Bank, the entrance to the former being on Fifth avenue and that of the latter being on Liberty avenue. In regard to the rapidity with which the steel frame was erected it may be stated that it was commenced on August 12 and completed on September 12, nearly 1200 tons of steel being required.

The frontage on Liberty avenue is 88 feet, on Fifth avenue 55 feet and on Union street 60 feet. The first three stories of the façades are light colored granite, above which to the twelfth floor level they are of gray brick, the top story and cornice being of terra cotta.




Typical Floor Plan.

*Pittsburgh's New Bank Building.*

The interior will be handsomely finished, all corridors and stairways being of English veined white Italian marble, while the wood work will be of mahogany. All of the first floor will be devoted to the two banking institutions already mentioned, while the second to the twelfth floors, inclusive, will be devoted to offices, in all of which will be lavatories, and on each floor finely appointed toilet rooms. The heating and ventilating of the latter will be by the improved "blower" system. The air will be washed and purified in the basement and will then pass through drying and heating coils, whence it will be forced to the different toilet rooms by means of blower fans. The banking rooms will be fitted with solid bronze screens having marble bases. The walls will be lined with white Italian marble, and the ceilings will be of ornamental stucco work beautifully decorated. The fixtures will be of solid mahogany.

The entrance to the office building is at the angle formed by Fifth and Liberty avenues, where a wide passageway leads to the four elevators grouped in a semicircle around the end of the corridor.

The plans of the building were prepared by MacClure & Spahr, Keystone Bank Building, 320 Fourth avenue, Pittsburgh, Pa. The steel frame work was put up by the George M. Bole Construction Company, while James Stewart & Co. have the general coantract for the building.

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The Society for the Protection of Ancient Buildings in London is said to be making an effort to save the historic edifices of England from the ravages of time. Smoke seems to be a destructive agent. Every ton of coal burned sends nearly 50 pounds of sulphuric acid into the air. And rain water mixed with this destructive ingredient melts out the lime which forms the cement that holds the stone together and converts it into soft, loose gypsum, which fills the pores formerly occupied by solid lime and rots the stone to a mere loosely held sponge of sand or shell particles, which you can often scrape freely away with your finger. Often this rotting action goes to a depth of 6 inches or more, and the soft outer part of an old wall is hardly firmer than the moist sand of a sea beach.

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## Greek Temples and Timber Huts.

The earliest examples of the Grecian Doric, as, for instance, that of the temple of Corinth, are marked by a massiveness of proportions approaching to heaviness, if not to rudeness; which circumstance, together with the narrowness of the intercolumns (spaces between one column and another), favors the supposition that the Greeks borrowed their first ideas of architecture from Egypt. If this be admitted, the hypothesis of the different parts of a Grecian structure being derived from a primitive timber hut falls at once to the ground, says a writer in a late issue of the *Architect and Contract Reporter*. The following considerations also are urged against this hypothesis. Unless the aim had been to make the hut itself in the first instance resemble as nearly as possible an erection in stone, such timber model would have given rise to a much lighter style of architecture. If single pieces of timber of sufficient thickness and length for the columns could have been procured, so could they also for the architraves; nor could there have been the slightest occasion for putting the columns so close together.

It will be said that we do not see the first essays in stone, which undoubtedly retained more of the character of the timber prototype, but structures wherein greater solidity had been introduced so as to render their character and proportions more conformable with the nature of the material employed. Yet as far as extant examples themselves afford any proof, the reverse of this took place, since in them we observe a progressive change from heaviness to lightness—from columns less than four diameters in hight to those of nearly seven.

The chief circumstance that favors the idea of the Grecian style being derived from timber construction is that the columns are round and tapering like the stems of trees, a form not likely to have been adopted had stone been employed from the first, it being more natural that the pillars should have been square. But it is urged that this circumstance ought to lead us to adopt the same hypothesis in regard to Egyptian architecture, whereas by supposing that the Greeks took their first ideas from that source, perhaps all the difficulties attending the other hypothesis are removed. "The entire character of Grecian architecture," says Wolff, "as well as of Egyptian, is essentially connected with construction in stone, which alone is capable of accounting for the architectonic principles it exhibits."

In stating these opinions as to Grecian being borrowed from Egyptian architecture, it must be observed that many strong reasons are urged on the other side; and so far as there is any direct historical evidence either on one side or the other, it is in favor of the hypothesis against which we here contend.

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The new Wanamaker store in course of erection in Philadelphia, Pa., will have 12 main floors and 3 mezzanine floors above the street level, and 2 main and 1 mezzanine floor below grade.

# CORRESPONDENCE.

### Figuring Stresses in a Trestle.

*From* A. P. S., *Williamsport, Pa.*—I have a problem which I would like to have Frank E. Kidder work out for me and, in doing so, I think what he may have to say will be greatly appreciated by many other readers besides myself. The question is this: We desire to burn shavings from the planing mill and carpenter shop, which is located 553 feet from the power house, and the idea is to convey them through two pipes placed one above the other, as shown on the accompanying blue print, Fig. 1, the top pipe being 19 inches and the bottom one 28 inches in diameter. The hight from the ground to the center of the lower pipe is 42 feet and the pipes are spaced 6 inches apart. We desire to put up just as neat and light struc-

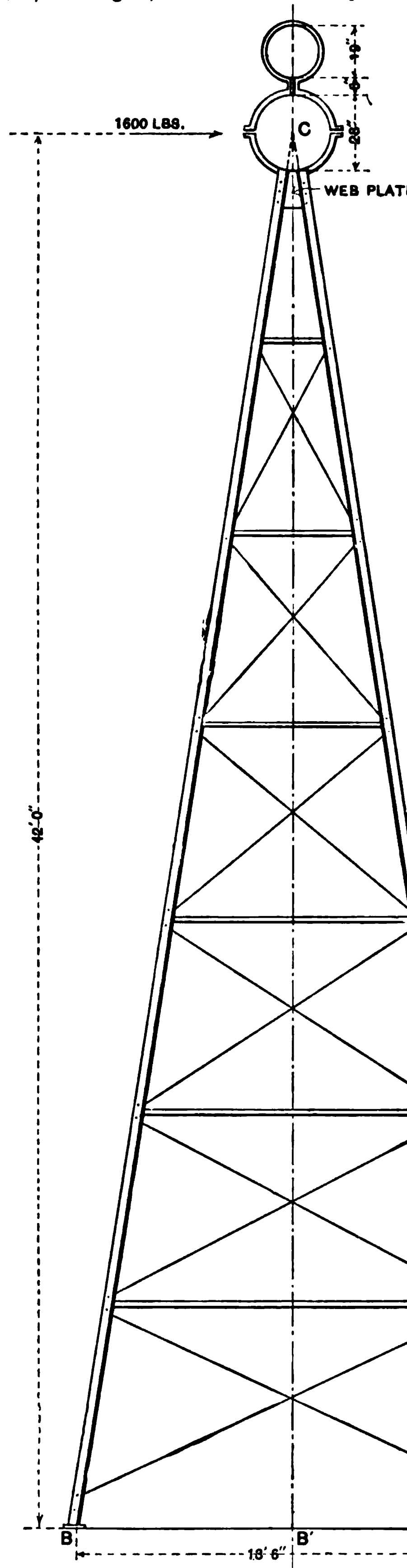



Fig. 1.—Construction Proposed by " A. P. S."

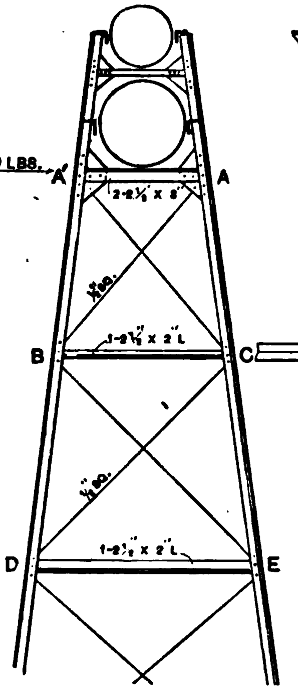



Fig. 2.—As Suggested by Mr. Kidder.

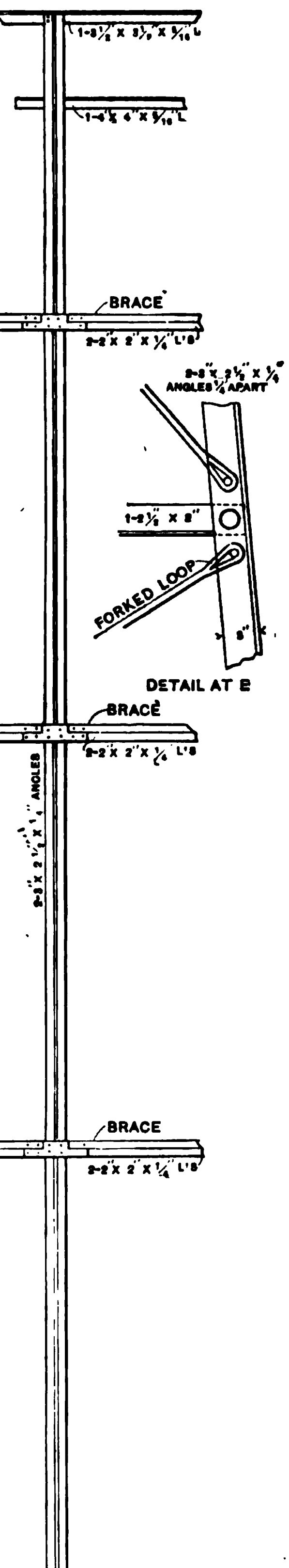



Fig. 3.—Side Elevation of Trestle.

*Figuring Stresses in a Trestle.*

tural steel supports as the conditions will permit, following out the design as indicated in the drawing and allowing 20 pounds for wind pressure, or Mr. Kidder's figure, if more or less.

I would like to have Mr. Kidder show by formulæ what strain is on each member of the truss, including the diagonals, also the distance apart the supports should be located. I would state that the pipes are made of No. 20 galvanized iron and weigh respectively 12 7-10 pounds and 8 7-10 pounds per foot. At present these pipes are supported by ugly wooden trusses, which not only take up much valuable room, but present anything but a handsome appearance. I omitted to mention that the end thrust on the pipes is taken care of by being rigidly fastened to the two respective buildings at each end of the line. I trust I have made myself intelligible and that Mr. Kidder will make the solution clear to a young engineer who is a regular reader of *Carpentry and Building*.

*Answer.*—In accordance with the suggestion of our correspondent above, his communication was submitted to Mr. Kidder, who furnishes the following, with accompanying sketches, in reply:

The stresses in a trestle, as in a truss, can usually be more quickly and easily found by the graphic method, and hence I shall use this method in explaining the nature of the stresses and how they are found.

After having determined on the outline of the trestle, the next step is to figure the load or pressure it must be capable of resisting with safety. The trestle has to sustain two loads, a vertical load, consisting of the pipes, sawdust and weight of the frame itself, and a horizontal pressure due to the wind pressure against the pipes. We will first compute the wind load and the stresses due to it, as they are the more important.

From the bottom of the large pipe to the top of the small one is 4 feet 7 inches. As the pipes are round and there is a space between them, an allowance of 20 pounds per square foot will probably be sufficient, which would make the total wind pressure about 92 pounds per running foot. For convenience in figuring and to be on the safe side, we will call the wind load 100 pounds per lineal foot of conduit. Economy will require that the trestles be placed at least 16 feet apart, I should say, which will make the wind pressure to be resisted by each trestle 1600 pounds. The frame itself is so light that we may neglect the wind pressure on it.

Now to find the stresses due to this 1600 pounds wind pressure draw a horizontal line *a b*, Fig. 4, and make its length equal to 1600 pounds at some scale, say, 800 pounds to the inch. Then from one end, *b*, draw a line parallel to the right leg of the trestle, and through the other end, *a*, a line parallel to the left leg, and continue the lines until they intersect at *c*. Then the line *b c* will represent the compression in the right leg of the trestle, and *a b* the tension in the left leg. In the actual trestle, Fig. 1, the two legs do not quite meet, but the web plate would give the same result as though they did meet.

In a triangular frame the stresses found above exist in the entire length of each leg, and theoretically *there will be no stress in any of the bracing* and if the two legs were made of sufficient size to resist the compressive stress, considered as a long strut, no bracing of any kind would be required. Practically, by inserting horizontal braces we stiffen the legs, so that only their unsupported length need be considered in determining their size. The writer knows of no way in which the stress in these horizontal braces can be computed, and he does not think that the diagonal braces would be required at all. To show that there is no stress in the bracing, we have only to consider the case of a boom derrick, Fig. 5, which is exactly the same construction as the trestle, only the load is vertical, and the axis of the triangle is horizontal. It is a matter of experience that no bracing is used between the rope and boom, but the boom is made large enough to resist the entire compressive stress without bracing.

Practically, I do not think the method of supporting the pipes shown by "A P. S." to be a good one, because I think the wind would bend the iron work which supports them.

I would recommend that the top of the trestles be framed as in Fig. 2, and horizontal angles run from trestle to trestle to support the pipes, by means of bands. In this way no dependence is placed upon the strength

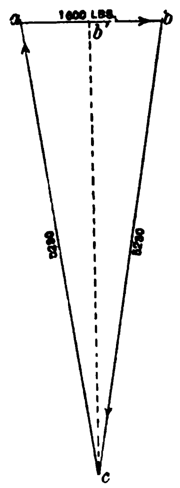



Fig. 4.—Stress Diagram.

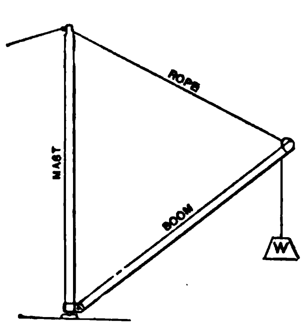



Fig. 5.—Illustrating the Principle.

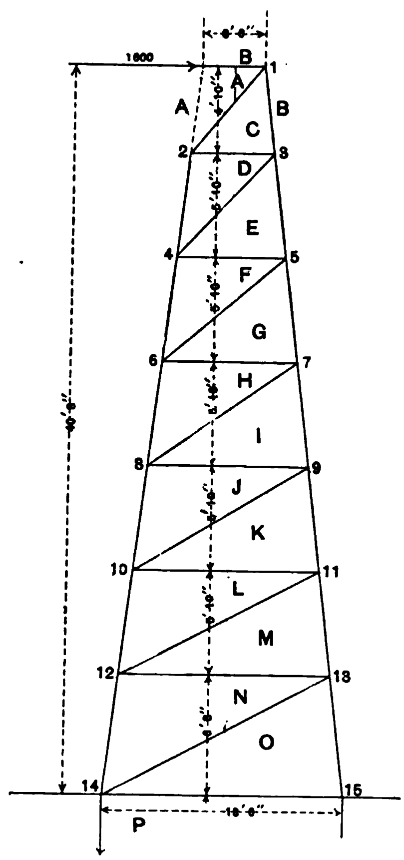



Fig. 6.—Diagram of Trestle.

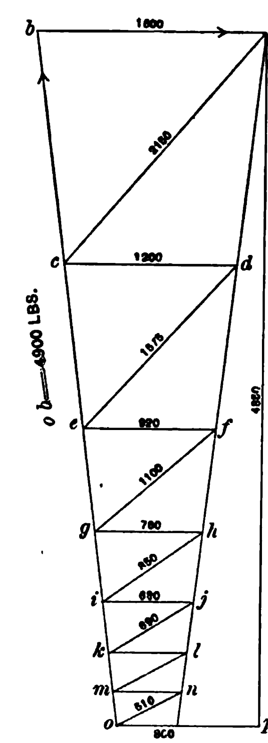



Fig. 7.—Stress Diagram.

*Figuring Stresses in a Trestle.*

of the pipes, and the trestles can easily be placed 16 feet apart.

If we consider the trestle, Fig. 2, as cut off at A', then there will be stresses developed in the bracing, and these stresses can readily be found graphically. Let Fig. 6 represent the center lines of the members of the trestle with the wind from the left.

It should be noted in this connection that only one set of diagonals can act at one time. With the wind from the left the diagonals should be placed as in Fig. 6; with wind from the right an opposite set of diagonals will be required, and as the wind may blow from either direction, it is, of course, necessary to put both sets of diagonals in the structure, but for computing the stresses only one set should be shown.

To draw the stress diagram, Fig. 7, commence with the horizontal line *a b*, equal in length to 1600 pounds. (A scale of 1000 or 800 pounds to the inch should be used.) Then from *a* draw a line parallel to the diagonal A C, and from *b* a line parallel to B C, the two lines intersecting at *c*. [Note that lines in Fig. 6 are denoted by the letters at each side of them, capital letters always referring to Fig. 6 and small letters to Fig. 7.]

Then *a c* denotes the stress in the upper diagonal, and *b c* the stress in the top section of the right hand leg. There is no stress in the top section of the left leg. The stress in A B will, of course, be 1600 pounds.

Next, at joint 2, we have the stress in C A, represented by the line *c a*, and at this joint the stress acts up. In a trestle we must take the members in order, going around to the *left* so that the next member is A D. From *a* draw a line parallel to A D, and from *c* a line parallel to C D, the two intersecting at *d*. At joint 3 we have the known stresses *b c*, *c d*, and draw *d e* and *b e*; *b e* lies over *b c*, but they should be considered as two different lines. The stresses at joint 4 are *e d*, *d a*, *a f* and *f e*. In the same way the stresses are found for the remaining joints. At joint 14 we have the stress *o n*, *n a*, a stress *a p*, representing the anchorage required to keep the trestle from overturning, and the horizontal line *p o*, which represents the horizontal force tending to blow the trestle sidewise. This force, it will be noticed, is just half the wind pressure. Now by scaling the lines in Fig. 6 A we obtain the amount of each stress in pounds, as indicated by the figures in Fig. 7. The right leg and all of the horizontal braces are in compression. The left leg and the diagonals in tension.

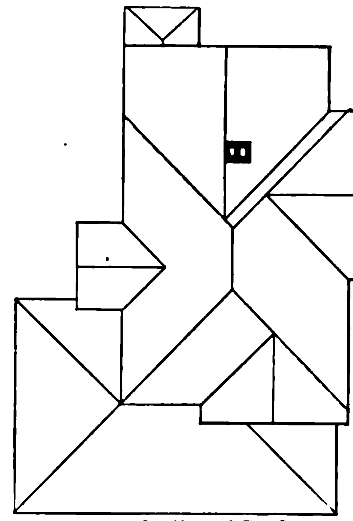
To the compression in the leg due to the wind pressure should be added the compression due to the dead load. The dead load I estimate as follows:

| | Pounds. | Pounds. |
|---|---|---|
| Weight of 16 feet of upper pipe, at 8.7 pounds | 139 | |
| 16 feet of sawdust, at 12 pounds | 192 | |
| Two 3½ x 3½ x 5-16 inch angles, 32 feet, at 7.1 pounds | 227 | |
| 16 feet of large pipe, at 12.7 pounds | 208 | |
| Sawdust in same, at 25 pounds per lineal foot | 400 | |
| Two 4 x 4 x 5-16 inch angles, 32 feet, at 8.2 pounds | 262 | |
| | | 1,428 |

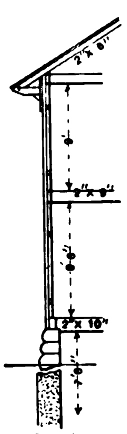
| | | |
|---|---|---|
| Weight of frame: | | |
| Four 3 x 2½ x ¼ inch angles, 45 feet long, 180 x 4.5 | 810 | |
| 12½ feet of 3 x 2½ inch angles, at 4.5 | 56 | |
| 27½ feet of 2½ x 2 inch angles, at 3.7 | 102 | |
| 22 feet of 3 x 2½ inch angles, at 4.5 | 99 | |
| 184 feet of ½ x ½ inch bars, at 0.85 | 114 | |
| | | 1,181 |
| Total dead load | | 2,604 |

The compression in each leg will be one-half of this increased in the proportion that the length of the leg bears to the vertical hight. Without stopping to compute it, we will call the stress in each leg due to vertical load 1400 pounds, and as the wind stress in the bottom section of the leg is 4900 pounds, each leg must be computed to sustain 6300 pounds in the bottom section. As this will require only very light angles, it will be best to make the legs of the same size their entire length. The dimensions given on Figs. 2 and 3 are as light as the author would recommend.

Each diagonal should be provided with a turnbuckle. The weight of shavings was arrived at by considering the pipes filled, and by actual trial I find the weight of loose mill shavings to be about 6 pounds per cubic foot.

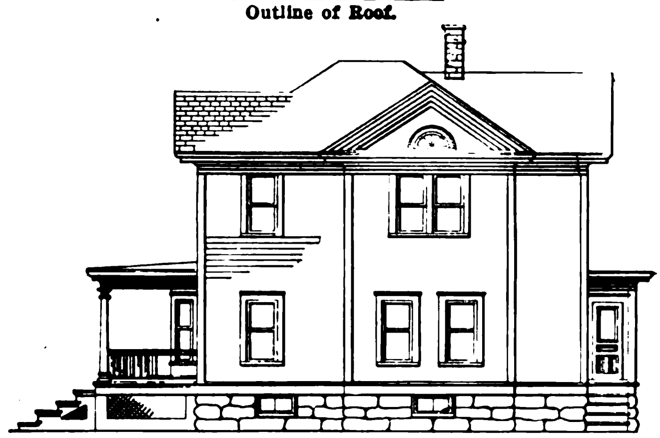


Outline of Roof.



Section.

Front Elevation.



Scale, 1-16 Inch to the Foot. Side (Right) Elevation.

*Elevations for Floor Plans of "J. W. H."—Drawings Submitted by "W. H. H.," Saranac Lake.*

#### Elevations for "J. W. H.'s" Floor Plans.

*From* W. H. H., *Saranac Lake, N. Y.*—In the November issue "J. W. H." of Bayonne, N. J., asked the readers to furnish for publication an elevation adapted to his floor plans. I send herewith front and side elevations, with roof plan, which I hope will be of interest to him.

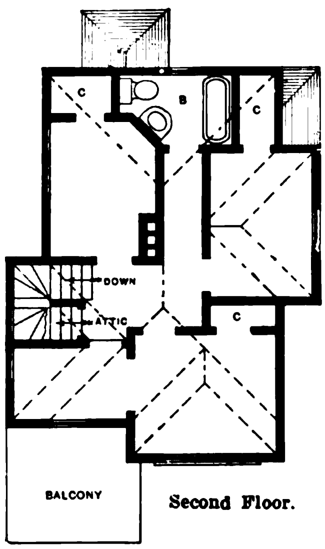
*From* M. P. KELLOGG, *Boulder, Col.*—In answer to the inquiry of "J. W. H." of Bayonne, N. J., which appeared in the November issue of *Carpentry and Building*, I have prepared a sketch representing a front elevation which may be of interest to him. A careful inspection of the floor plans will reveal the fact that I have made some changes which I believe will render them more complete and give a much better arrangement. If the suggestions indicated by the drawings are carried out the result will be a very attractive residence. I should like very much to have "J. W. H." comment upon the changes I have made and also tell what he thinks of the elevations.

### Laying Hard Wood Floors.

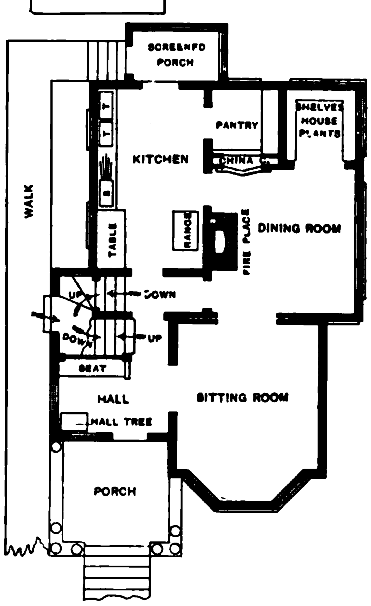
*From* F. A. B., *Bolton Landing, N. Y.*—I have been a reader of *Carpentry and Building* for many years and cannot speak too highly in its praise. I am happy to say that I possess at the present time every copy of the much coveted journal which I have received since I commenced my subscription a long time ago. It is consoling to know that when I run against a "snag" in the work I may be doing I can look over the back numbers of the paper and somewhere find a way in which to overcome the difficulty. I always have each volume in its own particular place and the numbers arranged in their regular monthly order. At the end of the year I place the index sheet in its proper place, so that it is a very simple matter to find any particular subject to which I may wish to refer. I do not bind the issues of the paper as some readers suggest. I do not like this plan for the reason that when the numbers are left single it is very convenient to take one with me on a job for some particular reference, whereas if they were all bound together it would necessitate taking the whole volume.

I have read with much interest the many discussions in the Correspondence department, which it seems to me is getting more interesting with each issue. I was just reviewing what the different "chips" have been saying about laying hard wood floors. I see, as in all other discussions, some very good ideas suggested and some which are not so good. I notice on page 152 of the May number the query from "J. M. D.," Why is it necessary to tongue and groove the ends of flooring? While it may not be absolutely necessary, it seems to me that any one might readily see that two pieces of flooring coming together at the ends will make a much firmer joint if matched than if simply butted together, and will also hold their place much better. The correspondent further says, quoting from his communication, "It would seem to the writer that if the hard wood flooring is tongued and grooved on the ends and every joint required to be thus fitted, the material would cut very much to waste." This is a wrong impression. I have laid quite a quantity of this kind of flooring, some plain, some in patterns, yet I find less waste than in any flooring I have yet laid. In putting down a plain floor— that is, in laying it in straight courses from one end of the room to the other—the correspondent will find it will work very nicely if he will start his courses with the groove end of the piece of flooring back next to the wall and the tongue end ahead, then run the course through, forcing the grooved end of each piece onto the tongued end of the piece behind it. If, when he comes to the last piece in the course, it requires to be cut, do so and take the piece cut off back to the other end of the room and start the next course with it. Now where is the waste? It does not matter much how much short this piece may be, as it cannot move after the next course is laid, for it has the tongue on the end as well as on the side to help hold it. There is practically no waste if the work is properly done, unless perhaps it is on a job where one does not care to use too short pieces on account of appearances.

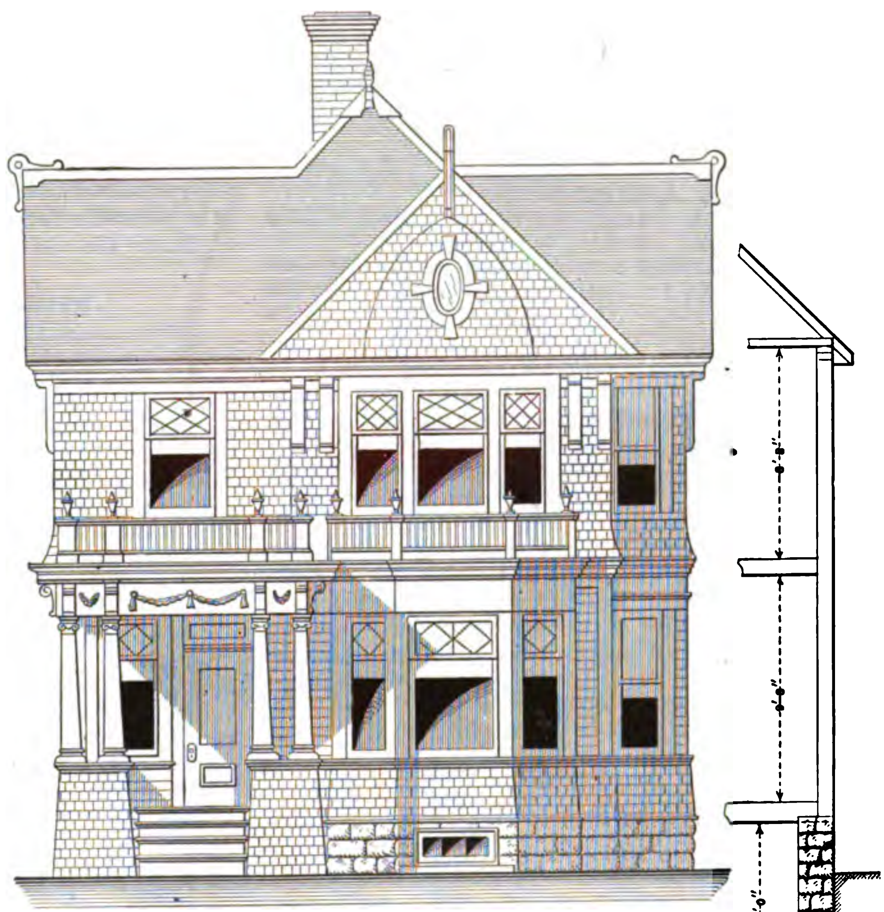
I derive much benefit from the various discussions appearing in the columns of the paper and have no doubt many other readers feel the same way. I hope all will



Second Floor.



First Floor.
Scale, 1-16 Inch to the Foot.


Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

*Elevations for Floor Plans of "J. W. H."—Contributed by M. P. Kellogg.*

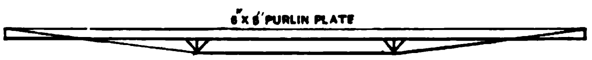
express their opinions freely, but would ask that the 20-door a day man and the 10,000-shingle man be omitted. I do not think we have any use for such. They are better suited for some quick acting electrical machine.

I have noticed from time to time several very good ideas for tool chests and, with the editor's consent, will be glad to send for publication description and drawings of a tool chest which I made the past winter.

*Note.*—We shall be very glad to have our correspondent send forward the matter relating to the tool chest which he has constructed, as we have no doubt it will be of interest to a large class of our readers.

#### Strength of Barn Roof.

*From* J. H. B., *Empire, Canada.*—I erected a barn this summer which had a 40-foot hay mow. I put in ⅝-inch truss rods in the purlin plates, as indicated in Fig. 1 of the sketches. I am most anxious to have some light on this question of truss work, and want to know if the roof should have any other support. The idea is to have no timbers in the way. The sketch, Fig. 2, gives an idea of the construction in question, this showing the barn to be 46 feet wide and from the plates to the peak 23 feet. I would like to see published the views of some




*Strength of Barn Roof.—Fig. 1.—Side View of Trussed Purlin Plate.*

of the practical readers on improved methods of barn framing, as I think the matter would prove of unusual interest.

#### Why Do Cypress Shingles Check and Split?

*From* L. M. R., *Riverhead, Long Island, N. Y.*—I have a great deal of trouble with cypress shingles checking and splitting, generally over the joint. Will some of the many readers of the paper suggest a remedy, for I have tried all the ways I could think of, but without success?

Speaking of shingles reminds me to say to "G. H. B.," who asked why shingle nails rust, that I have found no trouble with cut nails. Steel wire nails, however, are very liable to rust off just under the head, owing somewhat to the acid used in their manufacture. If the two kinds of nails are put together it will be found that the

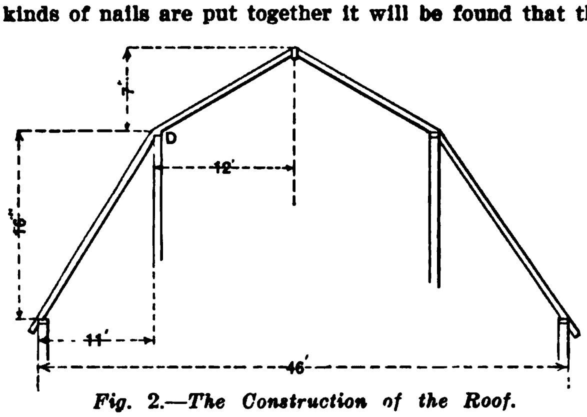



*Fig. 2.—The Construction of the Roof.*

bright wire nails will begin rusting first when both are exposed to the same conditions.

#### Comments on Saw Filing.

*From* S. A. T., *Boyne City, Mich.*—I started to file saws about ten years ago, and I find the best way is to hold the point of the file toward the handle of the saw, keeping the file at an angle of about 35 degrees and level. This leaves the wire edge on the back of the tooth and does not dull the saw when put in the work.

#### Copper Roof for Foundry.

*From* H. B. P., *New Haven, Conn.*—Can any of your readers out of their experience tell me anything about a copper roof? I have found from my own experience and been told by others that these roofs have not always been satisfactory. I have now in mind two or three manufacturers who contemplate using copper in large sheets for foundry roofs.

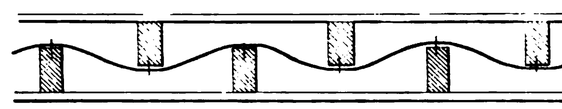
#### The Steel Square in Dividing a Circle.

*From* L. M. R., *Riverhead, Long Island, N. Y.*—I woud like to ask "John L. Shawver" where the steel square comes in when dividing the circle, or does he use a protractor, and why does he use a bevel? I would like to know how many carpenters there are in the country who use a protractor.

#### Making a Division Wall Sound Proof.

*From* B. U. T., *Olean, N. Y.*—Noting the inquiry of "H. S." of Indianapolis in the last issue of *Carpentry and Building* I would suggest that he build his center partition of 2 x 4 studding and fill in with mineral wool.

*From* S. F. V., *Norfolk, Va.*—In the December issue "H. S." of Indianapolis asks how to deaden partition



*Making a Division Wall Sound Proof.*

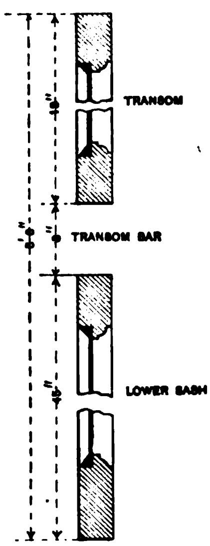
walls. Permit me to say that if he sets his studding as indicated in the sketch and interlaces with sheathing paper as shown by the heavy wavy line, nailing the paper to the studs by means of lath, he will break the vibration in the air space and secure a dead wall.

#### Durability of Shingle Nails.

*From* C. A. C., *Troy, Pa.*—In looking over the December issue of *Carpentry and Building* to-day I find a great deal in the Correspondence Department that is interesting, and I cannot lay it down without saying a word to some of those who ask questions. Referring to the letter of "G. H. B.," page 349, as to the reason shingle nails rust off after being in use anywhere from three to four years, one little word covers the whole secret, and that word is s-t-e-e-l. I am building a 30-foot extension to a stock barn which was erected in 1896, and while the shingles are still in good condition the roof as a protection against rain is a failure, simply because the nails are eaten away by rust just underneath the top shingles. They are cut nails, but they are steel, and on my own house, built 18 years ago, the roof of which I have just been over getting it ready to paint, the nails are all in good condition, except on one gable, in shingling which we used wire nails. Those are gone, and I reshingled it. I desire to say here that it pays to paint shingle roofs. I painted my roof when put on, and it has been painted once since. It is still good, while the same kind of shingles, sliced or cut from steamed bolts, put on the same year and not painted were replaced eight or ten years ago. I am painting my roof now, using boiled linseed oil and Venetian red for it.

Speaking of laying shingles, I can almost always get to the heart, as the woodsmen say, but I hired a famous carpenter the other day who can down me in spite of all I can do. He fills his mouth with nails and can drive them "for fair." I am satisfied if my men put 2000 shingles on a roof and lay them as they should be, but I do not get many men to do more than that. I can go into a house at 7 o'clock in the morning and leave it at 6 at night, and if no other work takes my time I can fit and hang ten doors 2 feet 8 inches by 6 feet 8 inches by 1½ inches, with two butts, but not put on the locks, and can do it easy and follow it up day after day.

I have a way of my own for fitting doors, which is this: I have a Stanley slide rule, and my first operation is to set this between jambs, top and bottom, then transfer this width to the face of my door, pricking same plainly with my knife. I then joint my doors to the width pretty nearly square on the butt edge, bevel enough to clear on the lock edge, and then stand the door in place and scribe the bottom to the floor. I then cut it off and stand it in place and mark both top corners with a knife. I then lay on horses, straight edge from knife marks, and saw off and plane up the top, working from the face of the door all the time. I next stand the door in place and with my knife mark the door and jamb for the top of my upper butt and bottom of the other one. Next, I stand the door on the lock edge, cut in the butts, screw them in place, hang on the door, and nine times out of ten I am done with it, and not ashamed of the job, either. I worked once on a job where one of the men fitted, hung and rim locked 18 doors in ten hours, and they passed inspection, but I cannot do it. I had a man this summer whom I paid 25 cents per door, and he was three and one-half hours putting on a vestibule lock, which I have put on in 30 minutes. He took it very hard




*Constructing a Transom Bar.*

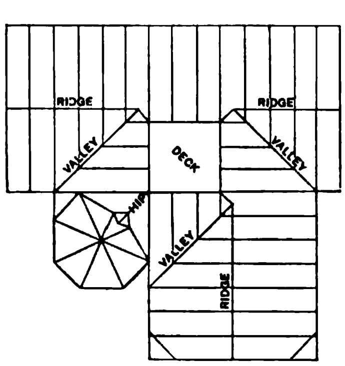
when I told him he must do better on the next one. He told one of the men, for I heard him, that "the boss must have a terrible hurry spell on, for he wanted men to fly," but I noticed on the next job he more than cut his time in half, and so it shall ever be.

**Constructing a Transom Bar.**

*From* M. S. M., *Spokane, Wash.*—Will some reader of the paper explain through the Correspondence columns how to construct a transom bar for a No. 98 window, allowing 3 inches for the bar? I would state that a No. 96 window is what is known as a cottage front sash with transom. The sectional view which I send will perhaps make my needs more clearly understood.

**Solution of Problem in Roof Framing.**

*From* C. B. L., *Yorktown, Texas.*—Complying with the request of "A. S. W.," Shawnee, W. Va., in the October issue, I send herewith a sketch of a roof plan, Fig. 1, for a story and a half house. I also give an elevation, Fig. 2, which may prove of interest in this connection. I think, however, the correspondent should have been more explicit in stating his requirements. He did not give




*Solution of Problem in Roof Framing.—Fig. 1.—Roofing Plan.*

the hight of the walls, so that we do not know how much head room he wants in the half story or how much the second floor should drop below the plate; neither does he say whether or not he desires to use the upper story for a bedroom or whether for ornamental purposes. If he simply wants a dark place in which to lock up the children as a little punishment when they do not behave,

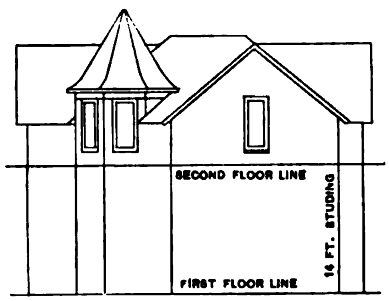
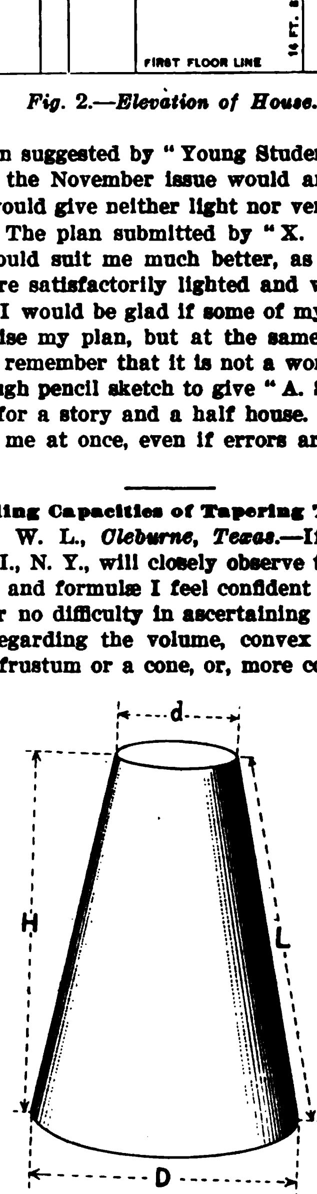



*Fig. 2.—Elevation of House.*

then the plan suggested by "Young Student" and shown in Fig. 2 of the November issue would answer the purpose, as it would give neither light nor ventilation in the half story. The plan submitted by "X. S." and shown in Fig. 3 would suit me much better, as the half story could be more satisfactorily lighted and ventilated from four sides. I would be glad if some of my brother chips would criticise my plan, but at the same time I would ask them to remember that it is not a working plan, but simply a rough pencil sketch to give "A. S. W." my idea of the roof for a story and a half house. Please do not all jump on me at once, even if errors are found in my plan.

**Finding Capacities of Tapering Tanks.**

*From* T. W. L., *Oleburne, Texas.*—If. "B. W." of Mineola, L. I., N. Y., will closely observe the accompanying diagram and formulæ I feel confident he will experience little or no difficulty in ascertaining the desired information regarding the volume, convex or whole surface, of the frustum or a cone, or, more commonly desig-




*Finding Capacities of Tapering Tanks.*

nated, tapering tanks. In determining the gallon capacity of such tanks inside dimensions are required, as this is often more easily done than subtracting the solidity of the tank's body. However, in computing the convex, whole surface or volume, as if it were a solid, outside dimensions are employed. It is required to find the gallon capacity of a tank which measures ($H$) 14 feet 10¼ inches, ($D$) 7 feet 7¼ inches, and ($d$) 6 feet 8 inches; then applying the formula $G = 0.2618\ H\ (D^2 + Dd + d^2)\ (7.48) = 0.2618 \times$ 14 feet 10¼ inches (7 feet 7¼ inches$^2$ + 7 feet 7¼ inches $\times$ 6 feet 8 inches + 6 feet 8 inches$^2$) (7.48) = the answer.

I will give two other formulæ, hoping they will be of benefit to some of the many readers.

To find the convex surface of the frustum of a cone:

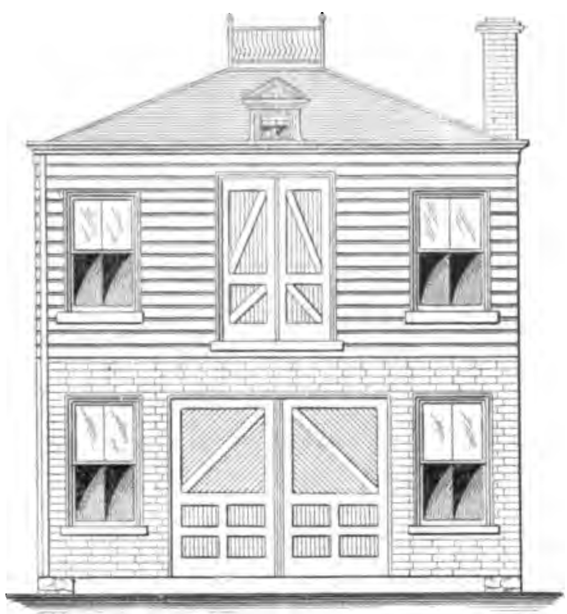
$C = \frac{1}{2} L$ ($P$ + the perimeter) $= 1.5708\ L\ (D + d)$,

and whole surface:

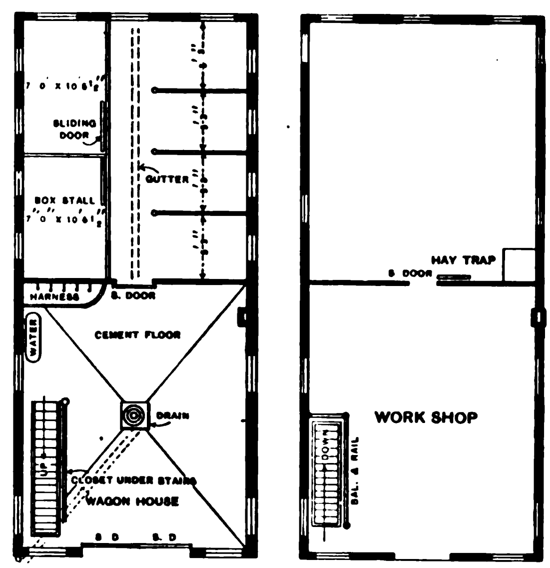
$$S = 1.5708\ L\ (D + d) + 0.7854\ (D^2 + d^2).$$

# DESIGN FOR STABLE AND WORKSHOP.

WE present herewith elevations, floor plans and a few details of construction relating to a two-story building, the lower portion of which is used as a stable and the upper floor as a workshop and hay loft. The first story is of brick, resting on stone foundations, while the second story is covered with German siding and the roof with shingles. The foundation walls are sunk 4 feet 6 inches below grade, as indicated in the sectional view, while the main floor is constructed of 8 inches of broken stone, on which are 10 inches of cinders, this in turn being covered with 4 inches of slag cement and finished with 2 inches of cement, making a total thickness of 2 feet below the sill of the carriage house door. The same method is followed at the front of the building under the sliding doors, only there are 2 inches of cement instead of the several thicknesses already enumerated. There is an iron groove or gutter in the cement work, in which the doors slide, the cement extending for several feet outside of the line of the front of the building. A cross section through this sliding door gutter is presented in the details.



Front Elevation.—Scale, ⅛ Inch to the Foot.




Main Floor. Second Floor.
Scale, 1-16 Inch to the Foot.

*Design for Stable and Workshop.—John J. Brown, Builder, Germantown, Philadelphia, Pa.*

The building here shown was erected not long since in Germantown, Pa., by John J. Brown, of that place, at a cost of practically $2000. The cost of excavating, together with the stone and brick work, was $380; the lumber amounted to $338.85; the mill work cost $261; the plumbing and sewer drainage, $120; the carpenter work, $350; the iron work, $125; the cement work, $45; the hardware, $40; the tin and spouting work, $77, and painting and glazing, $178.

## Sheet Metal Building Construction.

Sheet metal has been used for a number of years in many forms of architectural construction, but the general opinion among those not well acquainted with the architectural possibilities of this material seems to be that it is suited rather to the cheaper class of buildings and to temporary structures than to anything elaborate or permanent. That such is not the case is attested by many fine examples of sheet metal ornamentation used on costly buildings. Moreover, there are a number of handsome buildings scattered throughout the country that are constructed of sheet metal. Conspicuous among these is the Central Congregational Church, located in a fashionable residential section of Brooklyn, N. Y., on Hancock street, facing Sterling Place. It is one of the largest churches in Brooklyn, having a seating capacity of nearly 2000 people. This church, although built more than 30 years ago, shows no sign of deterioration. In fact, it compares more than favorably with many stone or wooden buildings of the same age. The stone buildings have become discolored with age or disfigured by cracking, while most wooden buildings of the same age are beginning to show signs of decay. As regards the cost, including the initial outlay and the subsequent expense for maintenance, the sheet metal structure shows up very favorably in comparison. The first cost, as compared with that of a wooden structure, is about the same, and it is considerably less than the cost of a stone or brick building. The expense for repairs during the 30 years of the church's existence has been insignificant, except for an occasional repainting, no extensive repairing having been done in that time.

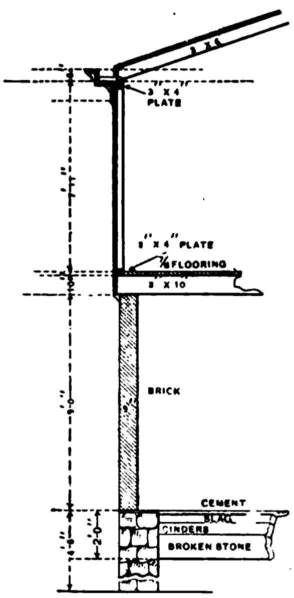
The frame work of the building is of the same character as is used in wooden construction. This frame work is covered on both sides with strips of corrugated iron, the corrugations running up and down, with windows and door frames made of galvanized iron. The ornamental and supporting columns, of which there are a large number on the outside, are covered with corrugated iron and are surmounted by Corinthian capitals, which give them the appearance of marble columns. The friezes, cornice and pinnacles are made in like manner, with sheet zinc ornamentations. The steeple is a striking piece of architectural work, having many minor pinnacles. This is surmounted by a large metal star having six points. In the interior of the building the same general scheme is followed. The side walls are of corrugated iron and the columns supporting the gallery are constructed in the same manner as those on the outside of the building. The fronts of both the gallery and the pulpit are decorated by ornamental stamped sheet metal work, the ceiling being of the same material. This gives a very pleasing effect to the interior.

It will be seen by this that sheet metal building construction is not a thing of such very recent date, and also that, when tried by time, it justifies the claims of the advocates of this form of construction.

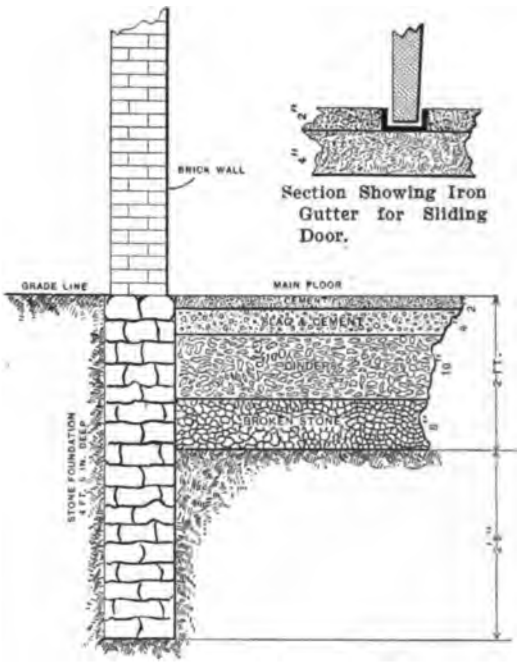
## Wages and Cost of Living.

The eighteenth annual report of Commissioner of Labor Carroll D. Wright, just issued by the United States Department of Commerce and Labor, gives the result of an inquiry into the cost of living since 1896 as compared with the average wage rate in the same period. The report is the result of a very detailed and careful investigation of 519 occupations representing 67 industries in 3429 separate establishments. The report shows that since 1896 wages have increased 16.6 per cent., while the cost of living for working men's families having under $1200 income per year, has increased 15.5 per cent. In order to arrive at this average increase, the Labor Bureau ascertained the minimum and expenditure in detail of 2567 families in 33 States, the retail prices of food and other necessaries of living being considered.

As an indication of the improved condition of wage earners, it is shown that in the establishments that have been running continuously from 1890 to 1903, the aggregate of the wages paid in 1903 was 45.1 per cent. greater than in 1896, and 54.4 per cent. greater than in 1894. In all of these establishments the number of employees in the trades entering into the statistics of the Bureau was 26.6 per cent. greater in 1903 than in 1896, and 34 per cent. greater than in 1894. These figures indicate that although the price of living has risen materially in recent years, the average income of wage earners has increased in still greater ratio, so that the present condition of labor generally, as compared with ten years ago, is unusually favorable.

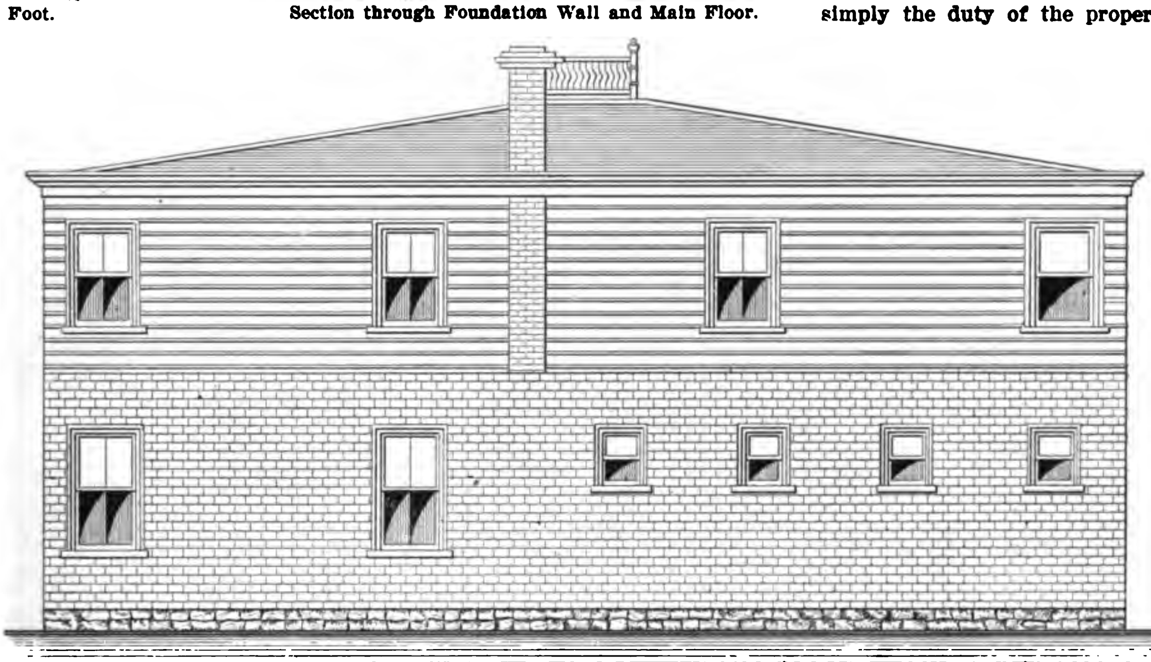



Section of Building.—Scale. ⅛ Inch to the Foot.




Section Showing Iron Gutter for Sliding Door.

Section through Foundation Wall and Main Floor.



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

*Design for Stable and Workshop.*

## Sensible Labor Epigrams.

The Chicago *Chronicle* is sending out to manufacturers who will promise to distribute them among their workmen envelopes containing neatly printed cards bearing epigrams on the labor situation. Many manufacturers are availing themselves of this method of talking to their workmen. Following are quotations from some of the cards:

"The same law which gives one man the right to quit work gives another man the right to work."

"To quit work is one thing; to prevent other people from working is another thing. No strike in Chicago contemplates merely the quitting of work. Its real purpose is to prevent anybody else from working."

"No union button gives a man a right to live and to work in peace. While this right is obscured at times, it exists and it is protected not by union buttons as big as butter plates, but by the Constitution and the laws."

"Is that labor free which, on the one hand, must submit to assessments in order to secure work, and which, on the other, refusing to share with idlers its earnings, is hunted with guns and bludgeons like an outlaw?"

"Arbitrate? There is no question for arbitration where there is organized violence and lawlessness. There is no question at all. It is simply the duty of the proper officers to restore order and peace and obedience to law and authority."

"Is it not common sense that under American institutions the majority shall rule, and rule by the orderly machinery of established government? Is it not common sense that trade disputes shall not be suffered to annihilate the peace of an entire community and throttle the law?"

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A SCHOOL HOUSE now in course of erection in New York City will, when completed, be the largest public elementary school in the world and the first of its type.

# WHAT BUILDERS ARE DOING.

THE reports which have come to hand since our last issue went to press indicate a most gratifying degree of activity in the building line with good prospects of its continuance on an increasing scale the coming spring. Most of the advices point to a larger volume of business at this season than was the case during the corresponding period last year, and it is only in a few instances that there has been a falling off in the amount of work under way. This shrinkage as compared with a year ago is due to a variety of causes, but principally to local troubles in the labor world.

### Baltimore, Md.

Building has been very active during the past season, and the improvements in the burnt district have progressed beyond the expectations of those who took into account the obstacles which presented themselves shortly after the conflagration which visited the city in February. It must not, however, be inferred from this that the district has been fully rebuilt, as there yet remains a vast amount of work to be done. One of the difficulties with which builders and contractors have had to contend were the strikes which deprived property owners of hundreds of thousands of dollars' income. While a severe winter would greatly retard building operations, the feeling prevails among the architectural profession and the building trades that the spring will bring unprecedented activity.

The members of the Builders' Exchange and their friends to the number of about 125 went to Prospect Park on Back River, Saturday, December 3, and enjoyed what the committee in charge of the affair was pleased to designate as an "oyster roast," the *menu* consisting of oysters served in about every conceivable form, sauerkraut, smoked sausages and pig tail. After the pangs of hunger had been satisfied, 16 of the members with racing instincts engaged in a foot race, the winner to receive the gate receipts in the form of the fees charged for entrance in the contest. The prize went to Clarence Stewart, while second honors were secured by William Walter Garthe. A second attack was then made on the replenished stock of oysters, after which popular songs were rendered, and impromptu speeches made by John J. Kelly, president of the exchange; J. Henry Miller, president of the Master Builders' Association; City Councilman George W. Howser, and others. Notwithstanding the inclement weather the members had a very enjoyable day, and returned to the city about 7 o'clock in the evening.

At a special meeting of the Board of Directors of the Builders' Exchange held on November 24 a set of resolutions was adopted as a tribute to the memory of Samuel B. Sexton, Jr., who died suddenly on November 22. He was one of the most active members of the exchange, and was president of that body in 1895-1896. He was also for many years a member of the National Association of Builders, and at the time of his death was its second vice-president. Mr. Sexton was widely known in the stove trade as the head of the S. B. Sexton Stove & Mfg. Company. It is interesting in this connection to note that S. B. Sexton, Sr., was the original manufacturer of what is commonly known as the "Baltimore heater."

### Chicago, Ill.

There appears to be no cessation of building operations in and about the city, and the volume of business is on a scale which is likely to make the year one to be pleasantly remembered by contractors and builders. The figures for November are in excess of any corresponding month since 1891, permits having been taken out for 631 buildings, having a frontage of 19,990 feet and estimated to cost $5,785,-150. The totals compare with permits for 564 buildings having a frontage of 15,777 feet and costing $2,965,080 in November of last year.

Taking the records of the Department of Building for the 11 months, it is found that permits have been issued for 6772 buildings, having a frontage of a trifle over 200,000 feet and involving an estimated outlay of $41,570,940, as against 5790 buildings, having a frontage of 164,192 feet and costing $31,676,950 in the first 11 months of last year. The prospects for the future are of an encouraging nature, and it is felt among architects, builders and contractors that the coming spring will witness a marked degree of activity in the building line.

### Cleveland, Ohio.

The annual meeting of the Builders' Exchange was held on November 14, President William H. Hunt being in the chair. It was a most interesting occasion, a number of timely topics being discussed and matters of importance to the building trades very generally considered. There were reports from the Finance Committee, the treasurer, the Entertainment Committee and the Committee on Rooms, all of which were received with marked attention. Considerable time was devoted to the report of the Committee on Building Code, which was presented by Chairman Arthur Bradley and which dealt with the enactment of the code law by the said council. A comprehensive report as to what had been accomplished by the Committee on Smoke Prevention was presented by C. B. Lewis, chairman, and indicated the introduction of a large number of appliances for preventing smoke throughout the city. Secretary Roberts presented the report of the Board of Directors and in it gave a very interesting account of the doings of the exchange the past year. An important accomplishment was the organization of the Executive Board of Building Trades Employers for the better protection of contractors' interests. In concluding the report the directors said: "We believe that the Builders' Exchange of Cleveland as now developed is admirably equipped and adapted to the fullest possible use of its members for their advantage and profit. Not only this, we believe that in shaping the character and material aspect of the greater city this association of builders is to have a conspicuous part and will be found ready and willing to perform every task looking to a more perfect and architecturally more beautiful Cleveland."

The event of the evening was the address of President Hunt, who has held the office for the past four years, he taking as his theme "Cleveland's Possibilities in the Development of Municipal Art." What he had to say was received with marked attention on the part of his hearers, and there were frequent demonstrations of appreciation of the points upon which he touched. After the address had been concluded, E. H. Towson, who was the first president of the organization, presented Mr. Hunt, on behalf of the exchange, with a silver loving cup in appreciation of his services during the past four years as presiding officer.

The annual election of the Board of Directors for the ensuing year was held during the day named and resulted in the following selection: H. C. Bradley, Harry Gillett, F. C. Hogen, W. H. Hunt, John Leese, W. B. McAllister, Stephen Mills, Max Myers, Henry G. Slatmeyer, George B. McMillan and J. C. Norton.

At noon on Thursday, November 17, the Board of Directors organized by choosing the following officers: President, W. B. McAllister; vice-president, Harry Gillett; treasurer, F. C. Hogen; secretary, E. A. Roberts, and assistant secretary, Lester M. Harris.

In this connection it may be remarked that Mr. McAllister is the youngest man ever chosen for the position of president of the exchange. His father, the late Col. A. McAllister, was one of the most prominent contractors in the early days of Cleveland and held various offices in the local exchange. He was also prominently identified with the National Association of Builders, and erected many of the largest buildings in the city. The newly elected president has been a member of the exchange for some yars. He is secretary of the Building Trades Employers' Executive Board. He is also president of the W. B. McAllister Company, which operates a planing and finishing mill in the city and handles large building contracts. In honor of the new president and of retiring president Hunt a luncheon was given in the Chamber of Commerce Café directly after the Board of Directors had organized.

As soon as possible after the annual meeting President McAllister appointed the various standing committees for the year, making their composition such as to fairly represent the different branches of the building industry. The committees with the names of the chairmen are as follows:

Finance Committee—C. H. Carleton, secretary and treasurer of the Mills, Gray, Carleton Company.

Entertainment Committee—Charles W. Taylor of the Sterling & Welch Company.

Membership Committee—J. H. Collister, vice-president and treasurer of the Davis, Hunt, Collister Company.

Legislative Committee—J. A. Erner, president of the Erner Electric Company.

Rooms Committee—George H. Morse, secretary and treasurer of the George H. Morse Company.

Arbitration Committee—R. R. Wills, painting contractor.

Acquaintance and New Members Committee—George Y. Farmer of Younger & Farmer, carpenter contractors.

Special Code Committee—Arthur Bradley, chairman, manufacturer's agent.

Public Buildings Committee—L. N. Weber of the Weber, Lind & Hall Company, decorators.

Smoke Prevention Committee—C. E. Lewis, chairman, engineer.

The number of committees is the same as last year, the special committee on the new building code, the one on public buildings and that on smoke prevention being reappointed in recognition of their efficient service.

The new building ordinance of the city, which has finally been passed, provides that the Department of Buildings shall be composed of an inspector, a deputy inspector, a secretary, an inspector of iron and steel and masonry, carpentry, heating and elevators, a stenographer and such other officers and employees as the council may from time to time prescribe. The inspector must be either an architect, civil engineer, general building contractor or general superintendent of building construction of not less than ten years' experience in his profession or occupation. All the deputies must be men experienced in their various lines and trades.

### Evansville, Ind.

The Builders' Exchange held its regular meeting for the election of new officers on Thursday, December 1, resulting as follows: S. G. Rickwood, president; William Bedford, vice-president; C. H. Hitch, secretary, and H. C. Kleymeyer, treasurer.

The directors elected were George W. Goodge, Hans Lohse, Will Greiner, C. F. Kervis, David Heimen, Jr., and Sam. Schmitt.

The building prospects for 1905 are considered very good, and the indications are that the volume of business will exceed that of 1904. The weather has been thus far favorable for outdoor work, and there has been little or no trouble with labor, so that matters have progressed very satisfactorily. It is estimated that the amount of building in 1904 was something like 70 per cent. in excess of that of 1903. Among the work has been several large Government buildings. The Builders' Exchange now has on the tables a set of plans for a bank, and another for a depot, which will be erected in the near future.

### Los Angeles, Cal.

During the month of November the building inspector issued permits to the number of 695 for buildings, to cost $1,534,152, as compared with 649 permits for improvements, aggregating $1,183,814 during November, 1903. In November, 1902, the number of building permits issued was 496 for improvements, aggregating $1,129,954. The improvements for November, 1904, include, among others, a seven-story brick building. valued at $200,000; one six-story brick building, valued at $70,000; one five-story brick building, valued at $52,000; eight three-story brick buildings, valued at $189,366; six two-story brick buildings, valued at $59,-215, and four one-story brick buildings, valued at $10,464. The frame construction included 78 two-story residences, valued at $282,182; 33 one and one-half story residences, valued at $66,535; 365 one-story frame residences, valued at $347,481; 14 frame flats, valued at $67,932, and three apartment houses, valued at $28,000.

For the fiscal year ending November 30, 1904, the total number of building permits issued was 7040, the improvements authorized aggregating $12,892,479. This exceeds by about 600 the number of permits issued during the fiscal year ending November 30, 1903, but the total value of the improvements authorized is about $300,000 less than for 1903. Builders express themselves as more than satisfied with the showing made, as work has been active throughout the year and is active at the close. In fact, the amount of building now contemplated, for which permits will be taken out during December will, it is claimed, largely increase the monthly average for the year. There has been a noteworthy increase in building in all the surrounding towns tributary to Los Angeles. Pasadena, Long Beach, Santa Monica, San Pedro and other towns have all shown great activity, and Los Angeles builders are turning considerable attention in that direction.

### Manila, P. I.

The report of the Bureau of Engineering and Public Works shows that the permits for buildings for the fiscal year ending in 1904 amounted to $4,290,245. This amount is $378,783 less than for the similar year ending in 1903. Architects are now on the way from the United States who will plan and supervise the construction of a new and model city in the Philippine Islands. This city will be located at Geguio in the Province of Bunguet, 100 miles north of Manila and 4500 feet above the sea level, in a little valley where the hygienic conditions are claimed to be perfect. In this city, when constructed, the greater portion of the white population of Manila will reside during the hot summer months. The building of the city will be under the general supervision of Daniel H. Burnham, who planned the Chicago World's Fair. Beside the work at Geguio, a considerable amount of public building is to be done at Manila, where new administration buildings, a governor's mansion, a public library building, public baths, &c., are to be erected.

### New York City.

The local situation shows little or no change as compared with a month ago, building operations being conducted on a scale which in the aggregate is not much under that of last year. This is due, however, to the unprecedented volume of building which has been in progress above the Harlem River in the Borough of the Bronx, as it is here that flat houses have been erected upon a scale never before known in the history of that section of the city. Some idea of the magnitude of the operations in this part of Greater New York may be gathered from the statement that for the first 11 months of 1904 the total amount of new buildings projected was $20,451,830. while in the corresponding months of 1903 the value of the improvements was placed at $6,809,864. For the Borough of Manhattan, the figures for the first 11 months of 1904 show the estimated cost of new buildings to have been $69,887,860, as against $70,063,-000 in the corresponding period of 1903. From these figures it is seen that the total for 1904 is appreciably in excess of that of the year before.

The new secretary, P. K. Stephenson, of the Building Trades Employers' Association, is taking steps to extend the organization all over the city, and to make it the Greater New York Building Trades Employers' Association. It will be remembered that Mr. Stephenson was formerly connected with the Builders' Exchange of Pittsburgh, and was instrumental in largely increasing the membership of that organization. He expresses the view that in the near future all the building employers in the boroughs outside of Manhattan will join the organization.

### Philadelphia, Pa.

In certain wards building operations continue upon a scale which indicates that the record for the year is likely to be the largest in the history of the city, at least so far as regards the number of dwellings erected. During the month of November the Bureau of Building Inspection issued 669 permits covering 1018 operations, and calling for an estimated expenditure of $1,576.170. As indicating the degree to which dwellings are being erected it may be stated that the permits issued for these structures called for an expenditure of a trifle over $700,000; nearly $300,000 was for alterations and additions to buildings, and $230,000 was for manufactories. The greatest amount of work was done in the Twenty-seventh Ward, with the Thirty-third, Thirty-fourth and Thirty-eighth next in rank. The totals above enumerated compare with 602 permits, covering 911 building operations, and estimated to cost $1,472,165 in November of last year. For the 11 months the Department issued permits for 6497 dwellings, estimated to cost $14,-995,015. Of these 5779 were two stories in hight and 693 were three stories in hight. These figures show a large increase over the corresponding period of last year, when 5181 dwellings were erected at a cost of $11,342,205.

The members of the Builders' Exchange are looking forward with much interest to the annual celebration of the last day of the year and for which an appropriation was made at a recent meeting of the Board of Directors. On December 13 the board elected C. L. Leiper to fill the unexpired term of the late George M. Lewis.

### Pittsburgh, Pa.

Indications point to continued activity in the building line during the coming months, as architects are busy, and the permits which are issued from day to day by the Bureau of Building Inspection show that much new work will be undertaken in the near future. During November 262 permits were taken out for building improvements estimated to cost $824,067, of which amount $746,839 apply to 167 new buildings. Of the new structures, 34 are of brick, 74 of frame and 51 of brick veneer. In November of last year there were 110 permits less than November of the current year and the estimated cost was $22,830 less. Contractors and builders are of the opinion that the coming spring will be one of the most prosperous in building circles Pittsburgh has known for many a day. It is thought that by March 1 at least $500,000 worth of new construction work will be put under way.

Some of the work that is under construction and which it is expected will be completed during the new year includes four new public schools to cost $600,000; a business block on Fifth avenue to cost $200,000; the Elks Temple, $90,000; Masonic Temple, $100,000; post office building, $90,000; Hebrew synagogue, $50,000; Donovan & Ekin, business block, $50,000; W. F. Delaney, commission house, $50,000; T. L. White, apartment house, $50,000; James E. White, business block, $25,000; M. Levy, business block, $30,000; I. A. Aaron, business block, $50,000; M. Keller, business block, $15,000; Wesley Soles, business block, $15,000; Congregational Church, $12,000; two Methodist mission schools, $8000.

Among the prominent building operations for the early spring is that of C. R. Miller & Co., the builders who have recently finished 34 brick dwellings on the site of the old Charity Hospital in the Nineteenth Ward. This concern has purchased a plot of ground diagonally opposite to this site and it will be divided into 30-foot lots, on which brick dwellings will be erected at a cost of about $8000 each.

In what is known as Montooth Borough important building operations are in progress, and it is intimated that before spring opens an improvement company will erect 25 dwelling houses, making use of the new cement block construction. The fronts will be of bright red sandstone, and the houses will be built in rows, each occupying a lot 25 x 100 feet. The company has its own plant for the manufacture of the cement blocks, and is turning out the blocks 28 x 10 x 12 inches in size at the rate of 600 every ten hours.

An interesting phase of the recent building situation is found in the activity prevalent in what is known as the Squirrel Hill District. Something like 50 new houses have just been or are being completed, the major portion of them costing rather less than $10,000 each, while a few run over $20,000. One contractor is putting up 15 houses on Denniston avenue, which will soon be ready for occupancy. The new dwellings are of modern design, and are attractive additions to the residential section.

At Monessen there has been an unusual amount of building in progress, and it is estimated that fully 100 dwelling houses are under construction besides large business blocks and a hotel. It is thought that the stimulus recently noted in real estate operations has been due in large measure to the report that the American Steel Hoop Company is to centralize its hoop mills in Monessen.

A large amount of building is in progress in Homestead, where hundreds of men are being employed and many new houses, stores, halls, &c., are in process of construction. Some of the new work includes a new opera house, ten store buildings, a new municipal hall, several small size office buildings and an Odd Fellows' hall. All branches of the trade are active, and the outlook is encouraging.

### Portland, Ore.

Aside from the unusual stimulation of building, owing to construction work on the Lewis & Clark Exposition, a great deal is being done in a general way here. Builders report that considerable attention is being given to a more expensive class of residences. At the present time there are in the neighborhood of 75 unfinished buildings under way, ranging in cost from $1000 to $50,000. Business building seems to be confined largely to two and three story brick structures. The only building of extra large size which has been undertaken during the last few weeks is the Elk building, which is to cost in the neighborhood of $70,000.

Construction work on the buildings of the Lewis & Clark Exposition is proceeding rapidly, and most of the larger structures will soon be completed. Several are already finished as far as the exterior is concerned. The Agricultural Building, the Foreign Exhibits Building and the Liberal Arts Building are already roofed over, and will begin to receive exhibits very shortly.

### San Francisco, Cal.

Building operations have fallen off to some extent owing to the approach of winter, but there is, nevertheless, a great deal of work in progress, as the result of the remarkable activity which prevailed during the summer. Contractors report very few idle men, and expect to keep average forces at work throughout the greater part of the winter. A great many plans are being drawn for residences and apartment houses, the construction of which will be begun in the early part of the year. The impression prevails that the building of large business blocks, which has characterized the last two years, will hardly be so active during 1905. Several of these, including the Merchants' Exchange Building, the James Flood Building and the Fairmount Hotel, are now completed, save for the interior finishing. The Union Trust Building is also nearing completion, as are several other buildings in the wholesale and retail sections of the city. The completion of a large number of handsome modern office buildings will, it is believed, lead to the expenditure of large amounts next year in the reconstruction of older buildings which are being left vacant owing to the attractiveness of the new structures in the office district. There is considerable talk among investors on account of the alleged high cost of building in the city, it being claimed by many and even by some builders that the prevalence of union rule in the city renders the cost of building considerably higher than is the case in Los Angeles, where the "open shop" system generally prevails.

Dr. Herbert E. Law is now having plans drawn for the construction of a new ten-story steel and stone fire proof office building on Market and Anna streets, San Francisco. Other buildings, the plans of which have just been drawn, include a large modern office building at the corner of Sutter and Powell streets, by the Real Property Investment Corporation, and a new bank building by the Columbus Savings Bank, on Washington and Montgomery streets. The former structure will have a frontage of 161 feet on Sutter street and 77½ feet on Powell street.

### Seattle, Wash.

During the month of November 587 building permits authorising improvements to the amount of $462,930 were issued by the city authorities. This amount is somewhat less than the expenditures authorised during October, and it is also less than those authorised in November, 1903, when a permit was taken out for the Seattle Government Building, to cost in the neighborhood of $700,000, and this one item served to swell the record of that month. Aside from that building, the value of the work undertaken during November, 1904, was more than twice that undertaken during November, 1903. The construction work for 1904 included one three-story brick building, valued at $20,000; two one-story brick buildings, valued at $12,475; one three-story frame building, valued at $16,000; 45 two-story frame buildings valued at $220,510; 47 one and one-half story frame buildings, valued at $61,960; 96 one-story frame buildings, valued at $73,145; 173 alterations, valued at $30,665, and a large number of sheds, repairs and miscellaneous work.

Building is expected to fall off from now on until the coming of better weather in the spring, when a good deal of activity is anticipated. A large amount of important building work is now practically tied up, awaiting a decision from the City Council as to changes of grades and improvements of streets. Permanent grades are wanted on a number of streets, which it is anticipated will be regraded shortly.

### Tacoma, Wash.

In spite of the rainy weather which prevailed during the greater part of November, building has been brisk, and has shown a very large gain over the same month last year. During the month 119 building permits were issued for buildings to cost $219,675, as compared with a total cost of $122,225 for November last year. The principal feature of the building for the month was the beginning of construction work on the Tacoma High School, to cost $150,000, and the undertaking of work on 62 dwellings, to cost $64,450. The other work consisted of alterations, repairs, foundations and minor buildings. Building shows some falling off at this season of the year, and it is not expected that any pronounced revival will be noted for several months.

### Notes.

The Houston Builders' Exchange of Houston, Texas, filed articles of incorporation with the Secretary of State at Austin on November 26, the incorporators being W. W. Wilson, C. C. Wensel, E. Y. Hartwell, W. H. Huffaker, F. J. Marett, John R. Morin, E. Necco, William Ware, John Rudersdorf.

The Massachusetts State Association of Master Builders held its annual meeting at Worcester, that State, on Wednesday, November 16, and elected the following officers: President, H. C. Wood of North Adams; vice-presidents, A. B. Murdaugh of Watertown, and J. A. Jackson of Brockton; secretary-treasurer, H. M. Sweetser of Worcester.

The Commissioners of the District of Columbia recently granted a hearing to representatives of the Master Builders' Association relative to the proposition that Congress be asked to establish a board to examine and license builders in the district in order to insure safe and proper building construction in the city of Washington. It is proposed that the license fee be $25 per year, and that the examining board consist of two architects, two master builders and the district building inspector or one of his assistants.

# LAW IN THE BUILDING TRADES.

#### CONSTRUCTION OF PRINCIPAL CONTRACT BINDING ON SUBCONTRACTOR.

Where a building contract required the contractor to make certain excavations, and a subcontract for such excavations bound the subcontractor to do the excavating, grading, &c., for the building complete, in accordance with the drawings and specifications of the architect, and according to contract between the owner and the contractor, a construction of the contractor's contract as to such excavations was binding on the subcontractor.—Roberts *vs.* Koss (Ind.), 70 N. E. Rep., 185.

#### THE ARCHITECT IS LIMITED BY TERMS OF CONTRACT.

Under a building contract providing that if the work should be delayed by causes beyond the contractor's control, the architect might make an allowance for the delay, provided written notice be given at the time of the delay, and that a stipulated sum should be paid for each day the building remained unfinished after the stipulated time, if the architect certified that completion could have been accomplished by the time named, the architect had no right, in making a certificate as to the time when the building could have been completed, to consider any delay for which the contractor had not given written notice as required by the contract.—Davis *vs.* La Cross, &c. (Wis.), 99 N. W. Rep., 351.

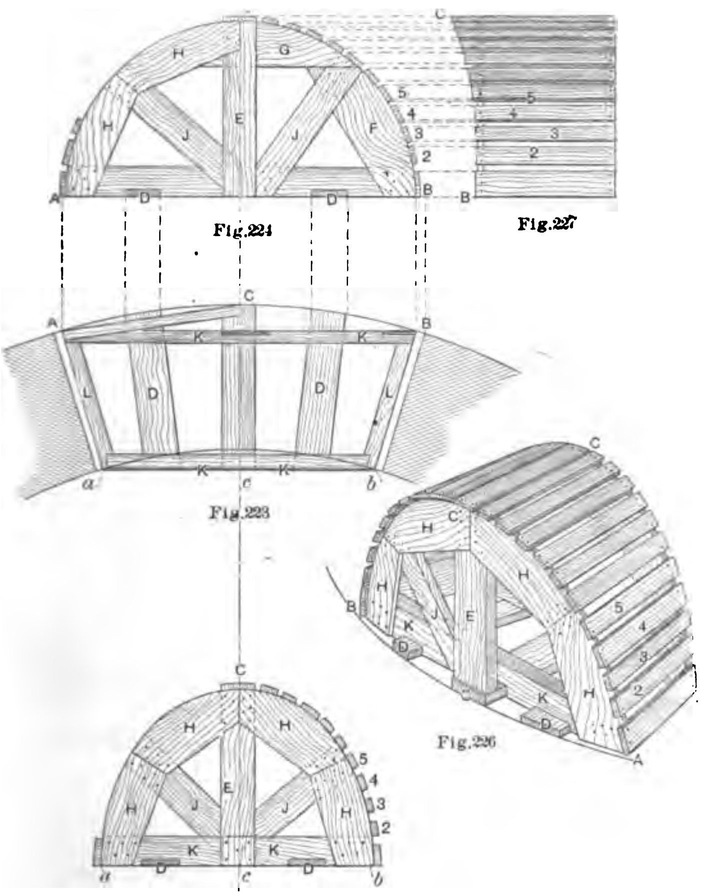
#### RATIFICATION OF VERBAL ORDER FOR EXTRAS A WAIVER OF REQUIREMENT.

Where a building contract provided that no payment should be made for extra work unless done on the written order of the architect the owner was liable for extra work where he ratified a verbal order for same by the architect.—Cronin *vs.* Still (Tex.), 79 S. W. Rep., 1074.

# LAYING OUT CIRCULAR ARCHES IN CIRCULAR WALLS.*—XXIV.

**By Charles H. Fox.**

IN the concluding chapter of this somewhat lengthy series we shall consider the construction of the centers required for a radiant arch. The illustrations presented herewith show the nature of what are termed "centers," these being the supports of stone or brick arches during the progress of their construction. The center is made of rough lumber, and generally by the carpenter, but we have thought it advisable before closing the series to explain a simple method by which the stone cutter may construct the centers he may at any time require for a radiant arch. We might refer him in this connection to the works of Tredgold, Tarbuck and others who have written scientifically on the art of carpentry




Figs. 223 to 227 Inclusive.—"Centers" for a Radiant Arch.

*Laying Out Circular Arches in Circular Walls.*

and where he will find the tables, &c., by means of which he will be enabled to calculate the strength of timbers to support the superincumbent weights which the centers will be called upon to bear. It may, however, be observed that the requisites of a center are strength and the means of keeping the stones of the arch in exact position during the work of erection. The precise curve of the soffit is assumed to have been determined before working the stones to their proper shape. The use of wedges under the center greatly facilitates the removal of them, and gives an opportunity by gently slacking them to allow the subsidence, if any, to distribute itself over the entire arch. Great care should be taken that it is not "struck" or removed too early—that is, before the work which is constructed upon it has thoroughly set and obtained the proper adhesion and bearing of one part with another. An absence of the requisite attention to this important point has occasioned failures in many instances.

When the arch is situated in a circular wall having a flat curve, so that the crown of the arch does not project more than ½ inch beyond the chord or opening line, which may be drawn at the face of the jambs, two segment heads will be sufficient, one at the face and back, as in the center required in connection with an ordinary arch in a plain wall. If, however, the arch is situated in a wall having a quick curve—that is, the radius with which the outer face line may have been drawn is a short one and the opening a wide one, it will be advisable to construct two segment heads at the front, one at the opening line A B of Fig. 223 and the other at the chord line A C, then, by putting in a vertical and two angle braces, as shown by E J J of Figs. 224 and 226, a substantial center may be constructed. The curve which gives the direction by which to saw out the segment over A B will be concentric to the directing curve of the soffit. A distance equal to the thickness of the battens, as 2, 3, 4, &c., of Figs. 224, 225 and 227, together with the space allowed for wedges, must be deducted from the radius with which the directing curve of the soffit may have been drawn. Say, for instance, the directing curve is a semicircle, the opening at the outer face equals 6 feet 6 inches; the radius of the directing curve, therefore, is 3 feet 3 inches. Now, assume the thickness of the battens to be 1½ inches, the space allowed for wedges is 1 inch, then the total to be deducted equals 2½ inches, giving a total of 3 feet ½ inch as the radius with which to draw the curve required at the segment from A B, the opening line. The segment required at the chord line A C will be a quarter ellipse, of which A C is one semiaxis and 3 feet ½ inch the other.

The curve required at the segment H H H H of Fig. 225 is a semiellipse, of which *a b* equals the minor axis and 3 feet ½ inch the semimajor axis. Now, having projected the curves, divide A C B, of Fig. 224, into the same number of parts as there are battens, in the manner explained for a like operation in the construction of face molds. Project each point into Fig. 225, which will give the required positions of the battens at the small segment. Before starting to nail on the battens notice the segments are placed plumb and in their proper and relative positions to each other.

It may be well to bear in mind that in setting the separate stones of which the radiant arch may be composed the trammel cannot be used in the manner generally employed when setting an ordinary arch. Therefore the setter has in a great measure to be guided in his work by the direction given by the center. It is obvious that this should be constructed in as true a manner as possible, and care taken to place it in its proper position in the opening. If these simple matters are attended to the setter's labors will be very greatly facilitated.

## Elastic Roofing Nails.

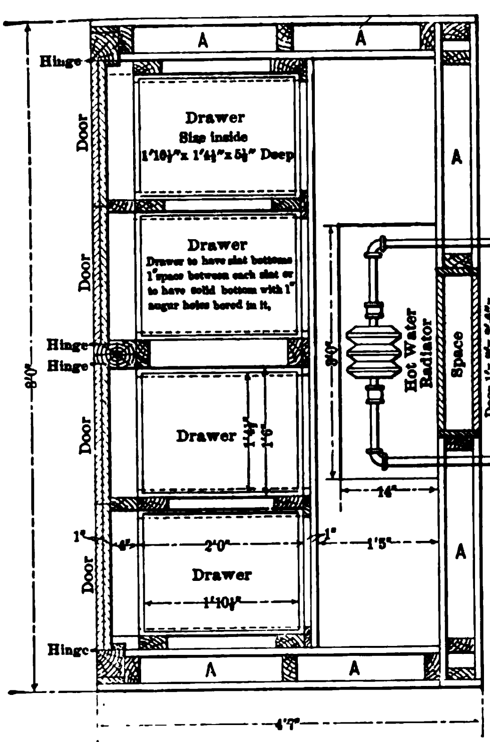
Frank Gold, Richmond, Victoria, Australia, has invented and patented in all of the principal countries of the world an elastic roofing nail, which, when driven through corrugated iron roofing, adapts itself to the corrugations, making a water tight union, with no danger of the washer flattening out or getting loose. Mr. Gold has for many years been interested in the production of roofing nails, and has introduced a number of improvements along this line. When the population began to flow into Western Australia, owing to the discovery of gold, Mr. Gold recognized the need of a light, substantial roofing nail. The nails then on the market ran from 20 to 30 to the pound, and it cost about 25 cents for freight alone to deliver a pound of these nails at the gold fields. Mr. Gold then invented and patented the solid head roofing nail which runs about 90 to the pound, and secured a large number of sales all over Australia. While experimenting with some of them one day, he was impressed with the idea that a thin washer added to the solid head and galvanized on after being made would prove a great advantage. A number of such nails were made and tested practically, with such satisfactory results that the idea was patented, and the nails are now being sold in large quantities throughout the Australasian colonies.

* Copyright, 1902, by Charles Horn Fox.

# HEATING A DYNAMITE STORAGE HOUSE.

Whenever an important step is taken in any field the tradesmen likely to profit should know about it, and this is my incentive to present a description, with plan and elevation, of a little structure and its heating plant designed to store and thaw out dynamite, says a correspondent in *The Metal Worker, Plumber and Steam Fitter.* In recent years dynamite has been far more generally used than the public is aware of, and carelessness in handling the explosive, which comes from too great a familiarity with it in everyday work, has led to many accidents and to frequent injury with loss of life to those who were utterly unaware of any danger. Wherever excavations have to be made in rock or the harder soils, dynamite is the modern pickaxe, and, used by the pickaxe man, it receives none too intelligent handling, to the menace of his own life and that of all within the range of its power.

Immense quantities of dynamite were used in New York City in the excavations for the subway, and in blasting the foundations for many large buildings the



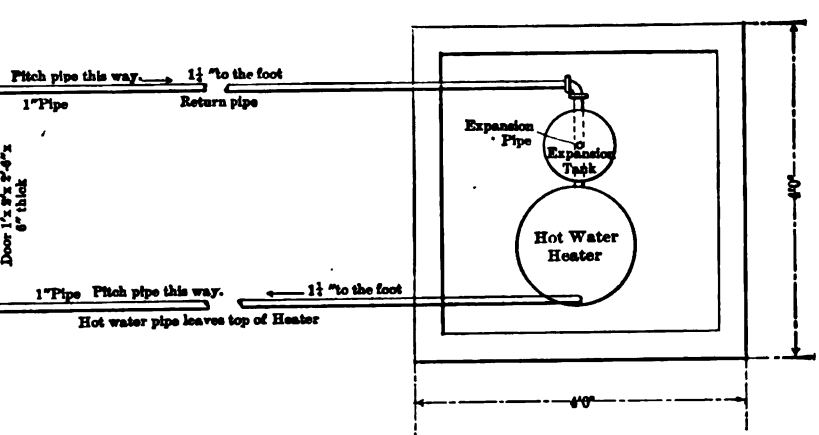




Fig. 1.—Plan of Dynamite House, with Heating Connections.

*Heating a Dynamite Storage House.*

frequent flying of dangerous missiles on its explosion having constrained the authorities to insist upon greater care in the storage, handling and use of the substance, for the protection of the public. Frequently items appear in the daily press telling of workmen having grown careless from long familiarity and constant handling of dynamite, losing an eye, an arm or a leg, and sometimes accounts of the narrow escape of persons in the vicinity from being struck by falling rocks or timber thrown up by the careless explosion of dynamite by workmen who were only intent on their own immediate object.

It is not uncommon, in cold weather, to see a wood fire around which sticks of harmless looking material are arranged to thaw out and raise them to a temperature which insures their efficiency. Within a few feet from where this process of thawing is going on a blast may be set off. Sometimes everything goes through all right, and again the workmen suffer terribly through their foolhardiness.

The Fire Commissioners of New York have adopted a plan and specifications for a dynamite storehouse, which is made in sections, so that it can be readily taken down and moved from one place to another, and quickly set up, and they are working in conjunction with the other officials to secure a rigid observance of the regulations requiring the use of these structures. Contractors who are engaged in work requiring dynamite are required to provide such storehouses. When these requirements were first brought to the notice of contractors they made a strong opposition, but the obvious necessity of some protection secured strict adherence to the observance of the rules laid down.

The type of dynamite storehouse adopted has a capacity for storing 500 pounds of the explosive. Notwithstanding, they occupy a space of but 4 feet 7 inches by 8 feet, and stand but 5 feet 6 inches in hight. The plan, given in Fig. 1, shows both the building for storing the hot water heater and the dynamite storehouse, a few feet of space intervening between the two buildings, preventing any disastrous effect upon the dynamite through carelessness in handling, meddling by outsiders or any other cause. The dynamite house is designed to be set on a brick foundation, and is provided with an air space between the inner and outer sheathing.

Near the middle of the house, on one of the sides, is a simple hot water radiator, inclosed within a chamber made of sheet iron arranged to continually circulate air and carry off the moisture from the thawing of sticks of dynamite, which are arranged in the drawers, as shown in the elevation given in Fig. 2. As indicated by the plan, it is designed that there shall be four sets of drawers, five tiers deep, so arranged that the air can readily circulate between the drawers and over the sticks of dynamite stored in them, and finally find escape through outlets in the front at each end near the top. The roof is also designed to be made double, with an air space between the top and bottom sections, the roof to be covered with tin or corrugated sheet iron. The radiator is designed to present a surface of about 15 feet, and is connected with the heater by means of 1-inch flow and return pipes, having a pitch of 1¼ inches to the foot. The specifications also provide for an expansion tank, the bottom of which must be above the top of the radiator.

From the illustrations and this description it can be readily seen that the dynamite can be kept free from the danger of freezing, and can be locked up so that none but those who appreciate its power shall handle it. When it is needed for use, it may be taken from the dynamite house in trays covered with hot sawdust to keep it from freezing until it is put into use. It will also be seen that attendance to the fire can in no way jar, or in any other manner interfere with the dynamite in the drawers. A heating contractor can also readily see that a simple hot water heater or tank heater is all that is required for the work, although the heater mentioned in the specifications must be 17 inches in diameter and 33 inches in hight.

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A recent interesting development in the architectural world is the suit brought by L. S. Buffington against the corporation known as "Sixty Wall Street," New York

City, for the infringement of a patent which it is alleged covers broadly the skeleton veneer construction employed in modern skyscrapers. The suit is one of a number which it is understood will be commenced in New York, Chicago, Philadelphia, &c., to establish the rights of Mr. Buffington in the invention of the steel skeleton frame building. It is said that Mr. Buffington first published his ideas in 1888, his plan being to support the walls wholly on the steel skeleton and provide shelves on each floor on which the walls were to be carried as a veneer. In that year a patent was granted to him broadly covering this form of construction.

## Baltimore Sheet Metal Workers' Agreement.

Below we give the terms of the agreement entered into between the Master Sheet Metal Workers' Association of Baltimore, Md., and Sheet Metal Workers' Local Union No. 122, of that city, which is in force until May 1, 1905. The agreement is as follows:

1. The minimum rate of wages of members of this union shall be $2.75 per day.

2. That eight hours shall constitute a working day and

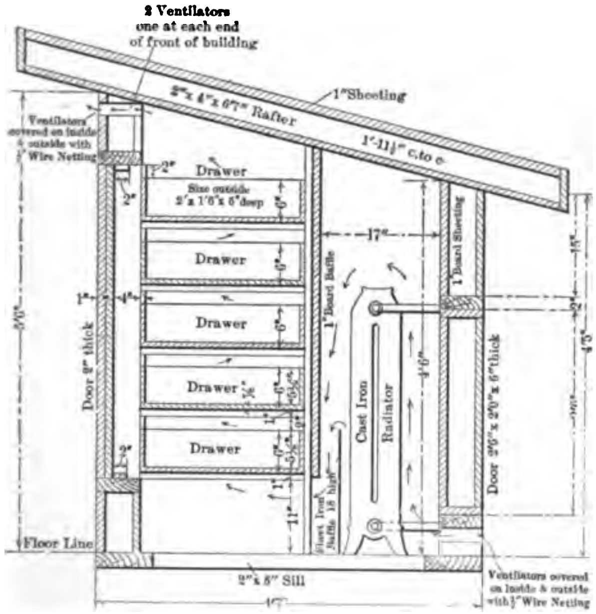


Fig. 2.—Sectional Elevation, Showing Internal Divisions.

*Heating a Dynamite Storage House.*

shall be divided as follows: From 8 a.m. to 12 m. and from 12.30 p.m. to 4.30 p.m., or at option of the employer.

3. That all extra time on secular days, over and above the aforesaid eight hours, shall be paid for at one and a half the rate paid for the regular time on secular days.

4. That all work on Sundays, New Year, Fourth of July, Christmas, shall be paid for at double the rate paid for regular time on secular days. The first Monday in September, known as Labor Day, shall be observed as a legal holiday.

5. That the members of the party of the first part shall give moral support to members of the party of the second part, and the members of the party of the second part shall give moral support to the members of the party of the first part to become members of their respective associations.

6. Any man working on a building or in a shop who is not a member of this local union, or a regular apprentice, except the employer, shall be classed as a helper and shall assist to the best of his ability, but shall be restricted from soldering or fitting, and that one helper be allowed to four journeymen or fraction thereof, on cornice work and roofing.

7. The said firms shall have the right to discharge any journeymen for incompetency, insobriety, insubordination or irregularities in attendance, provided that this does not in any way abridge or destroy the right of appeal from any apparent or alleged unjust decision rendered by said firm or their representative. The members of Sheet Metal Workers' Union No. 122 shall see that said firms shall receive all the benefits of a union shop, and their shop stewart and committee shall insist on its members doing their duty, and protect said firm against loafing, or doing anything that may be detrimental to the success of their business, or to the true intent of this agreement.

8. That all differences and disputes of mutual concern to both parties arising between members of the parties of the first and second parts shall be referred for adjustment to a Board of Arbitration, composed of seven members, who shall be selected for the term of one year, as follows:

Each party, at its first meeting in January of each year, shall select from among its own members three members to serve on said board for the ensuing year, and said six members, immediately upon their selection, shall select a seventh, who shall neither be a workingman nor an employer of workingmen. That the said seventh member of said board shall preside as chairman at all meetings, but shall have no vote upon any question unless the other members thereof, who are present, shall be equally divided, in which event the vote of said seventh member shall be taken upon any question presented. That a majority vote at any meeting of said board shall be controlling, and the findings and decisions of said board shall be considered final and binding upon all members of both parties hereto.

9. That this agreement and all its terms and conditions of the same shall remain in force and effect for the period of at least one year from the date hereof.

10. That the said agreement shall further continue in effect after the expiration of the said year indefinitely, unless either party hereto serve upon the other party a notice in writing of their desire to alter, modify or terminate the agreement, and such notice in writing must be served upon the opposite party at least six months before the date of such alteration, modifications or termination.

11. That no strike or lockout shall be made, instituted or declared for any cause or purpose whatsoever, except matters beyond the control of both parties hereto, during the continuance of this agreement, except for the violation of its terms, and not then until such question of violation shall have been referred to and acted upon by the Board of Arbitration hereinbefore provided for, which board shall sit within five days after time of reference.

12. The members of the party of the first part will pay all carfare, board and necessary expenses while out of the city on any job.

13. One apprentice to four journeymen, said apprentice to serve four years, at the expiration of which time the employer may grant certificate, if employer is of the opinion that apprentice is capable of doing journeyman service; if he is not, he shall continue one year longer under instructions. Apprentice shall permit the union to inspect all recommendations from former employer, and if trade is not finished, said apprentice shall furnish reason why he has not finished his trade. He must also show certificate before he is admitted to membership in the union.

14. The party of the second part will supply the needs of the party of the first part for workingmen before supplying any demands from employers of other cities.

15. When the party of the second part cannot provide the party of the first part with first-class mechanics to execute their work, then the party of the first part reserves the right to employ whom he pleases for the proper execution of his work.

16. No employee will be allowed to do any sheet metal work after working eight hours when employed during the day, except for the employer.

17. The business agent of the party of the second part shall have access to all shops at all times upon permission from the party of the first part, of the shop to which he desires access.

## Correspondence Instruction in Heating and Ventilation.

Since removing from its original location in Boston, Mass., to Chicago, and becoming affiliated with the Armour Institute of Technology, the American School of Correspondence has amplified and perfected its system of trade and technical instruction. We present below a statement of the school's method of correspondence instruction in heating and ventilation, which has been specially prepared for the benefit of our readers who are interested in the subject:

The student studying heating and ventilating by correspondence with the American School of Correspondence receives his instruction from instruction papers prepared especially for this work. The necessary calculations, descriptions, explanations, &c., are taken up in a very simple manner in about 40 of these instruction papers. He studies these papers one at a time, and receives help from the school whenever he meets with difficulty. The school is anxious for the student to understand thoroughly each step and is ready at any time to assist the student on problems and give explanations. After completing the study of the instruction paper, he writes out the answers to the questions and solves the problems in the examination. These are sent to the school for correction. The examination papers are corrected, both with regard to accuracy of the subject matter and also for English, spelling, &c. In the early papers the student is taught to arrange his work neatly and in order. In case a student has failed to solve a few of the problems, solutions and explanations are returned with the examination paper. If the examination is satisfactory the student receives his corrected paper with a certificate giving his grade. If unsatisfactory, he must rewrite the examination paper before continuing his course. While his paper is being corrected the student studies tne next instruction paper. As the school sends the student instruction papers as he progresses, thus keeping him supplied, there is no delay while correcting the examinations.

The course in heating and ventilating has been carefully planned by the instructors together with heating and ventilating engineers. Before taking up the technical part of the course it is necessary to lay a foundation by studying arithmetic, elementary algebra, mensuration, &c. The reasons for this work are evident. Without this knowledge, especially that of arithmetic and mensuration, the student will have difficulty with his later calculations on heating and ventilating plants. The sciences of heat and chemistry are also treated, as they have a direct bearing on the heating and ventilating engineer's work. On account of the various types of steam and hot water boilers, return traps, pumps and other accessories used in this work, instruction is given on these subjects also. The steam engine is also discussed in a simple, practical manner, so that the running of fans, blowers, &c., will present no difficulty.

Before taking up in detail the design and construction, the various systems are explained in a general way, so that the student will have a sort of a bird's-eye view with a general idea of the advantages and disadvantages of every system, and know under what conditions they should be used. In most of this work tables and simple formulas are used wherever they are practicable. As the tables used are reliable, having been prepared after years of practical experience, they are chosen in preference to formulas, as the calculations are then much simplified. In taking up the design of each heating system good forms and poor forms are discussed and illustrated, showing the advantages and disadvantages of each. The proper factors for heat losses, drop in pressure of pipes, &c., are carefully explained. With each system of heating the apparatus used is described in detail. Then the methods of calculating the size of the pipes, radiators, &c., are carefully explained, with illustrative examples for practice. The various systems of piping direct steam heating, for instance, are taken up with a detailed explanation of the connections, sizes of pipes, methods of returning condensation to the boiler, valves, &c. The difference between hot water and steam is discussed both for direct and indirect systems. Other items of importance are exhaust steam heating, exhaust ventilation, electric heating, temperature regulators, &c.

One of the valuable parts of this course is that devoted to the heating and ventilating devices for large buildings, such as schoolhouses, office buildings, apartment houses, theaters, greenhouses, factories, &c. The location of the apparatus, the introduction of air for ventilation and the calculations for the sizes of piping, ducts, &c., are carefully considered. The Webster and Paul systems are also explained. Following the discussion of each system are suggestions on the care and management of the apparatus of that system. As this course is of such value to mechanics, steam fitters, &c., a brief description of the methods and tools used in fitting pipes, making joints, &c., is given.

The mechanical drawing, which forms an important part of this course, may be taken up at any time. Most students make their drawings and carry on this portion of the course while studying the various instruction papers and sending in examinations. There are six instruction papers on this subject, beginning with the use of instruments, and taking the student step by step through geometrical drawing and projections to the working drawings. This latter branch is made very practical.

While the foregoing is the most valuable part of the course, the student may continue his studies still further without extra charge by selecting one of two options. The electrical option takes up the elements of electricity, dynamos, motors, electric lighting and electric wiring. Thus he may obtain an understanding of this important branch of engineering. The other option deals with mechanical work, such as machine design, pattern making, foundry work, forging and machine shop practice. Thus, in addition to the real instruction on heating and ventilating, the student acquires a general understanding of engineering, which is especially valuable should he be called on to design systems, including the writing of the specifications. After completing the required examinations, including one of these options, he receives a diploma certifying that he has passed the required examinations in his course.

A PECULIAR incident recently occurred in connection with the dispute between the Chicago Metal Trades Association and the Blacksmiths' District Council of that city. For six months the two organizations have endeavored to agree upon an umpire, for an Arbitration Board to settle the mutual differences between the two bodies, but all names suggested were rejected. A few weeks ago the employers handed the union committee eight names from which the committee decided to select one name. On investigation, however, the committee discovered that all of the eight men named had died within the past six months.

## The New York Trade School.

The day classes in plumbing and sheet metal work at the New York Trade School, First avenue, Sixty-seventh and Sixty-eighth streets, New York City, opened on Monday, December 5, with a large attendance of pupils. In the plumbing class 120 pupils are enrolled and a number of applicants had to be turned away because of lack of room, notwithstanding the addition that has been made to the working space during the past year. The cornice class is also enjoying popularity with a full enrollment of 20 pupils, and several young men had to be refused admission on account of lack of accommodation. According to Superintendent H. V. Brill, there will be over 800 students in the school when all the classes are at work in January.

The David Williams Company of 232-238 William street, New York City, has just issued a new catalogue of books on sheet metal work, plumbing, heating and other industrial subjects in which many of our readers are likely to be interested. This catalogue covers a large number of works which have been published by the David Williams Company, as well as a long list of standard publications in the sheet metal, sanitary and heating fields issued by other publishers, but which can be supplied by the company. A copy of this catalogue will be sent to any one interested on application.

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MacCLURE & SPAHR, Architects.

RESIDENCE OF THE MISSES DEWAN, ON MAIN STREET, PENN YAN, N. Y.

D. P. SLITOR, ARCHITECT.

SUPPLEMENT CARPENTRY AND BUILDING, JANUARY, 1906.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

232-238 WILLIAM STREET, NEW YORK.

FEBRUARY, 1905.

## The Local Building Situation.

The year which has just closed has been notable in the building world in the extent to which operations have been carried in nearly every section of the country. Reports which have come to hand show that in the great majority of cases the value of the building improvements projected during the 12 months of 1904 was in excess of any corresponding period in recent years, if not in the history of the community in which they occurred. The exceptions are found in some of the larger cities where labor disturbances have interfered with the normal progress of the work, but even here the volume of operations has been upon a scale of no mean proportions. In New York City, for example, where the conditions have been far from satisfactory, and where at one time it appeared doubtful if any great amount of work would be accomplished, the report for the year shows a volume in excess of 1903. In the Borough of Manhattan, where work has been most seriously interrupted, there were nearly 1400 new buildings projected, estimated to cost $74,624,960, as compared with 990 new buildings, costing $74,070,400, in the 12 months of the year previous. Adding the figures for the Borough of the Bronx, where operations have been conducted on a scale hitherto unknown in that section, the totals for 1904 show permits to have been issued by the Building Department for 3040 new structures, involving an estimated outlay of $96,749,840, or an average cost of $31,820. This showing compares with 1757 new buildings in 1903, estimated to cost $81,419,414, or an average cost of $40,647. Some idea of the activity in the Borough of the Bronx may be gained from the statement that as compared with 1903 it was fourfold, the majority of the new buildings being apartment houses and private dwellings. The amount of new work projected in 1904 does not break the record, but comes very close to it, as only in two previous years were the values of the building improvements greater, these being 1901, when the figures stood $118,897,820, and 1899, when they were $127,211,255. The activity which has prevailed in real estate transactions and the number of plans drawn for the improvement of vast tracts of vacant land in the upper confines of Manhattan Island and the Bronx, as well as the many gigantic enterprises that are likely to be carried out as soon as the season opens, forces the conviction that 1905 is likely to witness an amount of construction work that will give employment to a vast army of mechanics and put the record of 1904 in the background.

## How Strikes Retard Building Operations.

We have at intervals in the recent past given a number of interesting particulars in connection with the construction of the new building of the New York *Times*, located on the triangular plot at Broadway, Seventh avenue, Forty-second and Forty-third streets, but a feature not heretofore touched upon is the extent to which labor troubles impeded the work of erection. This is strikingly presented by the newspaper in question, which January 1 celebrated the completion and occupation of its new building by the issue of an illustrated supplement describing the edifice, giving full engineering details of the construction and equipment. So faithfully is the history of the work presented that it includes an account of the numerous strikes which delayed its progress. Excavation began early in 1903. The first strike occurred on May 1, when 45 men employed in excavating quit work and were joined by the truck drivers, a demand for higher wages and shorter hours having been refused. This strike was lost in less than a month. On November 10 the bricklayers and apprentices struck in sympathy with a strike on another building, but returned in nine days on the payment of $610.05 for "waiting time." On November 21 the ironworkers were called out because of a difficulty between employers and the recognition of a union, staying out until December. On January 7, 1904, the limestone setters struck and were out six days. On March 7 the bricklayers struck and were out for a month. On April 1 the elevator men went out for a week. On July 18 the carpenters went out on a sympathetic strike which lasted a week. On July 26 the painters went out for five days, and on August 5 were out again for two days. On August 6 the second carpenters' strike took place, nearly a month elapsing until another force was secured. On the same day the elevator workmen went out again, also the electricians, plasterers and marblemen, while on August 9 the plumbers took a hand in the general controversy. The elevator men were back in three days, but the places of the others were not supplied for over a month. Summing up the time lost, the statement is made that 299 days' employment was sacrificed by the various trades involved. Of course all work was not stopped whenever a single trade went out, so that the completion of the building was not delayed the full 299 days. It is estimated, however, that but for these disturbances the building would have been ready for occupancy eight months ago. The *Times* building is a typical modern office building, with the addition of basements specially constructed for presses, and therefore containing much heavy machinery. The delay in its completion caused by labor troubles is no greater than has been experienced by other builders of the same class of structures in every year of late, and in fact is not so serious as some have suffered. But it presents a most disheartening picture of the possibilities which confront those who contemplate undertakings of this character. Owners may make the most careful arrangements for the erection of a building, giving contractors a liberal allowance over the time they name for having it ready for occupancy, and then find that many more months are consumed because of labor disputes. No question of hours or wages may arise, the owners may give *carte blanche* to the contractors on such points, but disputes may crop up between trades which will be harder to settle and consume more time than if hours or wages were involved. If this question of uncertainty with regard to labor could be eliminated the building trade would be much more active.

## Exhibition of Architectural League.

The members of the fraternity are looking forward with much interest to the coming exhibition of the Architectural League of New York, which will be held in this city from February 12 to March 4, inclusive. This will be the twentieth annual display of architectural work under the auspices of the league, and, as in years past, it will occur in the building of the American Fine Arts Society, at 215 West Fifty-seventh street, where exceptional facilities are afforded the general public to annually inspect some of the clever work turned out by the members of the architectural profession. The exhibition will consist of architectural drawings in plan, elevation, section, perspective and detail; photographs of executed work, drawings of decorative works, cartoons for stained glass, models of executed or proposed work, sketches and paintings of decorative subjects, together with work executed in stone, wood, bronze, wrought iron, mosaic, glass and leather. The special object of the exhibition is to show complete illustrations of individual rather than a large number of incompleted works, and to this end the committee having charge of the matter suggests that all perspectives and elevations be accompanied with carefully rendered plans of the same, also large scale drawings or details of some portion of the work, as well as models of architectural detail and sculpture in wood or stone. In connection with the exhibition the league announces that the New York Chapter of the American Institute of Architects has inaugurated a Medal of Honor, which will be awarded annually for a distinguished work of architecture, and that the work receiving the award will be represented in the league display by a photograph of the executed structure, together with at least a small scale plan. Another feature in connection with the exhibition will be the seventeenth annual competition for gold and silver medals, the contestants eligible to be residents of the United States and under the age of 30. The subject of the competition is "A Village Block in a Small Country Town," the building to be constructed of stone, wood or stucco, or a combination of these materials. The subject of the president's prize, which is open to members of the Architectural League only, is a book plate for the library of the league, a bronze medal being awarded the best design. The Henry O. Avery prize will be awarded for the best design for a full size model for a rectangular terra cotta flower box, suitable for use on a porch between columns. Not the least interesting feature of the twentieth annual exhibition of the league will be a series of public lectures by members of the profession upon topics appropriate to the occasion.

## Programme of Architects' Convention.

As this issue of the paper goes to press the American Institute of Architects is holding its thirty-eighth annual convention in Washington, D. C., with headquarters at the Arlington Hotel, corner of H street and Vermont avenue. The programme, as issued by Secretary Glenn Brown, is as follows:

ORDER OF PROCEEDINGS.

TUESDAY, JANUARY 10.

Meeting of the Board of Directors at 10 A. M.

WEDNESDAY, JANUARY 11.

(1) *Morning Session.*

1. The members of the Institute will assemble in the Dining Hall, The Arlington Hotel, Washington, D. C., at 9.30 o'clock.
   (*a*) Register their names.
   (*b*) Address of welcome by Major John Biddle, Engineer Commissioner, D. C., at 10 o'clock.
   (*c*) Address of the President, Mr. W. S. Eames.
   (*d*) The President will appoint the following committees:
   Three on Credentials of Delegates.
   Five on the Nomination of Officers.
   Three on President's Address.
   Three on recommendation contained in the report of the Board of Directors.
   Three on Reports of Chapters.
   Three on Standing Committees' Reports.
   Three on Special Committees' Reports.
   (*e*) Convention declared open for business.

ORDER OF BUSINESS.

2. Report of the Board of Directors.
3. Report of Treasurer and Auditing Committee.
4. Reports of Chapters, a synopsis by the Secretary.
5. Report of the Standing Committees:
   (*a*) Judiciary, Alfred Stone, Chairman.
   (*b*) House and Library, Robert Stead, Chairman.
   (*c*) Education and Publication, H. L. Warren, Chairman.
   (*d*) Foreign Correspondence, Glenn Brown, Chairman.
   (*e*) Contracts and Lien Laws, Alfred Stone, Chairman.
   (*f*) Applied Arts and Sciences, and on Metric System, William G. Preston, Chairman.
6. Reports of Special Committees:
   (*a*) On Government Architecture, Geo. B. Post, Chairman. (To be delivered at afternoon session in connection with papers.)
   (*b*) On Examinations and Admission to the Institute, Edgar V. Seeler, Chairman.
   (*c*) On Co-operation with the Architectural League of America, W. B. Ittner, Chairman.
   (*d*) On Competitions, Glenn Brown, Chairman.
   (*e*) On Washington City, W. S. Eames, Chairman.
   (*f*) On Municipal Improvement, Frank Miles Day, Chairman. (To be delivered Thursday evening.)
   (*g*) On World's Congress, T. C. Young, Chairman.
   (*h*) For Securing Funds for the Purchase of the Octagon, J. M. Carrere, Chairman.
   (*i*) On Nomination for Honorary and Corresponding Members, Frank Miles Day, Chairman.
   (*j*) Delegate to National Conference, Electrical Code, and to Meeting of National Fire Protection Association, Alfred Stone.

Luncheon served in Hall at 1 o'clock.*

(2) *Afternoon Session, 2 o'clock.*

1. Report of Credential Committee.
2. Reports of Committees not reached at morning session.
3. Papers:
   The Relation of the Architect with the Government, by George B. Post.
   The Selection of an Architect for Government Work by Competition, by James P. Jamieson and Irving K. Pond.
   The Selection of an Architect for Government Work Without Competition, to be discussed by C. F. McKim, Thomas Hastings and Joseph C. Hornblower.

(3) *Evening Session.*

The Annual Dinner, A. I. A. Subscribers and guests will assemble in annex to Dining Hall at 7.30 P. M. Dinner will be served promptly at 8 o'clock.

THURSDAY, JANUARY 12.

(4) *Morning Session, 10 o'clock.*

Papers:
   The Relations of Architects with Municipal School Work, by Messrs. R. Clipston Sturgis, William B. Ittner and William B. Mundie.
   Financing Building Operations, by W. H. Russell.
   Office Organization, by Grosvenor Atterbury.
   Relations of Specialists to Architects, to be discussed by C. T. Purdy and Edgar V. Seeler.

Luncheon served in the Hall at 1 o'clock.*

(5) *Afternoon Session, 2 o'clock.*

1. Reports of Special Committees not finished at first session.
2. Action on proposed amendments to By-Laws.
3. Unfinished business of the previous day.
4. Report of Nominating Committee and ballots open and distributed for Officers and Fellows.

(6) *Evening Session, 8 o'clock.*

Paper:
   Report on Municipal Improvement, Showing the Progress Made in the Systematic Grouping of Buildings and Parks Throughout the Country. Illustrated by lantern slides. By Frank Miles Day.

FRIDAY, JANUARY 13.

(7) *Morning Session.*

1. Depositing ballots for Officers and Fellows.
2. Reports of the Committees appointed at the first session and their consideration:
   (*a*) On the President's Address.
   (*b*) On the recommendations contained in the Report of the Board of Directors.
   (*c*) On the Reports of Chapters.
   (*d*) On the Standing Committees' Reports.
   (*e*) On the Special Committees' Reports.
   (*f*) On Credentials of Delegates.
   (*g*) On the Nomination of Officers.
3. Unfinished business.
4. Miscellaneous business.

(8) *Afternoon Session, 2 o'clock.*

1. Unfinished business.
2. Report of tellers on election of Officers and Fellows.
3. Selection of place for next convention.

Delegates will be distinguished by a red ribbon, and will occupy seats from the front row as far back as is necessary for their accommodation.

Members of the Institute who are not delegates are entitled to take part in all discussions, to offer resolutions and motions, and to vote on a proposition that it is the sense of the meeting.

All sessions will begin promptly at the hours named in the programme.

GLENN BROWN, *Secretary,*
*The Octagon, Washington, D. C.*

*Committee of Arrangements.*

GLENN BROWN. LEON E. DESSEZ.
FRANK MILES DAY. ROBERT STEAD.
W. A. BORING.

Any suggestions from delegates should be submitted to the Committee of Arrangements.

* Ladies with members are invited to attend all sessions and luncheon.

## Awarded Grand Prize.

Our patrons will be interested in learning that at the Louisiana Purchase Exposition, recently held at St. Loius, Mo., a grand prize was awarded the David Williams Company for its various publications.

# A TWO-FAMILY HOUSE IN WORCESTER, MASS.

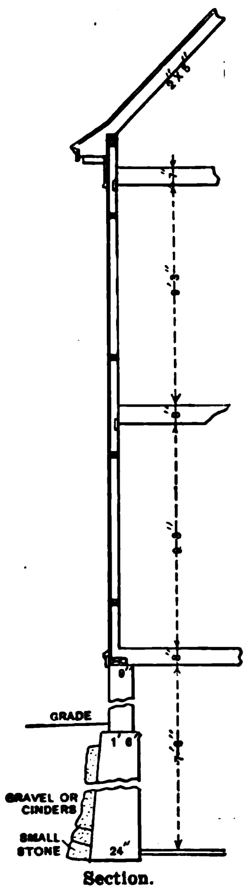
THE building which we have taken for the subject of our half-tone supplemental plate this month is a two-family dwelling so designed as to look as much like a private residence as possible without sacrificing the comforts and conveniences of either tenant. The house was erected a little more than a year ago and is occupied by the owner, who lives on the first floor and rents the second floor. The illustrations presented herewith give an idea of the internal arrangement, while the many details show the leading features of construction.

It will be observed from an inspection of the drawings and photograph that there is ample porch room for one or both families on the first floor, and a balcony for the second floor occupants. At the rear is a porch to cover the side entrance door and a covered platform for each family, from which can be used the clothes reel which hangs on one side of the opening. From each platform opens a room for coal and ash sifter, so that there is no necessity for going to the cellar for these things.

There is on each floor a well arranged pantry and china closet, with a commodious bath, which is convenient to both bedrooms without having to pass through other rooms as well as other parts. The small lobby makes it possible to reach the bathroom and rear bedroom from the front bedroom and sitting room without going through, or being seen from, the kitchen. In the attic is space for three rooms, one being intended for the first-floor tenant and is reached by the rear stairs, while the other two are for the second-floor tenant and are accessible by the front stairs.

According to the specifications of the architect the foundations are of stone with a brick underpinning. The framing and dimension timber is of spruce, the floor girders being 8 x 9 inches, the sills 4 x 7 inches, the partition joist 5 x 8 inches, the first and second floor joist 2 x 8 inches, the third-floor joist 2 x 7 inches, collar beams 1 x 6 inches, the rafters 2 x 5 inches, with hips and valleys 3 x 8 inches. The main partition and wall studs are 2 x 4 inches, with minor partition studs 2 x 3 inches; the front piazza sills and girts are 6 x 6 inches; the joist 2 x 6 inches, and the wall plates, double, 2 x 4 inches.

The exterior frame is covered with ⅞-inch matched spruce boards laid with broken joints, over which is

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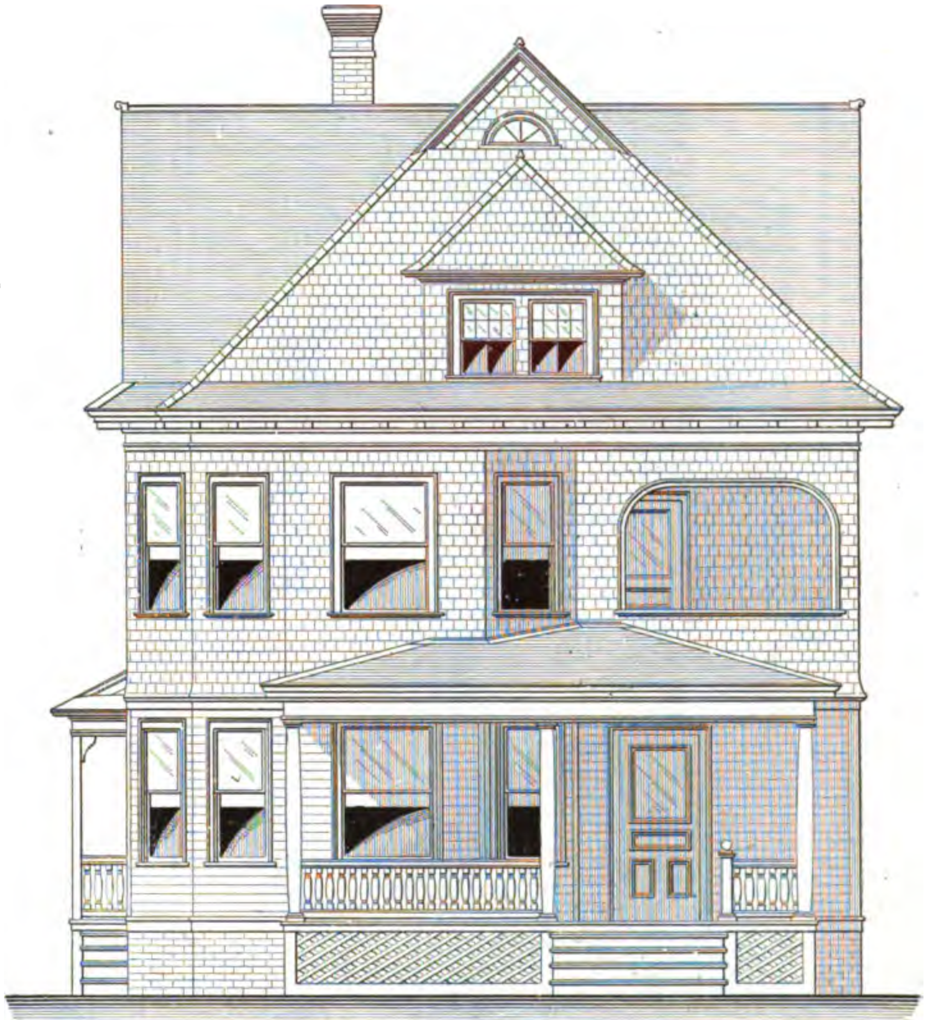


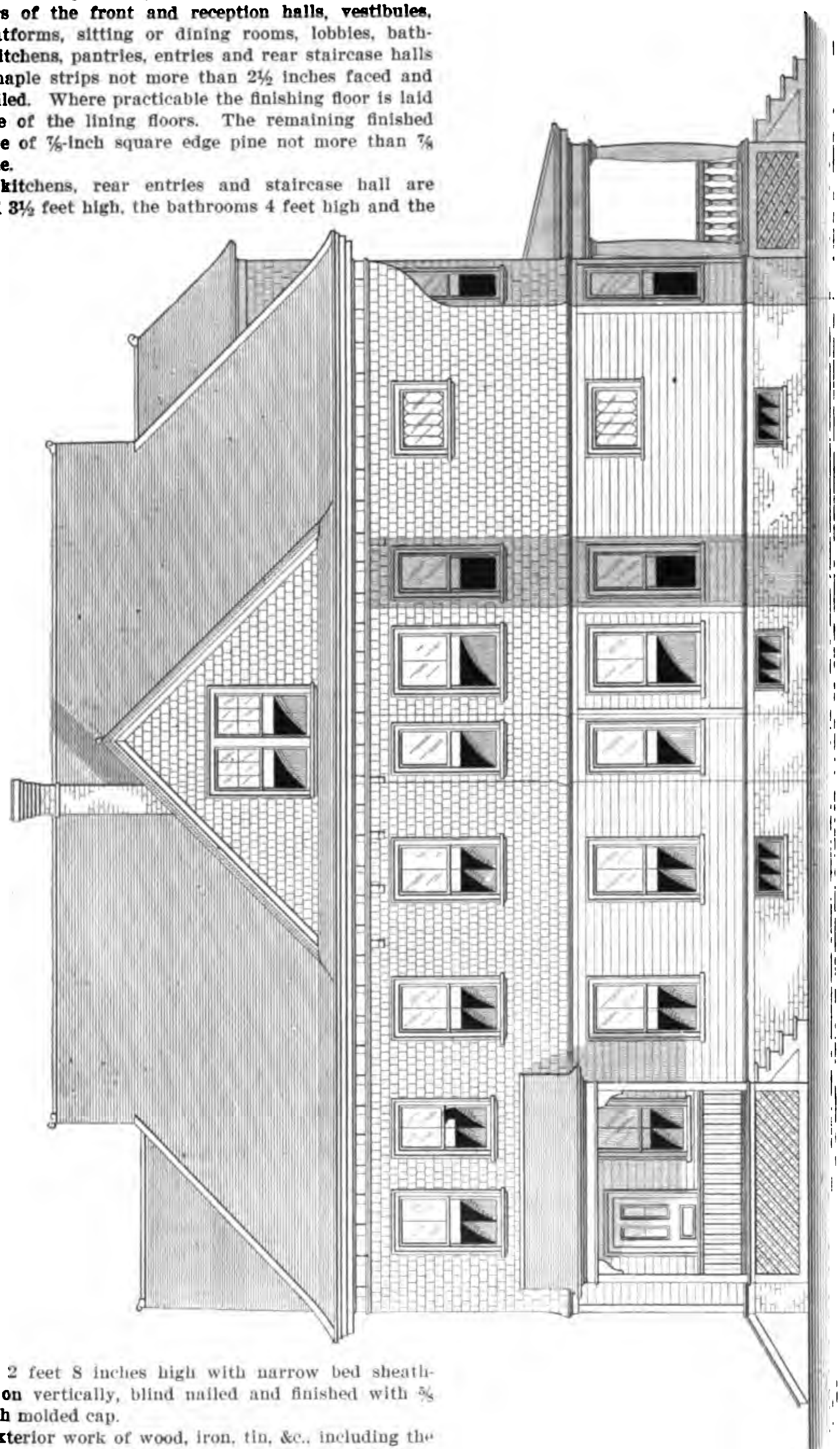
Front Elevation.—Scale, ⅛ Inch to the Foot.

*A Two-Family House at Worcester, Mass.—John P. Kingston, Architect,* 518 *Main Street, Worcester, Mass.*

placed Neponset building paper well lapped, this in turn being covered where indicated on the elevations by 6-inch spruce clapboards laid not more than 4½ inches to the weather, while the walls, gables or other places so shown are covered with 16-inch cedar shingles laid not more than 5 inches to the weather. The roof is covered with the best quality extra sawed 16-inch Eastern cedar shingles laid not more than 4½ and 4¾ inches to the weather. The hips are covered with a braided course in the proper manner, and the valleys are laid open about 4 inches at the top and 5 inches at the bottom. The piazza has a flooring of 1⅛ x 5 inch matched rift grain Southern yellow pine. The cellar floor is concrete.

The front halls, vestibules, parlors, sitting or dining rooms are finished in even colored cypress. The kitchens, pantries, rear entries, staircase halls and bathrooms are finished in North Carolina pine with all doors of cypress. The two bedrooms on each floor are finished in white wood and painted. The vestibule door is 1½ inches thick, with double thick glass in place of the two top panels and rail, and is hung with three butts. All other doors are 1⅜ inches thick. The bathroom doors have Florentine or Venetian glass in place of the two top panels. The top floors of the front and reception halls, vestibules, stair platforms, sitting or dining rooms, lobbies, bathrooms, kitchens, pantries, entries and rear staircase halls are of maple strips not more than 2½ inches faced and blind nailed. Where practicable the finishing floor is laid crosswise of the lining floors. The remaining finished floors are of ⅞-inch square edge pine not more than ⅞ inch wide.

The kitchens, rear entries and staircase hall are sheathed 3½ feet high, the bathrooms 4 feet high and the

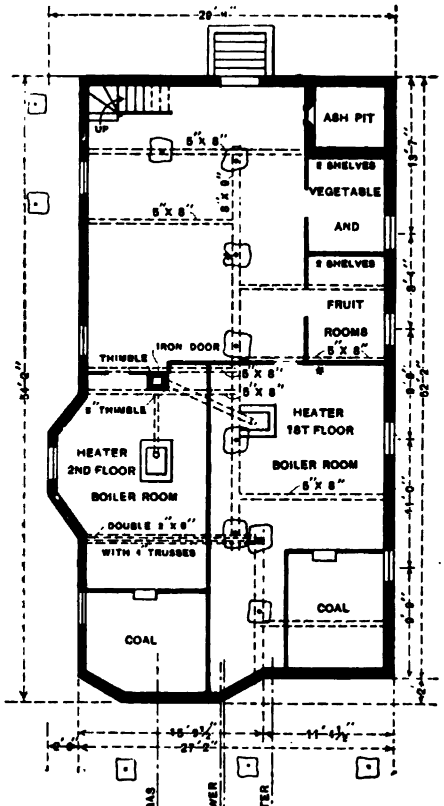


*A Two-Family House at Worcester, Mass.—Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.*

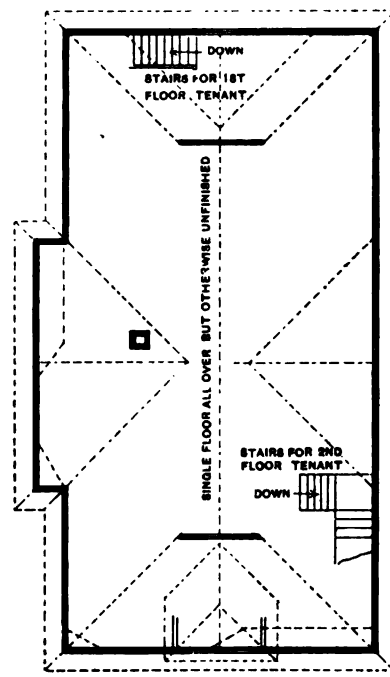
pantries 2 feet 8 inches high with narrow bed sheathing put on vertically, blind nailed and finished with ⅝ x 3½ inch molded cap.

All exterior work of wood, iron, tin, &c., including the floors of the piazza and the balcony and rear platforms, is painted with two coats of lead and oil in colors to suit the owner. The shingles on the side walls and gables were treated to a coat of pure linseed oil stain and then a coat of oil. The roof has one heavy coat of pure linseed oil stain. The hard wood floors in the vestibule, the front halls, dining or sitting rooms have a coat of pure white alcohol shellac and two coats of Butchers' floor wax. The floors in the kitchen, pantries, bathrooms, lobbies, rear entries and staircase have one coat of oil and turpentine, equal parts, and one coat of Berry Brothers' liquid granite. The finished work in parlors, sitting or dining rooms, front halls, including all stair finish, has a coat of shellac and two coats of varnish with the parlor rubbed to an egg shell gloss. The plastered walls of the kitchens, pantries, bathrooms, staircase hall and rear entries have a coat of sizing and two coats of paint.

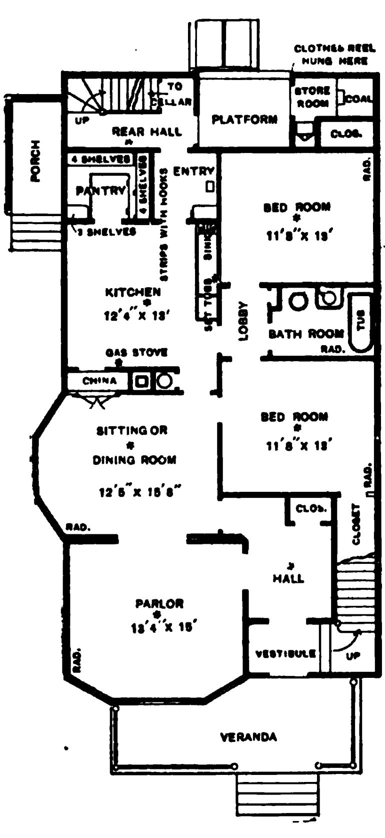
Each bathroom is fitted with a white earthen ware siphon water closet, with 6-gallon tank and nickel plated fittings, one iron 2¼-inch roll rim bathtub 5 feet long, white porcelain enameled inside, and one 14 x 17 inch white earthen ware washbowl with overflow connections, clamped to an Italian marble slab 20 x 28 inches with



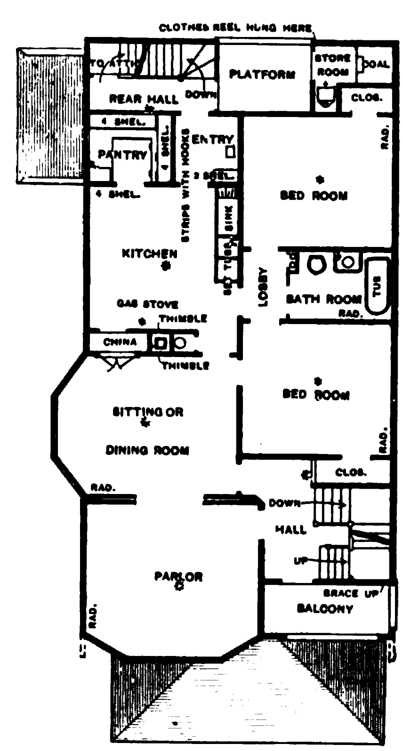

Foundation.




Attic and Roof Plans.




First Floor.




Second Floor.

*A Two-Family House at Worcester, Mass.—Floor Plans.—Scale, 1-16 Inch to the Foot.*

sunk top and molded edges. The house is piped for gas, and is wired for electric bells, door openers, &c.

The building cost a little over $5000, the principal items being: Excavation and stone work, $182.75; mason work, $400; clapboards, shingles, matched boards, framing lumber, &c., $830; exterior finish, $448; inside finish, $610; heating, $470; painting, $285; plumbing and gas piping, $527, and carpenter's labor, $980.

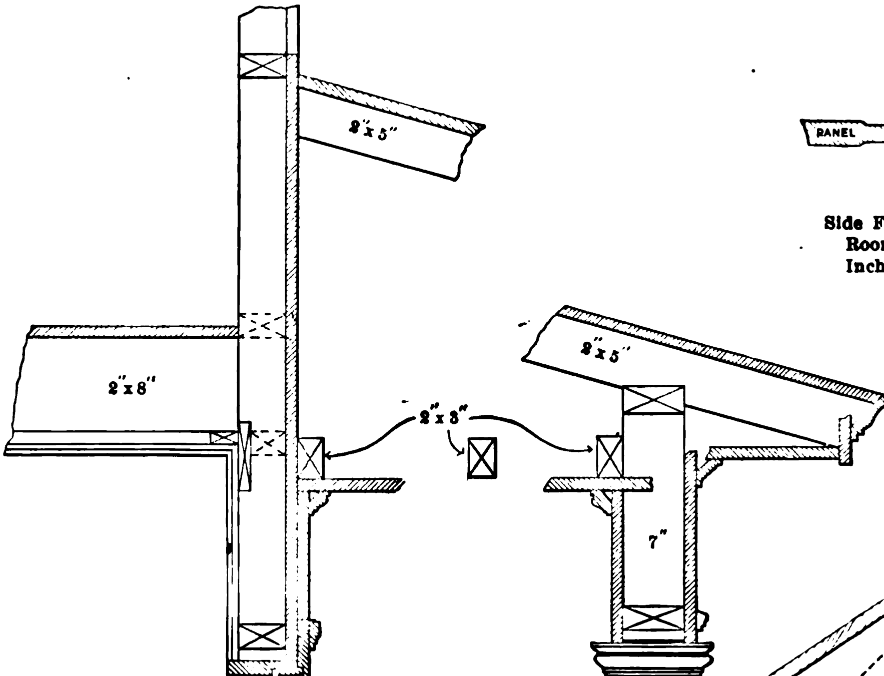
The two-family dwelling here shown was built in accordance with plans prepared by John P. Kingston of 518 Main street, Worcester, Mass.

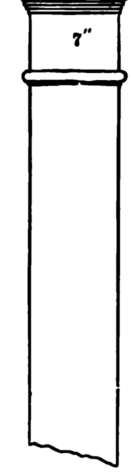
## Building Outlook in New York City.

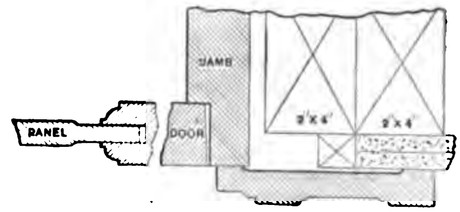
In discussing the outlook for the new year the views of Charles L. Eidlitz, president of the Building Trades Employers' Association of New York, and presented in a late issue of the *Herald*, cannot fail to be of interest:

The prospects for a good building season never were brighter than at the present time.

For the last two years investors and speculators have been conservative in the extreme. The complicated labor condition and the doubt that existed with many as to

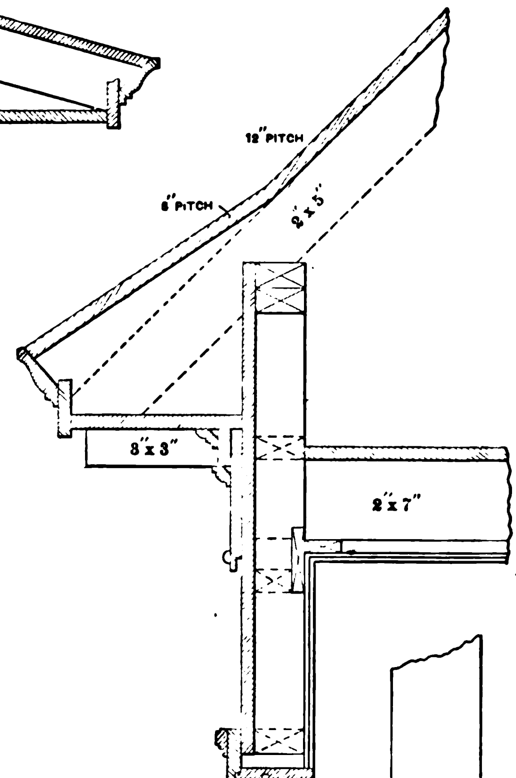




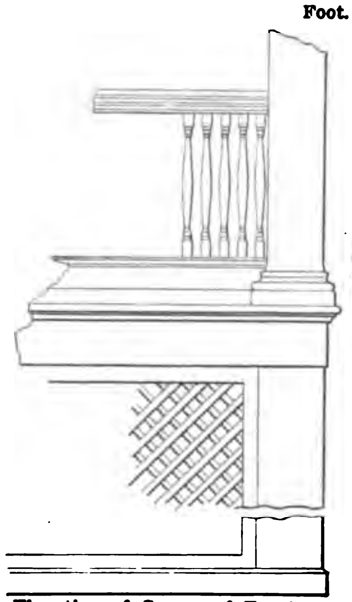



**Side Finish in Vestibule, Front Halls, Front Rooms and Dining Rooms.—Scale, 3 Inches to the Foot.**

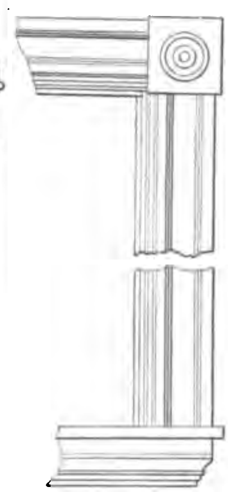
**Details of Front Veranda.—Scale, ¾ Inch to the Foot.**



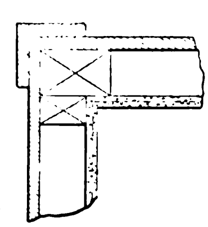

**Details of Main Cornice.—Scale, ¾ Inch to the Foot.**



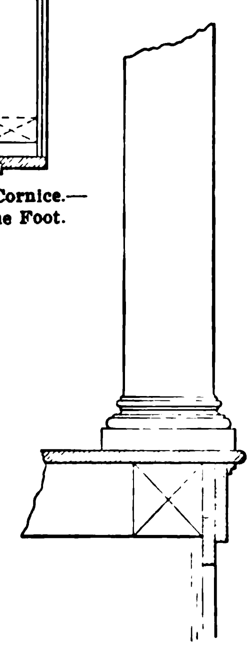
**Elevation of Corner of Front Veranda.—Scale. ½ Inch to the Foot.**



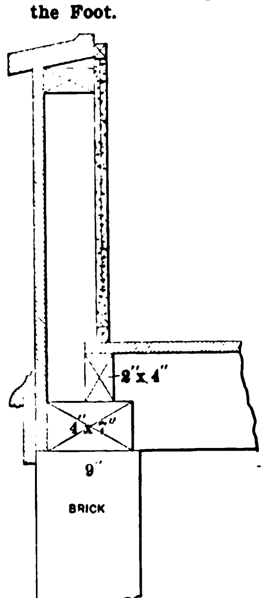
**Window Frame Finish.—Scale, ¾ Inch to the Foot.**



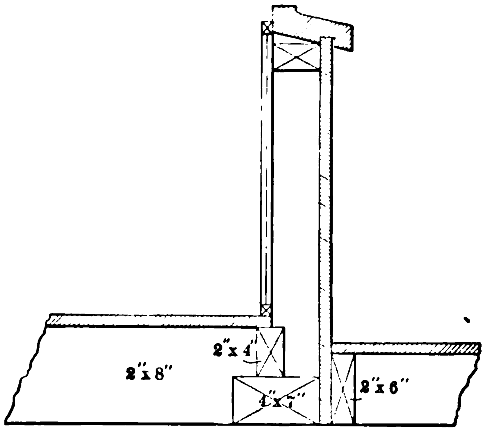
**Corner Boards.—Scale, ¾ Inch to the Foot.**



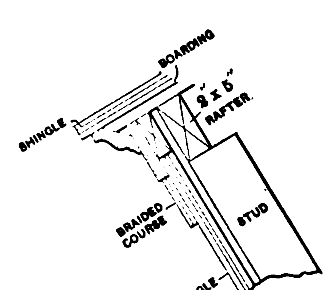
**Section through Front Veranda Floor.—Scale, ¾ Inch to the Foot.**




**Detail of Water Table.—Scale, ¾ Inch to the Foot.**




**Section through Front Wall of Building at Line of Piazza Floor.—Scale, ¾ Inch to the Foot.**




**Gable Cornice.—Scale, ¾ Inch to the Foot.**

*Miscellaneous Constructive Details of Two-Family House at Worcester, Mass.*

whether or not the employers would be able to control the situation prevented those desiring to build from beginning work, but these men are now almost satisfied that building projects will be able to go ahead uninterruptedly when spring opens, and many will take advantage of the fact that the contractors are not busy and are anxious to secure work.

The contractor himself has been uneasy for some months past, and has made no effort to obtain contracts, rather playing a waiting game than be in the midst of a large amount of work with unsettled labor, but he cannot wait forever and must start shortly.

Whether the season will be what it promises will depend almost entirely upon the laboring men. The war is over and everybody interested is turning to his own particular field. The slightest upset in the present state of quiet, however, will quickly unsettle the investor. The contractor was compelled to gain his independence at a considerable loss to owner and mechanic, but at tremendous loss to himself, and, having gained it, he must retain it, even at a still greater sacrifice or go out of business. His efforts have benefited both investors and speculators in the building trade, and if his position can be maintained the building season will be a successful one.

There is every reason to believe that the mechanic has at last learned to think for himself instead of blindly following the irresponsible and selfish leader, and that the coming year will be quiet and orderly. With such a condition apparently assured, plans long laid aside will be brought out once more, and the clang of trowel and hammer and puff of hoisting engine, music to the mechanic and contractor alike, will be heard throughout the country.

## Novel Features of a Church.

Something of a novelty in the way of church architecture is the structure which has just been completed at the corner of Broadway and Fifty-sixth street, New York City, and which contains two chapels, a score of Sunday school rooms, which can be thrown into one by means of folding partitions, men's club rooms, women's parlors and an administration room, giving accommodations for a total of 6000 persons at one time. The building, including the lot, cost in the neighborhood of $1,000,000, and it is probably the only church in the country that is built upon such an altitudinous scale, the parish house addition being 10 stories in hight, the upper floors being reached by two electric passenger elevators.

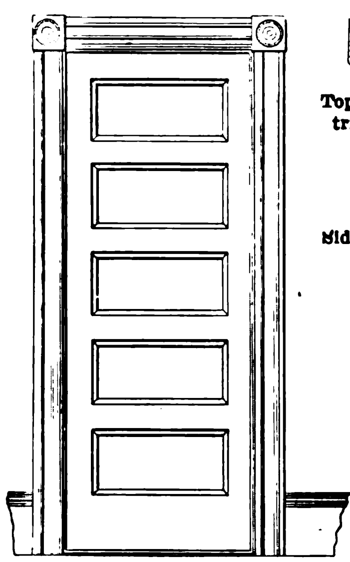
An interesting feature of the new church is a museum where any ecclesiastic relic may be placed. Another feature is a safe deposit vault, while in the basement is what the architects, Barney & Chapman, designate as a theater, consisting as it does of a stage, with footlights, stage entrance, dressing rooms, an elevated floor in the amphitheater which slopes down to the orchestra pit in true theater fashion, and boxes on either side of the stage. This has a seating capacity of 600. Another unique feature is a chapel constructed especially for weddings, which occupies a triangular plot at the extreme northern portion of the Broadway side of the edifice. It is furnished with a tiny altar and black oak pews, while three stained glass windows give ample illumination through the day, with electricity by night.

## Count Teixeira's New York Residence.

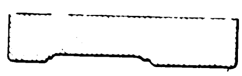
The change in ownership of a piece of property in New York City a short time ago revives interest in a dwelling of quaint design which possesses a history that is somewhat out of the common. It is located on the corner of West End avenue and 105th street and has long been known by the residents in that section as the "Spanish Castle." It derived its title from the fact that after the five-story mansion which was put up on the site about eight years ago had been completed it was sold to the Brazilian Don Eugenio Faria Goanzales de Teixeira, Marquis of Aguila Branca, who made extensive alterations to suit his own peculiar tastes. The appearance of the building from the outside is decidedly oriental and grotesque. On the corner hangs an immense wrought iron dragon with glittering eyes of electric lights. To this a long pending iron chain and lamp is attached, which when lighted at night has a most grewsome effect. On the main wall are various crests showing the count's ancestral connections, there being two especially large wrought iron crests directly over the door, as well as two lamps of oriental art and design hanging over the entrance to light it up at night.

With the exception of the fourth and top floors the windows are all of heavy stained glass. On entering, the most unusual decorations are seen: first a magnificent staircase of onyx, the ceiling of the foyer hall being of a heavy mirror. To the left of this is a small room which the count used as a den, or cosy corner. Its peculiar decorations of Grecian characters are magnificently finished in mosaic. The floor above is three rooms deep, the front one being what was known as the parlor, or gold room; the center room has walls finished in a heavy solid coat of silver, and the rear room, used by the marquis as a smoking room, has numerous peculiar decorations.

The marquis being an art connoisseur had his ceilings profusely decorated with the finest of paintings, while over the doors and windows are again his crests in various Grecian figures, heads of gladiators, &c. On the top floor he built a large and elaborate altar, where he performed regularly his religious duties.

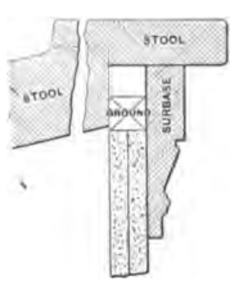


Elevation of Finish in Vestibule, Front Rooms, Front Halls and Dining Rooms.—Scale, ⅜ Inch to the Foot.

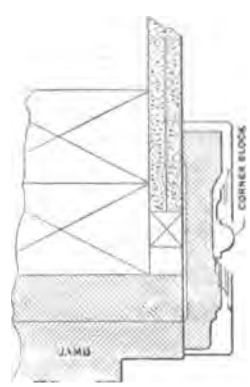


Top Casing in Kitchens, Pantries, Bath and Bed Rooms.

Side Casing in Rooms Above Mentioned.

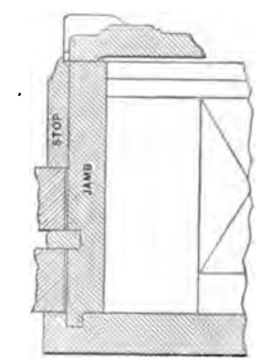



Detail of Window Stool and Apron. Scale, 3 Inches to the Foot.




Top Finish in Vestibule, Front Halls, Front Rooms and Dining Rooms.


Base.




Horizontal Section through Window Frame.

Scale, 3 Inches to the Foot.

*Miscellaneous Constructive Details of Two-Family House at Worcester, Mass.*

# HANDY DEVICES FOR THE CARPENTER

BY PAUL D. OTTER.

IT may be stated without fear of contradiction that handy devices are either the result of a sudden inspiration or a "simmered down" way of doing a thing better than at first anticipated. Competition is in most cases accountable for short cut methods and apparatus quick and double acting. No live man, however removed from active centers or in whatever line of work he may be engaged, can afford to handle unnecessarily or back track on his work. It is unwise in these times to do things the long way, as one's time for rest and recreation is equally valuable with the same time occupied in doing work piece by piece. Those who lack inventiveness should cultivate observation, for many a man will come on the scene who attracts attention by getting through his work and having plenty of breathing time. Upon close study it will be found he has some method or handy contrivance which he has wrought out as the result of time and experience.

From making boxes, one like another, all the way through the range of constructive work, thought should be used in "coming out whole" on a job, whether it be a personal expenditure of time and energy or figuring against a competitor. This businesslike calculation is sure to be valuable "when out for business." The modern factory is augumented throughout with apparatus and devices solely of a hand power class, holders and markers being used to prepare the work for unskilled hands at the machine. This "setting up" practice solves the problem of the ability of a factory to figure closely. In other words, brains think out every detail before a stick is cut. The factory manager holds no patent right in taking a short cut across the field of competition; the same conservation of energy should prevail in the shop.

The illustrations presented herewith are simply memoranda jotted down from time to time and given for the purpose of bringing forth other devices which the readers of *Carpentry and Building* have found to circumvent time and lessen labor. Frequently the spying out of some portion of a broken down machine will offer a suggestion in the making of a tool or the building of another machine adapted to one's needs.

We show in Fig. 1 a very handy clamp made from an old crippled hand screw, the jaws having been reduced to the shape shown and 6 or 8 inches in length; one screw being used, the scope is limited by the filling in block, as shown, which is connected to the jaw ends by a piece of belt leather glued and braded. Two or more of these clamps at hand will be found very useful in repairing, gluing up or temporarily fitting parts. To be without clamps of any description is in connection with gluing up work like losing the oars of a boat in midocean—very embarrassing—for it may only require a little force in a concentrated form to send the parts home. This very frequently is impossible, even though resort is had to a block and a mallet.

An apparatus which is powerful yet portable and which will be found useful when many frames are being made up is illustrated in Fig. 2. The wheel, screw and nut have been parts of an old machine. The heavy block through which the screw passes is held firmly to the bench by two heavy staples clasping and passing through the bench top and washer plates underneath, where they are drawn tightly by large nuts. In default of the wheel and screw the form shown in Fig. 3 is very effective. Certain holes may be made in the bench to receive the four bolts in the block A and the large bolt in the block B. This will permit of the press being readily removed or set up when needed. The enlarged handle is reinforced by a piece of heavy brass plate secured well up on both sides. The L-shaped iron C centers over the lever with a washer intervening on the bolt.

A squeezing press of a permanent form is indicated in Fig. 4, where the principles are clearly shown. It will be found a very valuable machine, as rails and stiles to small frame work can be quickly brought to a tight, square joint. The notched metal plate attached to the

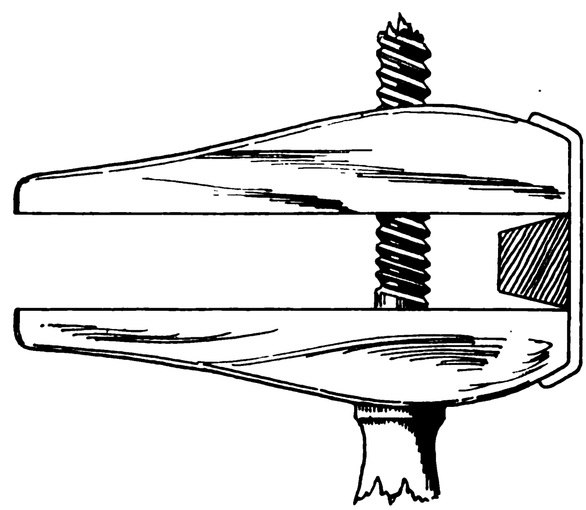


Fig. 1.—A Handy Clamp.


Fig. 3.—Another Form of Frame Holder.

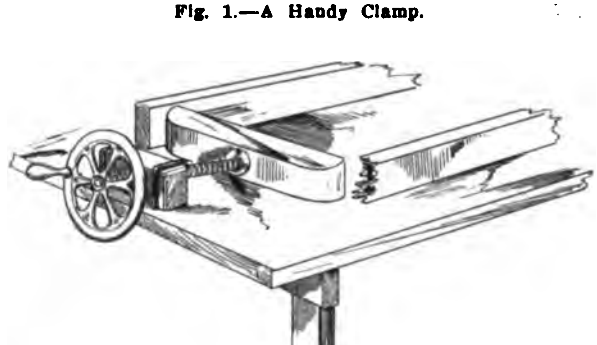


Fig. 2.—Wheel and Screw Apparatus for Making Frames.

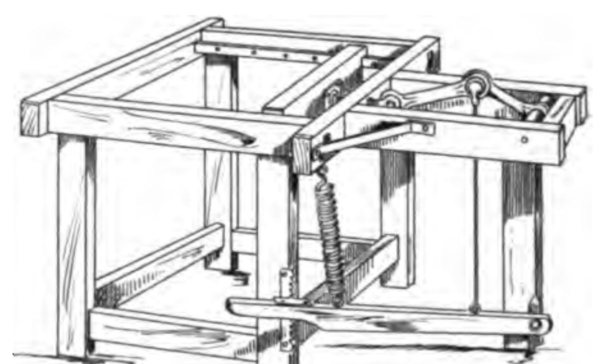


Fig. 4.—Permanent Form of "Squeezing Press."

*Handy Devices for the Carpenter.*

post, as shown, permits of the tension being held until the glue is dry or the boring of holes and the placing of dowels are accomplished.

The sanding stick shown in Fig. 5 and found in use by a careful workman indicates what by some might be considered trifling, but is a real essential when put to use. This stick will prove on further acquaintance with it to be a rival of a wood rasp. The sand, or, better, garnet, paper is held firmly and smoothly to the stick, allowing every bit of surface to be brought into use. The paper being cut overlapping wide should be conformed to the stick; then, with the two laps turned in, sanded side together, the tube is slipped over the stick, the laps sliding into the saw kerf. The same principle is used on power driven sanding spindles.

As the carpenter does not make use of a steel scraper as frequently as a cabinet maker, he may find the proper way to sharpen for a continued use of that tool a little elaborate. This was discussed some months ago in these columns with considerable interest by a number of readers. Holding such a well sharpened scraper in reserve, however, another blade for less severe use may be kept keen on both edges by adopting another craftsman's plan of having a flat, smooth file secured by staples to a stick and having a saw kerf just over the surface of the file. The blade when dull is then drawn through the kerf against the file, insuring a keen, square edge. A careful study of Fig. 6 will demonstrate this point more clearly.

While there are all varieties of metal planes of a modern type many of them do not give the satisfaction that can be derived from the use of such a one as that illustrated in Fig. 7. In this case the body is made from a dry piece of maple or beech. There is a certain easy slip of wood over wood which holds this and the smooth plane in favor with many workmen. By the aid of the blacksmith the manufacture of this routing tool is very easily accomplished and will prove of service in many ways, particularly in producing sunken work on panels and drawer fronts. The block is 2 inches in thickness. The thumb nut when in position on the screw which binds the cutters draws up against an imbedded plate, as shown. In default of the thumb nut an ordinary nut may be used.

Where a considerable number of wedges are used in expanding tenons after parts are glued up the simple device shown in Fig. 8 permits of producing many in a very short time. The sketch shows a 1-inch board marked A laid on top of a cross cut saw table, B. This board is provided with a fixed strip sliding in the table grooves C and permits of its movement up to the strip D, clamped for the time on the saw table. The stock E for cutting into wedges is placed against the handle F, which easily swings by the nut shown between the adjusted stops G G. The adjustment of these stops and also the wood screw inside of the hook end of the handle F determines the taper of the wedge, whether obtuse or acute. The cutting is done by holding the board A by means of the knob H and pushing it before the saw, cutting the edge, as shown. In pulling back it is only necessary to press the wood forward to the screw and stop on the handle, meanwhile swinging the handle against the upper stop G for the second cut.

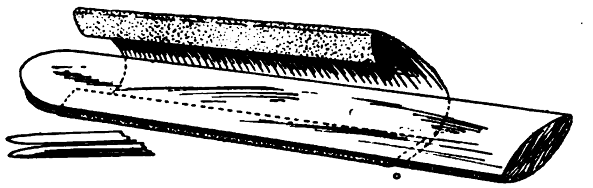


Fig. 5.—Sanding Stick.

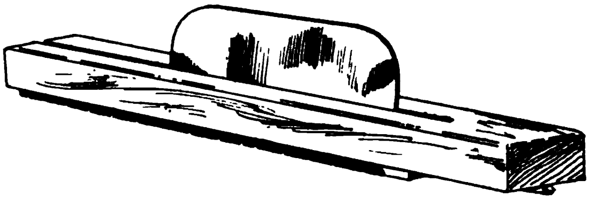


Fig. 6.—Device for Sharpening a Scraper.

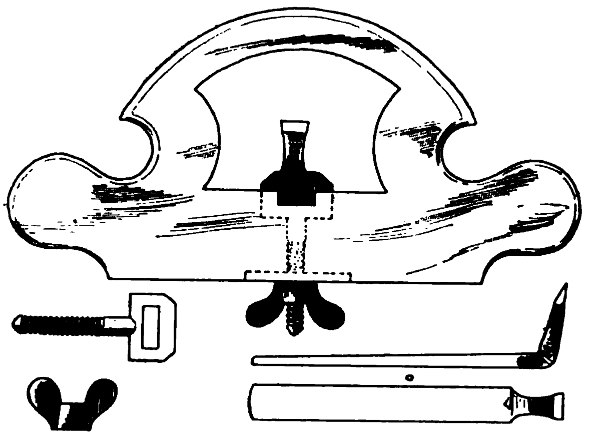


Fig. 7—A Metal Routing Plane.

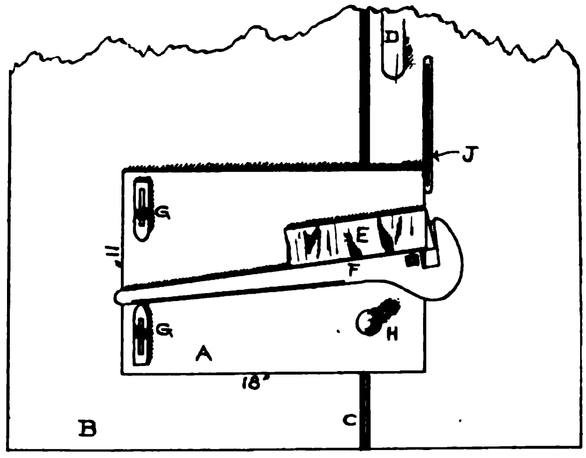



Fig. 8.—Device for Making Wedges.

*Handy Devices for the Carpenter.*

## Bathtubs in Hotels.

There is rapidly approaching completion in New York City a hotel building which has certain peculiarities of architecture which attract the attention of many who pass. The most striking thing about it is the small number of large windows and the large number of small windows, the former being single, rather than double, and on either side of each large window is a small one. One is at a loss to account for it, unless one happens to see a sign on the corner of the building, which says that So-and-So hotel will be opened shortly with "300 rooms and 200 bathrooms." The small windows, of course, indicate the bathrooms. "They might have called it the Bathtub Hotel," remarked an old hotel man, as he studied the building from the opposite corner. "It is the most impressive evidence I have yet seen of the American craze for bathing. I can remember the time, and it was not so many years ago at that, when hotels thought they were well equipped if they had one bathroom on a floor, and we charged a quarter for towels and service. This new hotel, with nearly as many bath as guests' rooms, shows to what extreme the traveling public has pushed the 'room and bath' idea. If it keeps on some enterprising hotel man will be offering a room and two baths, and he'll find plenty of occupants."

The United States Brick Company has been formed in Reading, Pa., with the following officers: President, Albert A. Gery, and treasurer, W. W. Light, both of Reading, Pa.

# BEVELS USED IN CARPENTRY.*

## A Short Treatise on the Principles of Geometrical Drawing.

By George W. Kittredge.

THE same methods may be employed in making drawings of the individual rafters as of the entire roof. In Fig. 8 is shown the normal section of a roof of which A is a section of the ridge, B a side view of a common rafter and C the section of the wall plate. Immediately above is shown a plan of a portion of the roof including

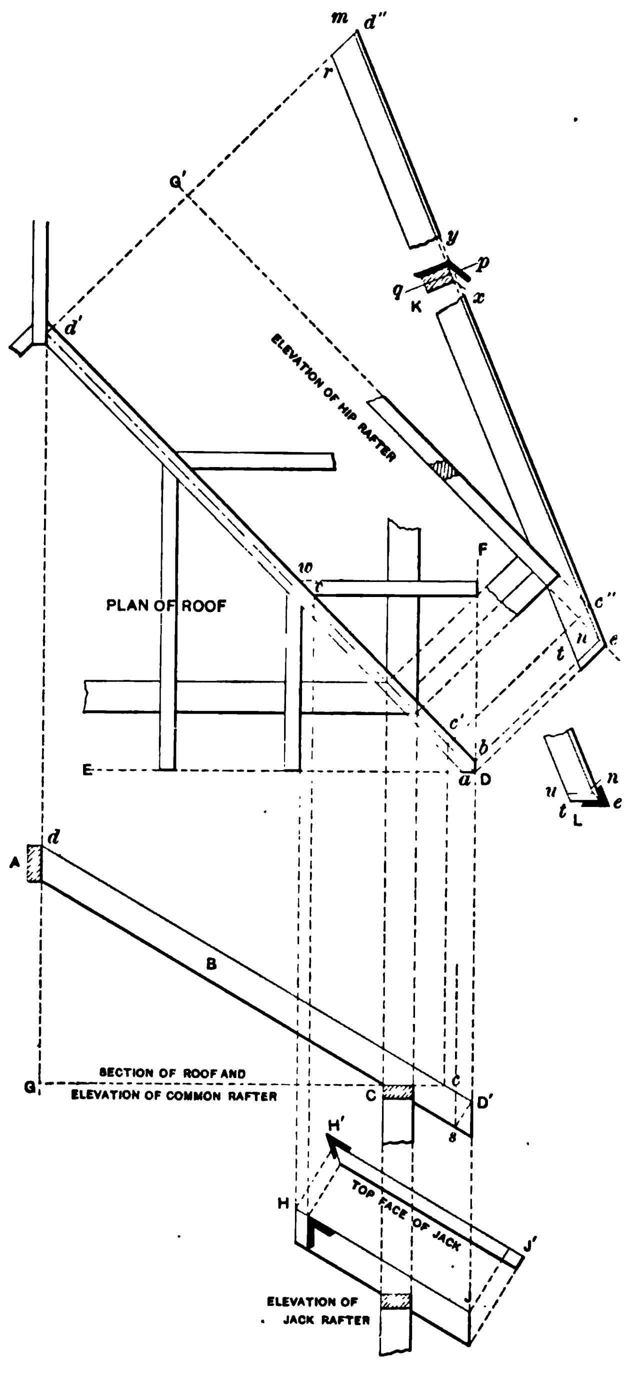



Fig. 8.—Method of Obtaining the Side and Top Views of Hips and Jack Rafters, Showing the Bevels.

*Bevels Used in Carpentry.*

a hip and jack rafters, of which it is required to construct correct drawings giving the length and backing of the hip and the bevels of the jack. First, draw the center line of the hip in the plan, shown dotted, then the wall plates, then set off from the face of the wall plate on both sides of the building, the projection of the rafters, as shown by the dotted lines D E and D F, seeing that they meet accurately on the center line of the hip rafter at D, thus determining the oblique cuts D *a* and D *b* on the foot of the hip rafter, which brings it in line with the points of the rafters on both sides. Now, assuming the top of the wall plate in the sectional view as a horizontal line, extend it to cut the face of the rafter at *c*, and in the opposite direction to meet at G, a perpendicular dropped from the extreme upper end of the rafter at *d*, or side of the ridge A. From *c* and *d* project lines upward, cutting the center line of the hip in plan, as shown at *c'* and *d'*, thus obtaining the correct length of the seat of the hip rafter.

It will now become necessary to construct an elevation of the hip rafter, which is in reality a vertical oblique elevation on a plane parallel to D *d'*. Therefore, assuming D *d'* as a horizontal line, erect vertical lines from points *d'* and *c'* indefinitely in the space above, across which at any convenient hight draw the horizontal line G' *c''* as the base line from which to measure hights. From G' set off G' *d''* equal to G *d* of the section and draw *d''* *c''*, which extend far enough to complete the lower end of the rafter. Now set off the width of the rafter as required and draw the lower line and wall plates all as shown. To complete the elevation of the lower end of the rafter, project lines vertically from points *a* (or *b*) and D into the elevation, as shown. The line from D gives the end of the rafter on its center line and intersects at *e* with *d''* *c''* extended, which represents the center line of the top surface of the rafter. Since now the lines D *a* and D *b* of the plan must be horizontal in order to be in line with the points of the other rafters, draw a horizontal line from point *e* to intersect with the line previously projected from *a*, as shown at *n*, and from *n* draw the line *n m* parallel to *d''* *c''*, which completes the elevation and gives the backing or bevel necessary to bring each half of the top surface of the hip rafter into the same plane with the tops of the adjacent jacks. The exact bevel of the backing can be formed by constructing a right section of the rafter, as shown at K. First draw *p q* at right angles to *d''* *c''*, on each side of which set off half the thickness of the rafters and draw the side lines. A line drawn from the intersection of *p q* with *d''* *c''* to the intersections of the sides with the line *m n* at *x* and *y* will give the required bevel.

If it be required to cut the ends of the rafters off square, as shown by D' *s* of the sectional view, then a line from point *s* must be projected first into the plan to cut the center line of the hip between the points D and *c'*, thence to the oblique elevation cutting the bottom line of the rafter at *t*. A line drawn from *t* to *e* will then give the required cut across the end of the hip rafter, and a line from *n* parallel to *e t* as shown by *n u* will give the bevel necessary to bring each half of the end surface into the same plane with the ends of the jack and common rafters if cut, as shown by D' *s*, all as shown in the separate view at L. The plumb cut at the top end of the hip rafter is obtained from the vertical line *d''* *r*.

All of the work shown in Fig. 8 and in those following can be done full size since it is not necessary to use the full length rafter in the operations. If the pitch of the roof D' *d* has been correctly drawn first, the point G may be assumed at any convenient distance from C. In fact, if its true distance in feet from C has been set off according to a particular scale, then the correct length of the hip, when obtained, may be determined by applying the same scale to the line *e* *d''*, while the details of the rafter are drawn full size.

To find the bevels of the jack rafter of the same roof, first construct an elevation of it by projections from the plan, as shown below the section—viz., draw H J parallel to D' *d*. The end J is determined by projection from D', and the lines of the upper end by projection from points *v* and *w* of the plan, giving the plumb cut.

* Continued from page 10, January issue.

The top surface H' J' of the rafter is now obtained by projection from the points on H J, as shown, in exactly the same manner as the roof surface of Fig. 7 was obtained from the points on the line A B of that figure.

The plan in Fig. 8 shows a hip between roof surfaces of equal pitch. Were they of unequal pitch the angle of the hip in plan would then be other than 45 degrees, as shown. Its angle would, of course, be the diagonal of a rectangle whose sides are respectively equal to the seats or "runs" of the common rafters. The plan having been correctly drawn, the subsequent work is performed in the same manner as above described, but, however, with different results. The backing of the two sides of the hip would be unequal, because the lines D *a* and D *b* would be of unequal length; likewise the bevels shown at L for the same reason, and separate projections would have to be made of the jacks for the two sides of the roof, because the angle *v w* would be different in each.

The method of obtaining the length and top cut of a valley rafter is exactly similar to that of obtaining the hip, but no beveling corresponding to the backing of the hip is considered necessary. Such bevels if obtained would, for obvious reasons, result in a channel cut in the upper edge of the rafter which would, of course, be the exact counterpart of the ridge or projecting angle on the hip. Since if the method described in obtaining the hip rafter be followed the center line of the valley will be in the plane of the roof and the edges of its top surface will necessarily be below that plane. It is evident, therefore, that the ends of the jacks coming against it must be set above the valley at its sides an amount equal to the depth of the backing of the hip rafter—that is, a distance equal to the space between the lines *d" c"* and *m n*. In the case of the bottom of a jack to come against a valley rafter it is simply necessary to first draw a correct plan of that portion of the roof, after which the method of obtaining the side and top face is the same as shown in Fig. 8, with the result that the beveled end of the jack will come at the bottom end instead of at the top.

It is sometimes required to construct dormers or gables whose ridges are inclined as shown in Fig. 9. In this case the principles of descriptive geometry must be applied with extreme care to the completion of the plan, front and side elevations of the timber work, after which the top and bottom surfaces of the rafters may be easily projected from the front elevation, as shown at the left. The essentials of these views are of course the inclination, or pitch, of the ridge A B of the side view and of the common rafter A' E in the front elevation, and also of the main roof G B, should that be a feature of the design. Space the rafters and set off their thickness in the side view, as shown, and from the intersections with A B, as at *a* and *b*, project lines to cut the side lines of the ridge A' B' in the front view, and from these points of intersection draw lines at the proper pitch, representing the upper edges of the common rafters, as shown, after which the bottom line showing the width of the forward rafter may be drawn parallel and the cut to fit over the wall plate at E determined. Now project the upper surface of the wall plate into the side elevation, cutting the face of the first or outer rafter, as shown at C, and draw C D, the top of the wall plate, parallel to A B. From the intersection of C D with the back lines of the forward rafter at *c* project a line back to the front elevation, cutting the outer vertical side of the wall plate at *e*. A horizontal line drawn from *e*, shown dotted, will then show the cut for the wall plate on the back surface of the rafter, due to the inclination of the wall plate. A right section of the rafter, showing the exact bevel of its upper surface, may now be constructed as shown at F, in the manner previously explained with regard to the section at K of Fig. 8. Should the rafter be required to extend beyond the wall plate set off the desired projection in the plan as shown at H, and carry this point into the front elevation, thus giving a correct view of the end of the rafter, as shown at J in that view. The top surface of the rafter may now be obtained from the elevation by projection, as shown above, while the method of obtaining the lower side, showing the oblique notch to fit over the wall plate, is clearly shown below. In obtaining the top surface it must be remembered that the width set off must be equal to *r s* and not to the thickness of the rafter. According to the rule of the juxtaposition of views, as explained above, the lower, or right hand, side of the upper development and the upper side of the lower development represent the side of the rafter shown in the elevation, so there can be no question as to which way to slant the bevels.

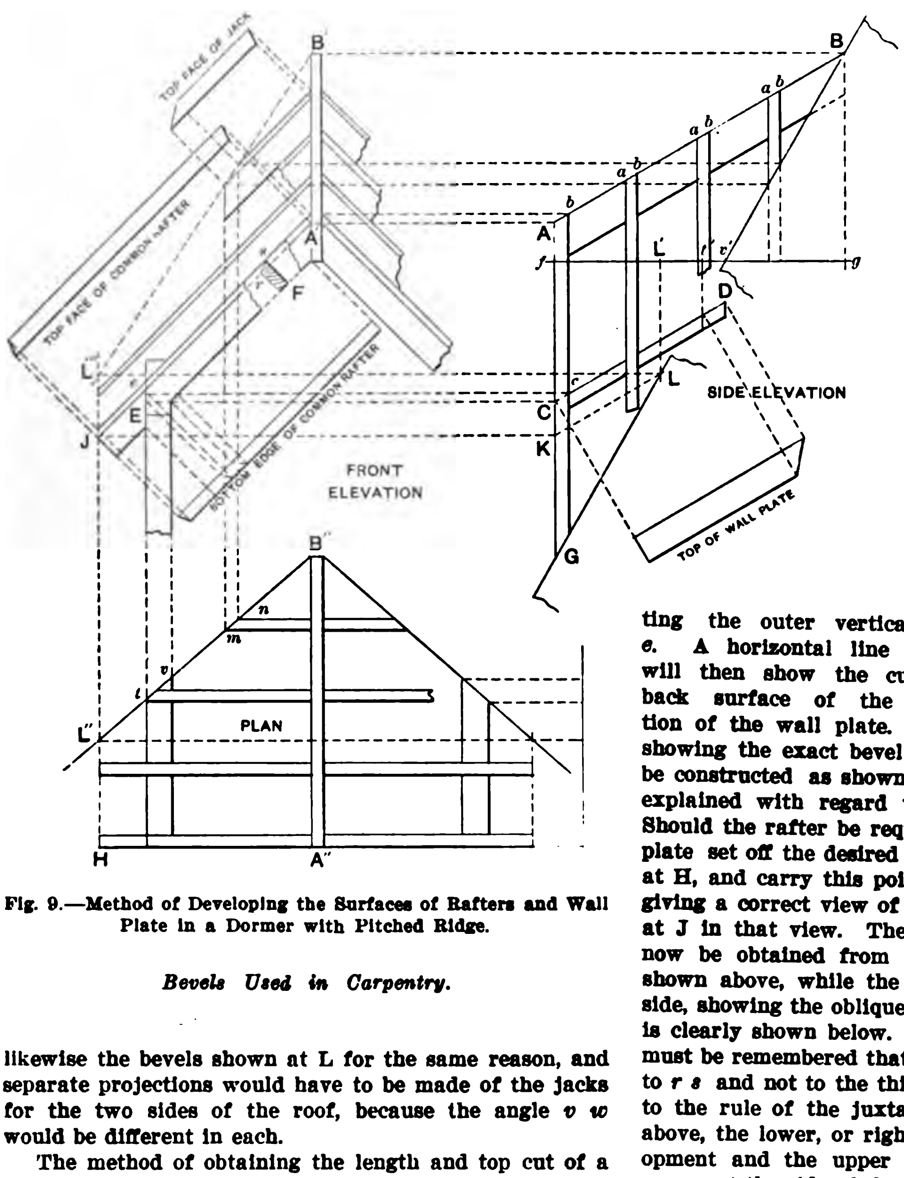



Fig. 9.—Method of Developing the Surfaces of Rafters and Wall Plate in a Dormer with Pitched Ridge.

*Bevels Used in Carpentry.*

Before the elevation of a jack rafter for this roof can be completed it will be necessary to find the position of a line representing the side of a valley rafter in plan. Therefore first project the lower point at J into the side elevation, as shown at K, and draw K L parallel to A B, cutting the line of the main roof G B at L. The positions of points L and B must now be found on any horizontal line, as at L' and *g* on *f g*, and their positions then found in the plan, H L" being made equal to *f* L' and A" B" equal to *f g*. Now draw L" B" representing the side of a valley rafter and extend the sides of the rafters in plan to meet it as shown at *m* and *n*, the spacing of the rafters having been transferred from the spaces on *f g*. The elevation of the jack may now be completed by projections from points *m* and *n* of the plan as shown by the dotted line. Since the side of the valley rafter, and, in fact, of all rafters in general, is a vertical plane, the side cuts of the jack at the foot must therefore be vertical, as shown by the line from the point *m* of the plan. The elevation of the jack may be verified, if desired, by first projecting the points L into the elevation as shown at L‴ and drawing L‴ B′, which should, if no error has been made, coincide with the bevel as previously obtained from *m* and *n;* this method, if used alone, is however, more liable to error than that of obtaining the points from the plan. The bevel at the end of the wall plate to fit against the side of the valley rafter may be obtained as follows: Measure the distances of *t* and *v* from H A″ of the plan and set them off *f g* of the side view, as shown at *t′ v′*, then drop those points into the line C D, which, as previously explained, was drawn parallel to A B. The top of the wall plate may now be found by the usual method of projection as shown below.

*(To be continued.)*

## Chicago's Largest Mercantile Building.

An important building operation that has just been commenced in the city of Chicago involves not only the usual arrangements for stores and offices on a large scale, but also a theater, a library, a club house and a dining hall, which will be devoted to business purposes and to the use of the employees of the concern for which the building is being constructed. According to the plans of the architects, Nimmons & Fellows, Marquette Building, Chicago, the principal structure of the group will be the merchandise building, 441 feet long by 337 feet wide and eight stories and basement in hight, with a court in the center 140 feet wide and 200 feet long. An ornamental feature will be a water tower 50 feet square and 200 feet in hight, in which will be stored tanks for the sprinkler system and the water supply of the entire plant. The construction will be of the highest type of "mill work," and the exterior of the building will be faced with vitrified brick, with trimmings of terra cotta and Bedford stone. The court will be covered with a glass skylight. In the rear of the merchandise building, in which the floor space of the shipping room, freight room and depot will aggregate 360,000 square feet, there will be two additional structures, each 700 feet long and 115 feet wide, designed to carry heavy articles of merchandise.

The administration building will be 400 feet long and 150 feet wide and will provide accommodations for a clerical force of 4000 hands, with provision for future extension. The rear of the building will face a park containing a small sheet of water and landscape effects. The club house for the employees will stand at the extreme eastern end of the property, surrounded with lawns and trees. The power plant will be contained in a building 200 feet long and 75 feet wide and will be up to date in all respects. These buildings, with their adjuncts, which are being put up for the Sears-Roebuck Company of Chicago, will cost something over $2,500,000, and the contract was awarded a few weeks ago to the Thompson-Starrett Company of 49 Wall Street, New York City. This is probably the largest building contract that has been given out in this country in recent years.

THE new post office building which is to be put up in Providence, R. I., will be constructed in accordance with plans prepared by Clarke & Howe, architects, of 72 Weybosset street, of that city. The material used will be what is known as Deer Island granite, and the building will be four stories in hight, covering a ground area 125 by 190 feet. The first floor will be devoted exclusively to the use of the post office, the second floor will be assigned to the use of the Customs and Internal Revenue Departments, while the third floor will be used by the United States courts. The fourth floor will be used for such purposes as the near future may determine. The contract has just been awarded for the construction of the building to Horton & Hemenway of Providence, R. I., for $459,290, and the work is to be completed by December 1 of the current year. The work covered by the contract includes simply the walls, floors and roof of the structure, but none of the interior finishing, heating, ventilating and plumbing appliances, nor the electrical work, for which separate estimates will be asked.

## Convention of Manufacturers of Sand-Lime Products.

Representatives of manufacturers of sand-lime products in various sections of the country, but principally in the Central West and Northwest, gathered in Cincinnati, Ohio, on December 5 and 6 and effected an organization known as the National Association of Sand-Lime Manufacturers. An interesting feature in connection with the meeting was the fact that it was held in the very room where the National Brick Manufacturers' Association was organized September 22, 1886, and where the nineteenth annual convention of that body was held in February last. The constitution and by-laws adopted were patterned after those of the Brick Makers' Association, and the objects of the new organization are "to promote the interests of those engaged in the manufacture of all sand-lime products by the discussion of questions pertaining thereto, and to establish and maintain more intimate and friendly relations between manufacturers of sand-lime products."

At this meeting a number of interesting papers dealing with methods of manufacture, cost, &c., were read and discussed, much valuable information being brought out. An idea of the scope of the papers may be gathered from a few of the titles, which were: "A Model Sand-Lime Brick Plant," by H. O. Duerr of Wilmington, Del.; "How to Get Sand-Lime Brick Before the Public," by J. L. Jackson of Saginaw; "Drying Sand," by P. L. Simpson of Chicago; "Shall the Sand-Lime Brick Men Join the National Brick Manufacturers Association?" by W. K. Squier of Syracuse, N. Y., and "What Are the Brick and Other Trade Journals Going To Do for the Sand-Lime Brick Industry?" by T. A. Randall of Indianapolis, Ind., and E. H. Befebaugh of Louisville, Ky.

The officers elected for the ensuing year are: President, W. K. Squier, Syracuse; vice-president, Robert E. Dolan, Denver, Col.; treasurer. William King, Cedar Rapids, Iowa; secretary, H. O. Duerr, Wilmington, Del.

## Convention of New York State Association of Builders.

As this issue of the paper goes out to our readers the New York State Association of Builders is holding its annual convention at Elks' Hall, Fifty-ninth street and Eighth avenue, New York City, the local Committee of Arrangements consisting of Stephen M. Wright, Lewis Harding, Ronald Taylor, Harry Stephenson, Edwin Outwater, A. E. Pelham and Augustus Meyers. A feature of the convention is to be a complimentary dinner tendered the delegates by the Mason Builders' Association and the Mechanics' and Traders' Exchange of New York. A report of the proceedings of the convention will appear in our next issue.

THE Society of American Artists will hold its twenty-seventh annual exhibition at 215 West Fifty-seventh street, New York City, from Saturday, March 25, to April 30, inclusive. Original works in paintings and sculpture not before publicly exhibited in the city of New York and approved by the jury of admission will be accepted for this exhibition. A number of prizes are offered, and a work of art may be eligible for more than one prize, according to circumstances. A circular issued by the secretary, Henry Prellwitz, gives full particulars relative to the rules governing the exhibition.

A SCHEME to make New York a fire proof city has been suggested to Commissioner John T. Oakley of the Water Supply Department by committees representing the Merchants' Association and the Retail Dry Goods Association. The plan is to equip the windows on all buildings throughout the city with a water shower, which is to be connected with pipes leading from the street. In case any building is threatened by fire which starts in an adjoining building these showers can be turned on by the firemen and thus make safe the endangered property.

# THE EVOLUTION OF A BALUSTER

By C. Tobyansky.

PERHAPS one of the most interesting performances in the line of manual labor is that of wood turning, more especially so to the smaller articles of manufacture, such as balusters, chair spindles, grille work and small fancy productions. Under the manipulation of tools by a skilled turner the forms develop so rapidly as to create the impression that the tool in his hands was the magic wand of our fairy tales. Often have I had visitors, to whom the operation of wood turning was new, watch the performance with something akin to fascination, and still it appears so very easy—and is when you know how. It is, however, an art not at all easy of acquirement. In fact, there is no branch of machine work in the wood working line which requires more skill or greater judgment and taste as regards shape and design than that of wood turning.

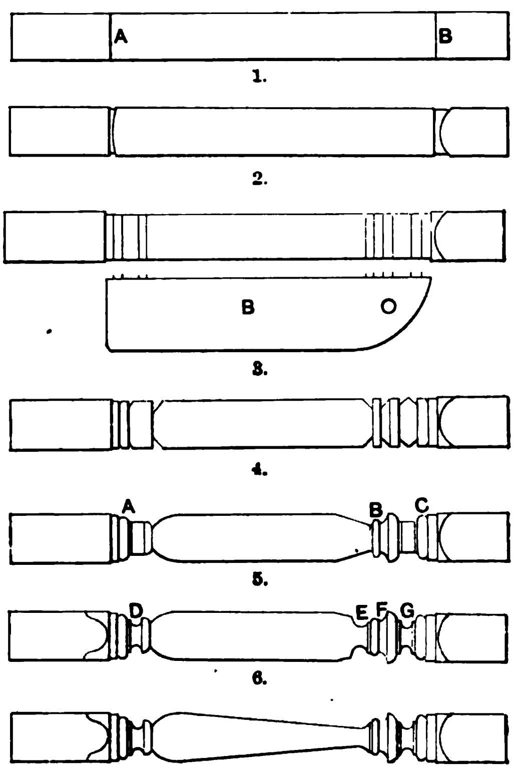
We see the expert violinist handle that instrument of wonderful possibilities, and it seems so easy to one who never attempted to play it. It appears to be only a question of placing the fingers in their proper place and touch the bow to the right string, but we know it is the result of long and continuous devotion and practice reaching into many years. So with the turner. It is only a question of holding the tool at a proper angle, combined with quick and accurate judgment as to the size and shape. That is truly all, but it demands a degree of taste and skill which some persons can never acquire, be they ever so diligent of practice. Perhaps it may be truly said of turners that "many are called, but few are chosen." The number who are truly first class in all branches and have the much needed artistic taste, coupled with mechanical skill, are few and far between.

The many forms of automatic lathes, with their cheap substitutes—almost an apology—for good hand turned work, has given this once splendid and remunerative profession a severe blow. Still, there has been quite a reaction of late. The market is evidently wearied of the stereotyped reproductions without workmanship, taste or individuality—rough and uncouth.

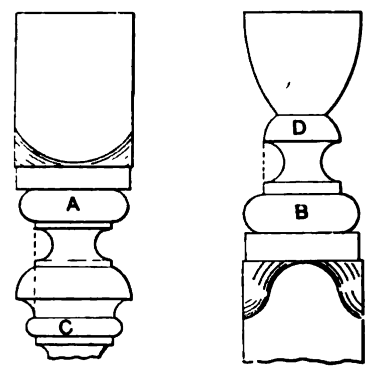
But to consider the subject as indicated by the heading of this article! In order to explain the evolution of a baluster I would refer the readers to the illustrations, Figs. 1 to 7, inclusive. I have chosen for my example a common porch baluster with square ends and chamfered corners. Fig. 1 shows the square stick, the pencil marks A and B showing the length of the turning. The expert turner would place these sticks between centers of a rapidly revolving lathe without stopping the machine. Fig. 2 shows the same piece cut down at the squares and one end chamfered while the chisel is in hand, the other chamfer requiring a gauge. The next step in the work is shown in Fig. 3 and is called roughing out. The scratch marker indicated by B of Fig. 3 is now brought into play, simply pressing it against the material in the position shown. This marker consists of a piece of hardwood about ⅝ inch thick, 3 inches wide and of a length as between squares. For each member, or mold, on the baluster two brads filed to a point are inserted in the marker, thus giving the width of the mold and the relative distance from other parts. This tool then gives all the guide lines required to proper placing of each respective mold in the entire baluster. There are other means of accomplishing this end, but none more quick and accurate.

The next step is to again take the chisel and make a series of V cuts, as indicated in Fig. 4, taking care to carry the line or cut down vertically at each mark, thus preserving the relative distances. This is a point worthy of note, as it is most distracting to the eye to look along a baluster and see the molds displaced—out of true, so to speak, with one another, the same as displaced type in print. Good judgment also is needed as to the proper depth of the cuts.

Keeping the same tool in hand, the next step is to form the molds and beads, giving the material the form shown




Figs. 1 to 7, Inclusive. Showing the Various Steps in the Production of a Baluster.




Figs. 8 and 9.—Base and Top of Fig. 7, Enlarged.

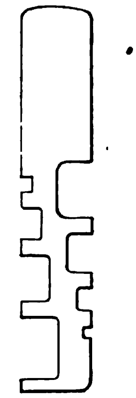


Fig. 10.—Plate Iron Gauge.

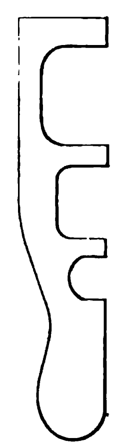


Fig. 11.—Gauge for Balusters of Varying Size.

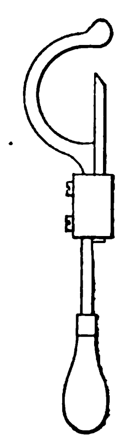
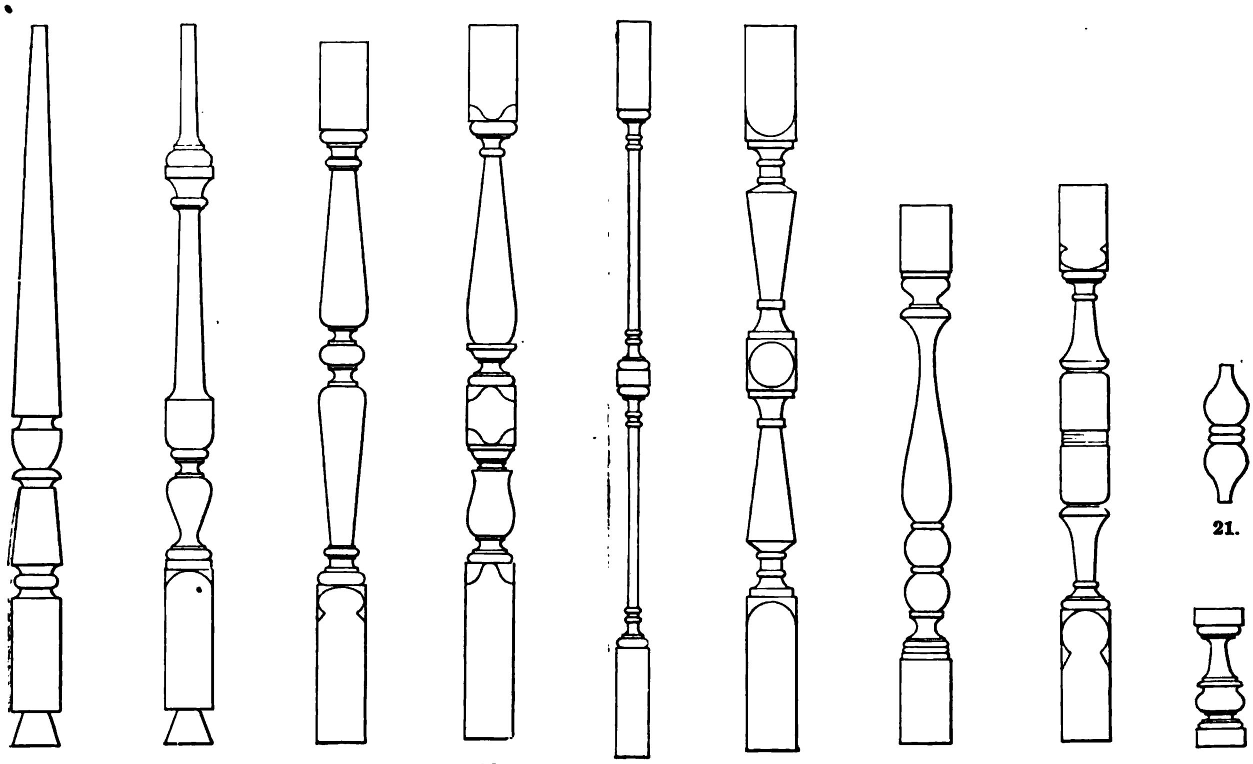


Fig. 12.—A "Goose Neck."

*The Evolution of a Baluster.*

in Fig. 5, where A, B and C are the beads. Next a narrow gouge is brought into use, cutting the coves and half coves D, E, F and G one after another from left to right, or in the opposite direction, as may be preferred. It is immaterial at which end the work is commenced so long as it is gone over once only. We now form the ogee chamfer on the bottom square. The baluster has now progressed to the shape shown in Fig. 6 and the small gouge is exchanged for a larger one to take off the bulk of the tapering shaft, finishing up with the chisel, when the evolution is completed, as indicated in Fig. 7. It only remains to sandpaper the work, but even this simple operation requires care so as not to round up or cut away the small clean cut corners which give hand work its distinctive characteristic.

It will be noted that thus far only three tools have been used in the production of this baluster—namely, a 1½ or 2 inch roughing gouge, a ½-inch gouge and a ¾-inch chisel. These are quite sufficient for so simple a pattern, and, indeed, for many patterns far more elaborate. Still there are turners who persist in handling as many tools as possible—a parting tool, which is a chisel about ⅛ inch wide, ground square across; gouges and chisels of differing sizes for the wider and narrower beads and coves—handling as many as six to nine tools on the commonest patterns. This is absolutely needless in most cases and means a waste of both time and energy.



13. 14. 15. 16. 17. 18. 19. 20. 21. 22.

**Figs. 13 to 22, Inclusive.—Samples of Stair and Porch Balusters and Spindles.**

*The Evolution of a Baluster.*

The baluster shown in Fig. 7 ought to be produced at the rate of about 20 an hour, allowing three minutes to each. This implies the placing of material properly between centers, turning and sanding, and in order to do the work properly the tools must be kept as keen almost as razors. It will be readily perceived that the handling and sharpening of a lot more tools than needed is retarding, and also that to the man upon whose ability to produce a certain quantity and quality of work the amount of his compensation depends the selection of well fitted tools is a matter of great importance.

Having selected the proper tools, the next matter to be considered is the handling of them in the most economical manner as regards time. Referring again to Fig. 7, it will be noted that there are five beads or half beads requiring the use of a chisel and four coves requiring the gouge. I have seen turners—numbers of them—pick up their chisel and cut the first bead, replace it with a gouge to cut the cove, retake the chisel and form the half bead, then pick up the gouge again for the cove, and so on to the end, all of which means lifting the chisel from the lathe five times and the gouge four times between the stages represented by Figs. 5 and 6 of the illustrations. This kind of a turner will work in the sweat of his brow; indeed, grabbing this tool and that, hustling and bustling and accomplishing comparatively little, or if he does do a fair day's work it is at the expense of a vast amount of energy. But the casual observer, not understanding the tricks of the trade, would probably remark to himself, "Gee, that fellow is a hustler!"

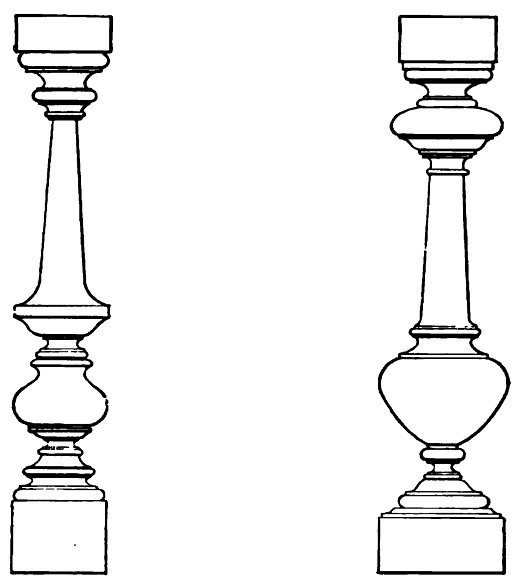
But behold the man who knows his business. No grabbing, no fumbling or fuming, for he works with the smoothness of an automaton. His appears to be the touch of magic, not of labor, while the other fellow—the hustler—exchanges his tools nine times and the expert, the man who thinks and plans, changes once. The chisel traverses the work once from end to end, cutting beads and half beads with precision and regularity. The gouge comes into play, one cove after another, and the trick is done. But the casual observer, after recovering from his astonishment, would remark, "Dead easy, isn't it?"—and such is life.

Another point is that of measurements. On a common baluster, such as indicated in Figs. 8 and 9, which represent the base and top of Fig. 7 drawn to a much larger scale, the expert turner would take no measurements at all. This may even be said of the average porch and stair baluster. The beads A and B would decide the size—meaning diameter—of C and D, and the cones being a half round decide themselves. But when tenons like those shown in Figs. 13 and 14 are considered then great accuracy is required, as they should fit the rail hole closely, thus strengthening the entire structure. The size is best obtained by a gauge made of plate iron and illustrated in Fig. 10. This is a very handy tool, quickly applied, and any turner can make one by means of emery wheel or file. When the product is a larger one, such as a 3 or 4 inch veranda baluster, where sizes vary greatly, I have found it most practical to take a piece of thin maple or other hardwood and with a band or jig saw cut the required sizes into the one piece, as shown in Fig. 11. The piece may be as long or short as the number of differing sizes require. One may use calipers, of course, but it takes time to handle three or four of these and select the proper one each time. When it is a question of a few duplicate balusters, as in repair work, or some single article, such as patterns and the like, then the caliper and compass play an important part.

The "gooseneck," shown in Fig. 12, is a handy tool; also is adjustable to any size within its capacity. But the stuff must be roughed down to very near the right size before it can be utilized to advantage. If this tool was improved upon in some manner so it could be applied to the stuff in the square or when merely roughed out it would have a much wider range of usefulness.

In the illustrations, Figs. 13 to 20, I have chosen the plainer and the most representative styles only, all of which may be elaborated upon to a great extent according to the fancy and taste of the turner or his customer. The more highly ornamented styles, fluted, twist beaded, &c., which bring into play other special machines, I will discuss at some future time.

The baluster shown in Fig. 13 is called a round spindle top, it having no square parts, and the upper or



Figs 23 and 24.—Colonial Veranda Balusters.

*The Evolution of a Baluster.*

spindle end fits into the rail hole. This design is more entitled to distinction because of venerable age and general use than because of its beauty. It is met with as frequently on the Continent of Europe as it is in this country.

In Fig. 14 is shown a spindle top with square chamfered base, plain but neat, while in Fig. 15 is shown what is known in the turners' vocabulary as a "double ender," because the pattern repeats itself on both sides of the center—a deservedly popular design. The next style, shown in Fig. 16, earns distinction because of the additional square near the base, all squares having an ogee chamfer. This style is also used in tremendous quantities.

With the design shown in Fig. 17 the writer had troubles of his own once turning a large lot of them out of gnarled red birch. They are, as will be observed, long and slender, ⅞ x ⅞, the shaft being ½ inch. It requires tender, almost reverent, touch to turn these and not have them break at some stage of the proceedings, but they give a handsome appearance to the baluster when placed very close together. In Fig. 18 is represented a double ender having a central square, as has also that shown in Fig. 17. It will be noticed that this central square in the former is chamfered in such a manner as to leave a true circular space. This is often further ornamented with turned rosettes on four sides. In Figs. 19 and 20 are represented porch balusters somewhat more elaborate than the one shown in process of evolution. It will be observed by looking at the different styles presented that much beauty and distinction can be given a baluster by different forms of chamfering on the squares. When these forms are such as shown in Figs. 15, 16, 18 and 20 it is well to draw additional pencil marks on the material as guiding lines. In Figs 21 and 22 are shown common porch spindles.

The more elaborate productions of the turner's art shown in Figs. 23 and 24 are porch balusters designed to be used with colonial columns. The smaller one is 4 x 4 and the larger 5 x 5, with the exception of the top square, which is reduced to 4 x 4 by running the material while in the square over the jointer a little way down on four sides. This is sometimes done with top and base squares, both giving the center mold more preponderance.

In the rich and imposing styles of colonial architecture, with its verandas, balconies and roof balusters, the hand turner has a field not as yet invaded by automatic machinery, and it is hardly likely that it ever will be so infested, as the many delicate members cannot well be produced except by the skillful hand of the turner.

## Dull Finish for Natural Woods.

Suggestions regarding the finish for natural woods in interior work are always interesting, and our readers are likely to obtain a hint or two regarding this matter from the reply presented in a recent issue of the *Painter's Magazine* to a correspondent of that journal, who stated that he desired to give a dull finish to the woodwork of three rooms, one of which was to be in birch, another in oak and the third in Georgia pine. He wanted to know the best method of producing the desired result, stating that he had had poor success in filling oak, and raised the question if he should apply two coats of paste filler. In conclusion he inquired what was best for rubbing, pumice stone and water or pumice and oil?

In reply to these questions the journal named offered the following: Birch belongs to the close grained woods and does not necessarily require filling, yet where it has been stained, many finishers are of the opinion that paste filler colored to suit the stain brings out some pretty effects not otherwise obtained. Whether filled or not, at least one coat of white shellac should be applied before the rubbing varnish is put on, and the latter need not be extra pale for this wood. Two coats of interior or cabinet rubbing varnish at least are required for a good finish, and three coats are none too many. Each coat of varnish should be permitted to stand 48 hours, and then be lightly rubbed with steel wool or curled hair before applying the next coat. The final coat should be allowed to stand at least three days, and then be rubbed to a dull finish with pumice and water. The work must be cleaned up well, and if the finish is too dull, go over it with a little rotten stone and rubbing oil. The pumice stone must be free from grit in order to avoid scratches.

White oak as well as dark oak belongs to the coarse, open grained variety of woods, and is difficult to fill properly. However, we do not believe in two applications of paste filler, and if one application is insufficient the fault is with the quality of the filler, though it may be in a measure due to inferior finish of the wood.

Color the paste filler, if necessary, to suit the wood, apply one full coat, allow to set from 15 to 30 minutes, remove the surplus with waste or excelsior shavings, and after 24 hours sandpaper lightly and dust off. Then apply a thin coat of white shellac varnish, and when dry again sandpaper lightly and you will find the wood well filled. Now apply the interior rubbing varnish, treating each coat as described for birch. Georgia pine is a sappy, close grained wood and requires no paste filler, but it is best to give a thin coat of white shellac varnish, which when dry should be sandpapered lightly. Over this coat of shellac as many coats of interior rubbing varnish of light color as your contract will permit should be applied, each coat to be rubbed as above. A light colored varnish is recommended, because varnish of dark color does not make a good appearance over this wood.

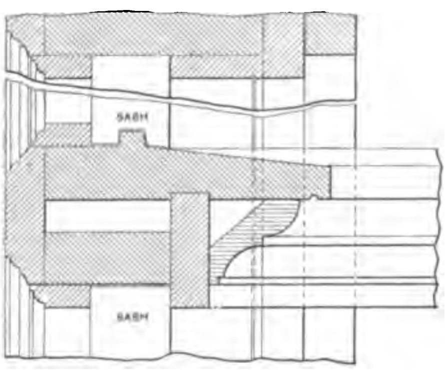
# CORRESPONDENCE.

### Ventilating an Icehouse.

*From* H. L. J., *Rose Creek, Minn.*—I am building an icehouse 9 x 9 feet in plan and 14 feet high, with a floor in it 6 feet high. I intend to use the lower part for a refrigerator and keep ice above. I am going to put a galvanized iron pan over the refrigerator to catch the water as it drips from the melting ice, and I would like to know how to ventilate in such a way as to get a good circulation in the refrigerator. I have taken *Carpentry and Building* for a year and am free to say that I would not be without it. I have, however, never seen anything in regard to icehouses or refrigerators, and therefore come to the Correspondence department for information.

### Constructing a Transom Bar.

*From* A READER, *Schenectady, N. Y.*—Inclosed find sectional drawing of transom bar for cottage front window with its application to frame and the architrave to it as per the request of "M. S. M." of Spokane, Wash. I




*Transom Bar for Cottage Front Window.*

trust it will meet his requirements, as it is neat in appearance and inexpensive.

### Design Wanted for Modern Piggery.

*From* A. A. B., *Plantsville, Conn.*—As a subscriber to and a reader of *Carpentry and Building*, would it be too much to ask some of the experienced men to furnish for publication their ideas of an up to date piggery, also of a farm barn? I have subscribed for the paper for several years and find it very helpful, especially as I am still under 30 years of age and my experience is limited.

### Should Roofing Tin Be Painted on the Under Side?

*From* N. & G. TAYLOR COMPANY, *Philadelphia, Pa.*—We note the communication from "S. F. B." in the December issue, and this matter has peculiar interest to us. Our experience seems to show conclusively that there are agencies in tarred paper that are injurious to roofing tin. We constantly warn roofers against the use of anything but rosin sized roofing paper under tin roofs, and of course tin should be painted with one coat on the under side before it is laid, as there is nearly always some little condensation of moisture on the under side of the tin unless the upper part of the building is exceptionally well ventilated. The use of such material as tarred paper, acids and patent paints are only a few of the modern methods which have been responsible for some of the dissatisfaction that has been experienced with common tin roofs.

We are constantly finding evidence that good roofing tin does not receive the same treatment as was customary in olden times. There is not so much care taken in laying the tin, and after the roof is completed it is common practice to use the tin roof as a thoroughfare and as a dumping ground for various materials. We have seen workmen with heavy hobnailed shoes trampling over the tin work, and shoveling various materials about on the freshly completed surface. In the early years of the tin roofing business the roofer took pride in his work, and saw that good tin was used, that it was properly laid, and that it was not maltreated afterward and that it received some attention in the way of possibly an extra coat of paint every five or six years. A good material, intended to last for an indefinite length of time, should receive reasonable treatment, and if good standard roofing tin were always insisted upon, and at the same time good workmanship, there would be fewer complaints of roofing tin as a class. We believe these facts are conceded by many of your readers interested in the roofing trade, and we therefore respectfully submit them for publication in your columns.

### Rule for Proportioning Doors.

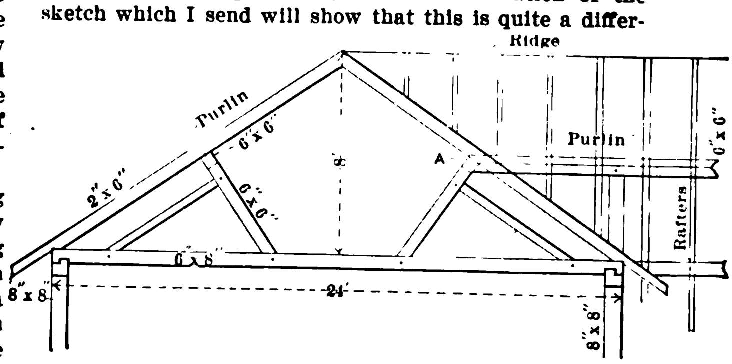
*From* J. F. D., *Dallas, Texas.*—Will some of the many readers of the paper give me through the Correspondence department a rule for proportioning doors; also for laying out roofs in feet and inches as is done out on the jobs, and not in some architect's office and upon paper at that? How much will each hypotenuse line gain per foot run of the base line? I would like to see more explanatory work given from actual measurement as is done with the steel square rather than geometrical solutions, as poor boys would then learn to read the square more accurately.

### Why Do Cypress Shingles Split?

*From* T. A. L., *Mobile, Ala.*—In the January issue of the paper "L. M. R." of Riverhead, L. I., asks why cypress shingles check and split. If he has reference to Southern Florida cypress shingles it is doubtless due to the fact that he puts two nails in them. We learned a long time ago to put in only one nail, and that about ¾ inch from the edge of the shingle, for the reason that cypress never gets through shrinking. When a shingle gets wet it will swell, and in dry weather it will shrink. We always nail them on right out of the bundle, wet, and place them so that about one-third of the shingle covers the joint, and the next course of shingles will give you another nail. Shingles gotten out in Florida are 5 inches wide.

### Finding Cut for Purlins.

*From* J. C. W., *Berlin, Pa.*—I send herewith a pencil sketch which is intended to bring out the question I am about to ask. Who will tell me how to lay out with the steel square and so as to fit neatly the two purlins which meet at the point indicated on a roof, both having the same pitch? The sketch shows a roof with one-third pitch, but to my mind one-half pitch would not be so difficult to work. I am aware of the fact that the cut would be some kind of a bootjack, but the particular thing that I desire to know is how to connect the one with the other at A of the sketch. This, it will be observed, occurs only on buildings of T or L shape. I have watched *Carpentry and Building* for the last few years for a problem of this kind, but in vain, so I lay it before the readers for the consideration of those who know how to solve the problem, for I confess I do not. I have noticed different correspondents writing on the subject of mitering or joining purlins on hip rafters, but an examination of the sketch which I send will show that this is quite a differ-




*Finding Cut for Purlins.—Scale, ⅛ Inch to the Foot.*

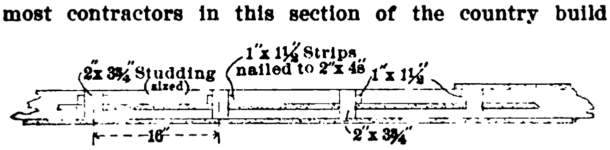
ent piece of work. I would suggest that those of the readers who are familiar with the subject describe the way the work can be done, not only in connection with roofs of one-third pitch, but also in cases where one roof is of one pitch and another is of a different pitch, the purlins in all cases being 6 x 6 inches.

#### Preventing the Sweating of Show Windows.

*From* W. A. K., *Garnavillo, Iowa.*—I would like to be told through the Correspondence department how it is possible to prevent show windows from sweating. I have tried a remedy suggested by several readers in *Carpentry and Building* about two years ago, but this did not give any relief. The windows on which I have experimented face the north and there is a light frame and glass partition between the show windows and the main dry goods store. I bored ¾-inch holes all along the top and bottom rail about 6 inches apart, but the results were far from satisfactory. Perhaps some reader could give me more light on the subject.

#### Making Division Walls Sound Proof.

*From* C. F. H., *Napa, Cal.*—In answer to the recent inquiry of "H. S." of Indianapolis, Ind., I would say that most contractors in this section of the country build




*Making Division Walls Sound Proof.*

sound proof partitions as indicated in the accompanying sketch, which represents a horizontal section through the wall. Personally I think the method a very good one.

#### Why Shingle Nails Rust.

*From* C. E. B., Judson, Ind.—Allow me to present a few words in reply to "G. H. B." and "C. A. C." as to why shingle nails rust off in such a short time, as the question has more than one answer in this section of the country. In order to treat the case fairly and squarely it is first necessary to find out why they lasted so long 25 years ago. It may, however, be stated that 25 to 40 years ago builders used nothing but yellow poplar sheathing, and it was thoroughly dry. The shingles were generally of the same grade of wood, only better. The nails were heavy cut ones, and lasted as long as the shingles because there was no acid in the shingles or sheathing to start the nails rusting. Not long since I tore off an old roof of the above described material that had been on 23 years, and the nails were about half gone. If the steel nails mentioned by "C. A. C.," had been used in place of the old cut nails the same size, they would have lasted as well. With what are we sheathing to-day? Out here we use green beech, oak, elm, gum and sugar tree. When the little wire nails came around everybody took a fancy to them, because they went so far on the roof and were easy to drive. They lasted from four to eight years when driven in the above mentioned sheathing. This taught us a lesson, and now we are using a heavy galvanized steel nail and are watching the results.

Our experience with steel roofing in this part of the country may be illustrated by the following incident: Mr. A—— roofed the barn which he built with steel roofing, using oak, beech and elm for sheathing, putting it on green. The roof lasted just ten years. Mr. R—— covered the roof of his house at the same time with the same kind of material, putting it over the old shingles. The roof is good at the present time, and to all appearances will last another ten years.

My solution of this rusty nail business is to use galvanized nails if they do cost more and require a harder lick to drive them. Now, brother chips, if I have missed the solution in your locality do not all take a bat at me at once, for I am not a very good hand at dodging. Give us your experience through the Correspondence department, and we will then be wiser. I am not one of your fast hands, but have nailed on 2700 shingles in ten hours, have fitted, hung and put the locks on four doors, fitted the fifth and cut and nailed the stops on the jambs of same and based two rooms, all in nine hours.

#### Recipes for Furniture Polish and for "Mahoganizing."

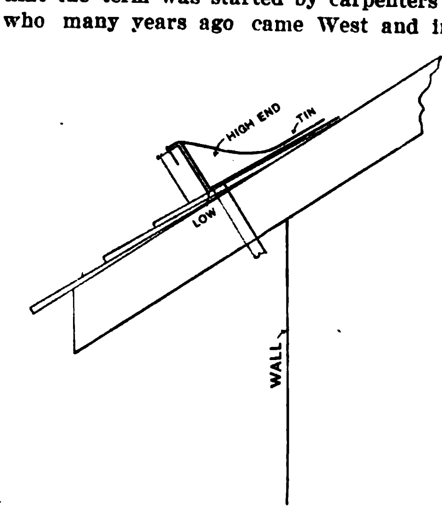
*From* H. L., *Mullica Hill, N. J.*—In your next issue will you kindly give a recipe for "mahoganizing," and also for a first class furniture polish?

*Answer.*—Our correspondent will probably find it more advantageous to make use of the preparations or powders for mixing put up by some of the reliable color mixers when the mahogany stain is to be used infrequently. When it is used extensively and the aim is to keep one established color the mixture or the proper shade should be prepared from one formula. Every finisher has his pet secret formula, which may vary as do the stains from the color houses. For this reason intelligence and patience must be a part of the mixture, frequent tests being made and finally a note as to the proportions when the satisfactory tint has been produced. The two ingredients frequently used are the aniline powders known as seal brown and French red. It is generally unsatisfactory to state how much of the red should be added to the brown in the water solution, as it is much a matter of testing the strength of color on a surface of wood similar to that which is to be stained. In a tin pan or vessel of very warm water sift in, while stirring, a small quantity of the brown, then follow with the French red, making a test, which should be allowed to dry before diluting or adding more color. The brown should be used sparingly at first, as it colors quickly. The red should not be too pronounced, suggesting that cheap Christmas toy red seen on low priced furniture. By confining the experiments to scrap wood and matching with a sample of genuine finished mahogany no trouble should be found in imitating the recognized color. When the desired shade is obtained it is not necessary to apply it hot to the wood. The surface should be finished sand free from any grease or glue spots which would hinder the stain from being absorbed. Some parts on the entire surface might be benefited by a second coat.

In reply to the second question of our correspondent we would state that a true and tried preparation for furniture polish consists of half and half of turpentine and raw linseed oil and plenty of elbow work. A drop of alcohol added to the rubbing cloth will very frequently facilitate the operation.

#### What Is a Philadelphia Gutter?

*From* A. T., *Forest, Ohio.*—For the benefit of "J. J. D.," whose communication on this subject appeared recently in the paper, I will say that we 'uns of this State, when called upon to place a "Philadelphia gutter," proceed to do it as shown in the accompanying sketch. I think that the term was started by carpenters from the East who many years ago came West and introduced




*What is a Philadelphia Gutter?*

the same. I have found out in my 30 years' experience in the sheet metal trade that each locality has its name for things that are unknown 50 miles away. Not long ago I was asked to place a "Queen Anne gutter," and, not knowing what style of gutter it was, I had to pass it by. Now, my interpretation of a "Philadelphia gutter" may be entirely wrong, but it goes here, and so you have it.

### Combination Lock for Tool Chest.

*From* E. H. C., *Marysville, Cal.*—I think it would prove interesting to other readers as well as myself if "C. C. H." of Brockville, Pa., will tell us more about the combination lock which he mentioned in connection with the tool chest referred to in the June issue of the paper for last year.

### A Cheap Scaffold Bracket.

*From* C. J. C., *Troy, Pa.*—There have appeared at different times illustrations of scaffold brackets, and as being of possible interest to readers of the paper I will tell how mine are made. I have used the same brackets for 12 years and they are as good as ever. I cut a good piece of 2 x 4 inch stuff 36 inches long for the upright and a piece of the same dimension 48 inches long for the bracket or arm. I place the long piece on top of the short piece so as to form a right angle and spike them together, as shown in Fig. 1, with two 20d nails driven as near the outside as possible. Then I bore a ⅞-inch hole in the short piece directly under the top piece, as shown in Fig. 2, and through that I place a hook, Fig. 3, made

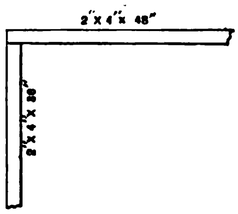



Fig. 1.—The First Step.

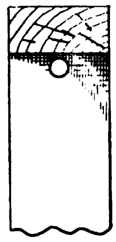


Fig. 2.—The Position of the Hole.

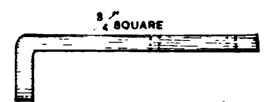



Fig. 3.—The Iron Hook.

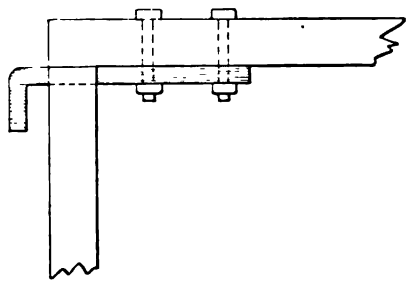


Fig. 4.—Its Place in the Bracket.

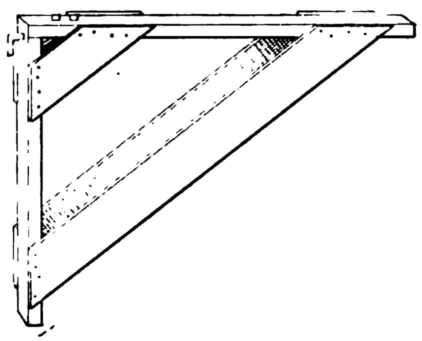


Fig. 5.—The Complete Bracket.

*A Cheap Scaffold Bracket.*

of ¾-inch square iron 9 inches long, which has drilled in it for bolts two ⅜-inch holes. The hook, I would state, is 2 inches long. This I bolt through the top bracket, as shown in Fig. 4, the hook being 1 inch from the upright. Then I take a piece of 1 x 6 and nail on both sides of the bracket diagonally from each 2 x 4, and the result is a strong, light bracket of the appearance shown in Fig. 5. A hole 1 inch wide and 3 inches high cut in the sheathing and close to the stud allows it to hook and unhook easily, while two or three 10d nails through the sheathing into the stud makes it safe for any kind of work required. At the same time the brackets are easily carried from place to place and easy to store when not in use.

### Some Questions in Stair Building.

*From* D. P., *Cairo, Ill.*—I have been a reader of *Carpentry and Building* for a number of years. The first issue I ever saw was a chance number that a brother workman had. It was three or four months old, but it had such genuine merit that I thought I would send for a few sample copies. The first three or four numbers were the concluding installments of the serial which later was published in book form as Hicks' "Builders' Guide." The result of getting those few copies is that I have kept up my subscription ever since. Each succeeding number has always met my expectation, and I am willing to venture the assertion that I shall never see a number in which I will feel disappointed.

If I have not taken too much space I should like to ask Morris Williams to give a description of how he gets out his hand rails after he has established the lines; also how he curves the stair stringers and the frieze. Of all the articles I have read on hand railing, not one of them ever gave the method of cutting out the crooks. I fancy some will say, after the lines are drawn, haggle it out any old way will accomplish the task, but there is a system for this kind of work and that is what I would like to learn.

### Wood Burnt vs. Coal Burnt Lime.

*From* J. S., *New Berlin, Pa.*—I would like to have some one explain through the medium of the Correspondence department the difference between wood burnt and coal burnt lime, giving the relative value of each for making all kinds of mortar.

### Which Construction Makes the Warmer Wall?

*From* J. A. P., *Katepwe, Assa.*—As a reader of *Carpentry and Building*, I desire some information regarding two kinds of walls, not taking into consideration the cost. I would ask which of the two constructions makes the warmer wall. In the first instance the studding is 2 x 4 inch, double boarded and clapboards outside. The inside is to be lath and three-coat plaster.

The second wall is to have 2 x 6 inch studding, single boarded, with ship lap or flooring outside, and clapboards. The inside is to be lath and plastered half way—that is to say, 3 inches from the outer wall—and then lath and three-coat plaster on the inside, thus giving two air spaces.

*Note.*—With no desire to cut off the discussion in which we trust our practical readers will indulge, we suggest to the correspondent above that his second method of construction will undoubtedly give him the warmer wall, provided the work is done in a first-class manner and not slighted in any way. The correspondent must make sure that the air spaces are closed at the sill and it might not be a bad idea to close them again at intervals of 6 or 8 feet in the vertical hight, especially at the second story and attic, so that by no possibility can drafts be created. We submit the questions to our readers in the hope that they will discuss the matter fully in the light of their own experience.

### Deafening a Floor.

*From* W. H., *Lethbridge, Canada.*—As an old subscriber will you allow me to inquire of the practical readers of the paper the best way to keep sound from traveling upward—that is, from a room on one floor to the room directly over it on the floor above? The ceiling of the lower room is sheet metal placed on strips. The floor joists are 12 inches deep, stripped with 1 x 4 diagonally. The floor of the upper room is doubled. I have been told to place empty bottles between the floor and ceiling of the two rooms, but I have not much faith in the plan.

*Note.*—There are various methods of accomplishing what our correspondent desires, all involving more or less trouble and expense, but we cannot say that the bottle scheme strikes us at all favorably. The filling in of the joists to the depth of 4 or more inches with some nonconducting material would be one plan that might be adopted to advantage, while another would be to place several thicknesses of deafening material under the floor of the upper room. Very much will depend upon the extent to which the item of cost enters into the problem, but we lay the query before the readers with the suggestion that they describe the way in which they would solve the problem.

### A Perforated Vault.

*From* DONALD FRASER, *Philadelphia, Pa.*—It very often happens in connection with modern construction that many changes are made in a building that are either overlooked in the planning or are found necessary and advantageous after the work has been commenced. In the present instance a large vault was to be built under a pavement or sidewalk and was to be used for storage purposes. In order to enter it the ends were left open. To save the time consumed in walking to each opening it was thought best to perforate the vault at the center so that an entrance could be made by inserting an iron circular stairway. The intention was to lay an iron ring and build the vault courses against it, but in looking over the situation it was decided to inclose the hole with stone in such a way that the latter would key the work and prevent collapse, as shown in the plan view in 5 of the diagram. In this way it was thought a very nice piece of work would result. A certain amount of knowledge, however, was necessary to make the several patterns required and to reduce the stone to the proper shape.

There are two ways of cutting the stones used for a job of this kind. The first method is to take the face pattern G H I J, which would be for the joint 13 14 of No. 3; run this pattern through first and next the joint 5, 6, after which apply No. 3 on top and mark the shape. The next step is to run the curved part through, using the square to keep it true.

The second method was the one used to cut the stone, and for the faces within the opening joint patterns and developed patterns were used. Take No. 3 again as the example. The top was worked good and true; the pattern was marked on as figured and cut to that shape, then G H I J was applied on 13 14; next the joint mold shown in Fig. 1 was applied along 5 11 6, then Fig. 2 was applied on the curved part, letters and figures corresponding. The lines being all marked on, the soffit was finished by cutting drafts parallel to 13 16. It may be stated that No. 4 is cut in the same way, Fig. 3 being the joint mold and Fig. 4 the face pattern in the opening.

To make the joint pattern we will go over joint 5 6 7 in plan as an example. In Fig. 3 make 5 6' 7' equal to 5 6 7 of the plan, then transfer from the section the corresponding distance lettered and figured. For the developed patterns of the opening it would be best to make the whole development in one piece and then separate them. Fig. 4 is taken around 5 8 of the plan and the distances taken from the section. In order to further understand joint and developed patterns it would be well for those interested to make every one, for it is well worth knowing how to do such work when called upon to do so.

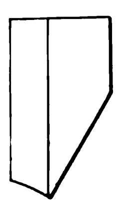


Fig. 1.—Mold for Joints.

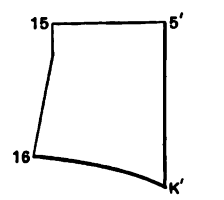



Fig. 2.—Mold for the Curved Part.

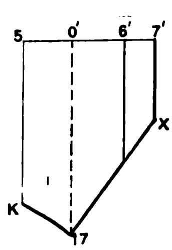



Fig. 3.—Joint Mold for Soffit.

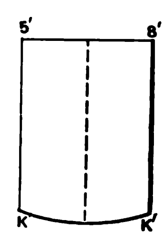



Fig. 4.—The Face Pattern.

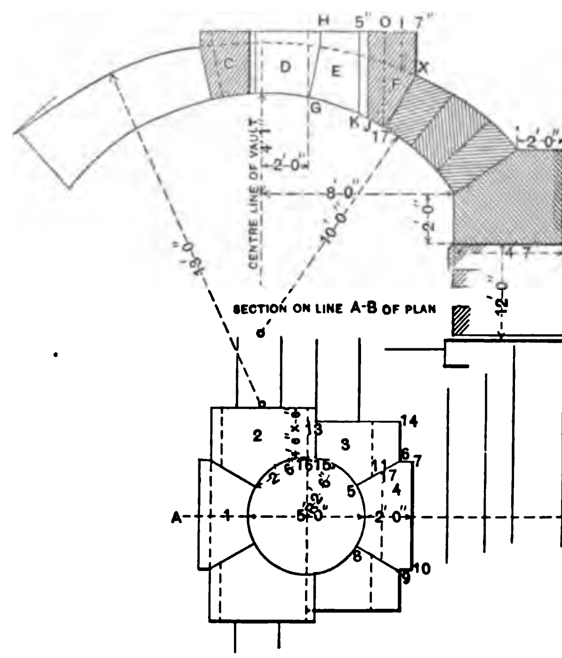



Fig. 5.—Plan and Sectional Elevation.

*A Perforated Vault.*

### Necessity of Moisture in Heated Rooms.

*From* H. E. D., *Seattle, Wash.*—For many years I have read with great interest the various articles in your valuable paper, and wish to be allowed to add a few words to the article contained in the October number, headed "The Necessity of Moisture in Heated Rooms," in which it was so clearly shown that the amount of heat required for comfort depends upon the humidity of the atmosphere. We deduce from the statements made there and from other reliable authority that if the humidity of a room be raised to about 50 a temperature of 65 degrees is equal to one of from 72 to 74 degrees with a relative humidity of 30. If, as is also stated, 25 per cent. of the cost of heating is required to raise the temperature from 60 to 70 degrees, it is plainly a matter of economy that we keep the proper moisture in our living rooms.

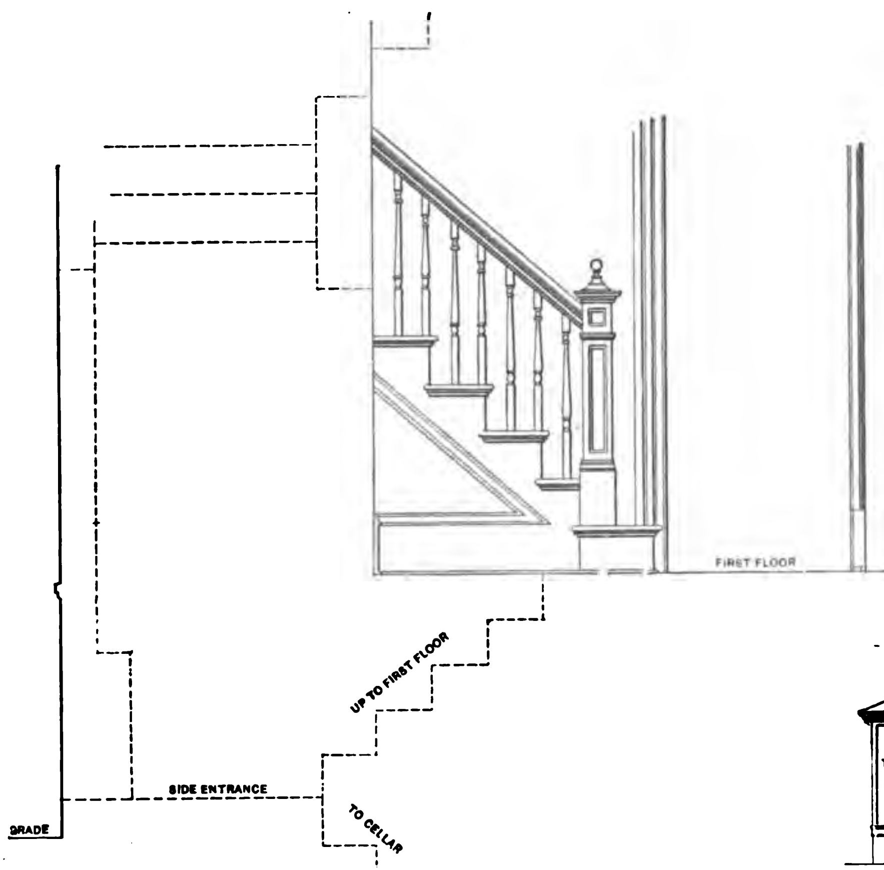
It is pointed out by eminent German authority that the abnormal conditions of the air in our rooms is the cause of many of the ills which affect mankind. The sudden change from the dry overheated air of the house to the air outside produces catarrh and other diseases of the skin and mucous membrane. Many hot air furnaces are supplied with moisture pans, which are or can be made successful in increasing the humidity of the atmosphere, but up to the present time no satisfactory method has been adopted for keeping the air moist in steam or hot water heated rooms.

### Dividing a Circle with the Steel Square.

*From* P. O. B., *Holdrege, Neb.*—I concur with "L. M. R.," Riverhead, Long Island, whose letter appears on page 18 of the January issue, in his query to John L. Shawver with reference to dividing a circle with the steel square. I would further ask Mr. Shawver why he does not teach us carpenters something about trigonometry, since he apparently thinks that we carry a complete surveyor's outfit in our tool chests. I will, however, explain how to divide a circle without the aid of a protractor. The sine for 30 degrees being 0.5, or, in other words, the hypotenuse of a triangle the sides of which are 90, 60 and 30 degrees, respectively, is twice as long as its shortest side. Hence by setting off, say, 12 inches on the straight edge and placing the tongue of the square at 6 inches on the one mark and letting the blade coincide with the other mark, which it will at 10⅜ inches, the blade will then give the 30-degree and the tongue the 60-degree angles.

### Elevations for "J. W. H.'s" Floor Plans.

*From* L. R. Steinberg, *Minneapolis, Minn.*—Under separate cover I am sending drawings showing elevations and stair details as requested by "J. W. H." of Bayonne, N. J., in the November issue of *Carpentry and Building.* I would say with reference to his plan that the side entrance to the basement will necessitate placing the tubs where the kitchen door into the passageway now is and putting the door in the corner where the tubs are now shown. I would also suggest that a better roof construction could be obtained if the wall along which the bath-tub stands was placed in line with the wall on the same side of the front chamber.




Details of Stairs.—Scale, ⅜ Inch to the Foot.

Front Elevation.

Side (Left) Elevation.—Scale, 1-16 Inch to the Foot.

*Elevations for "J. W. H.'s" Floor Plans.*

### Finding Lengths of Rafters with the Steel Square.

*From* G. A. W., *Vandegrift, Pa.*—I would suggest to "D. P. A." of Westchester, N. Y., that if he use the side of his square marked in twelfths of an inch, instead of the side marked in sixteenths, he will find it much more convenient as well as correct. In that case 4 feet 6 inches would read 4 6-12 inches and 6 feet 8 inches would then read 6 8-12 inches and not "6⅝ inches nearly."

$$\sqrt{4\tfrac{6}{12}^2 + 6\tfrac{8}{12}^2} = 8\text{—}.$$

### Appreciative Readers of "Carpentry and Building."

*From* J. K. A. B., *architect, Sharpsburg, Pa.*—I want to say that *Carpentry and Building* has become a fixture in my house, and it seems that we cannot get along without it. I have been a subscriber since the first issue, and think I can claim to be at least one of the oldest, if not *the* oldest reader of the paper. I have all the papers intact and value them highly. I find much of value in referring to back numbers and I wish the paper continued success.

*From* J. MacV., *Providence, R. I.*—In renewing my subscription for 1905 I wish to say that I would not be without *Carpentry and Building* for many times what it costs. As an instructor for house carpenters it is ahead of any other book or paper of which I have knowledge.

### Preparing Foundations for Frame Buildings.

*From* B. C. M., *Toppenish, Wash.*—In renewing my subscription to *Carpentry and Building* I desire to say that I think the paper a grand publication. It has assisted a great many times in my work, and I consider each issue worth a year's subscription. I would like very much to see in the Correspondence department an article or a discussion on the part of the readers of the subject of foundations for frame buildings, with a description of the different methods of squaring, leveling, blocking and bracing small and large foundations. This may have been treated in the past, but as I am only a year old subscriber I, with many others, have seen nothing of it. I offer this merely as a suggestion, as I think it would prove beneficial to a great many young mechanics who are just starting in the trade.

*Note.*—While the subject of laying out foundations has been covered to some extent in the past, we trust, in view of the fact that back numbers of the paper are unavailable by reason of the editions having long since been exhausted, that the older readers will describe their methods of doing the work indicated, and thus afford our young correspondent an idea of the practice which prevails in different sections of the country. The subject is one which offers a good field for discussion, and we trust that all will feel free to express their views and tell how they do the work in question.

### Finding Lengths of Valley Rafters in Roof of Varying Pitch.

*From* S. H., *Minneapolis, Minn.*—Will some carpenter give me a plain and simple method for getting the lengths of valley rafters where the pitch is different on the two sides, but starting from the same plate, the ridge being of unequal hight?

# WHAT BUILDERS ARE DOING.

IT is gratifying to note the comparative unanimity with which the reports of building operations for the year just closed record not only an increase in the value of the improvements, as compared with the previous 12 months, but a degree of activity never before equaled in the history of the city from which the figures are derived. Reports of this nature are perhaps more common from the smaller places of the country, as in many instances strikes and labor disturbances in the large cities have tended to restrict operations to some extent and rendered the results for the year less satisfactory than would otherwise have been the case. The total figures, however, demonstrate in a most striking manner the enormous volume of building that has been in progress throughout the country, with all the indications pointing to a most active spring season.

### Baltimore, Md.

The work of rebuilding the burnt district of the city has made such progress that the members of the Builders' Exchange have recently been able to reoccupy their old quarters in the building at the northeast corner of Charles and Lexington streets, where they will now have ample space for the proper conduct of the business of the exchange, and it is expected that the membership will continue to show a steady increase. We understand that the movement looking to the perfection of an employers' organization along lines previously indicated in these columns and which will include a permanent exhibition of builders' materials, an employment bureau and an arbitration feature, has made rapid progress, and that the amendments proposed for adoption by the exchange designed to cover these features have been duly considered by the committee having the matter in charge, and that the results of its deliberations will be submitted to a general meeting of the exchange in the near future.

At the thirteenth annual meeting of the Lumber Exchange, held on December 14, James Norman was elected president; Samuel C. Rowland, secretary, and Parker D. Dix, treasurer.

Some idea of the extent to which the burnt district of the city has been rebuilt may be gathered from the statement that up to the middle of December permits had been issued by the Bureau of Building Inspection for 341 buildings, of which 116 were for three-story structures, 92 were for four-story buildings, 51 were for five-story buildings, two were for eight-story, one each for a ten and 12-story building and two for a 16-story building. The cost of the structures for which permits were issued is placed at $9,030,855.

### Buffalo, N. Y.

The amount of building which the city has witnessed during the year just closed makes a very favorable comparison with that of 1903, the gain being decidedly appreciable. According to the figures of Deputy Building Commissioner Henry Rumrill, Jr., there were 2677 permits issued in the 12 months of 1904 for building improvements estimated to cost $6,638,319, while in the corresponding period of 1903 there were 2011 permits issued for improvements calling for an estimated expenditure of $6,263,402.

### Chicago, Ill.

Architects and builders of the city have had very little of which to complain during the past year, as the volume of building operations has been upon a scale which has been exceeded only twice in many years. According to the Building Department permits were taken out for the construction of 7131 buildings having a frontage of 203,760 feet and costing $44,593,090, whereas in the corresponding period of 1903 there were issued 6135 permits for building improvements having a frontage of 174,932 feet and costing $33,645,025. From this it will be seen that the past year has been unusually active in the building line, and the outlook for the coming season is of a most flattering nature. Even in the month of December last building operations were on a scale largely in excess of the same month of the year before, and this holds true of practically every month in the year with the exception of March, when there was more construction undertaken in that month in 1903 than in the same month of the past year.

### Cincinnati, Ohio.

Prospects in the city are regarded as very flattering for the ensuing year, and architects and builders feel pretty well satisfied with the situation. According to the figures of Inspector Charles A. Tooker there were 4508 permits issued during the year just closed calling for an expenditure of $6,335,330, these showing a marked increase over the 12 months of 1903, when 2505 permits were issued for building improvements estimated to cost $4,502,255. In fact, the figures for 1904 represent a valuation considerably in excess of any year since the Bureau of Building Inspection was established, the records going back to 1881. The nearest approach to the present figures was the year 1891, when the value of building improvements for which permits were issued amounted to $5,068,538.

There are at present no startling phases of the situation, and while there was a possibility of minor troubles in the labor world, especially in connection with the plasterers, everything seems to be running along smoothly, and it is hoped that the coming season will be as satisfactory as the one just closed. Builders now figure that costs are too high, more particularly labor, and would rather see a lowering of rates so as to insure a still larger amount of work, but on the whole they are doing a safe and sound business.

### Cleveland, Ohio.

Conditions existing at the opening of the new year are such that architects, contractors, builders and supply men generally are looking forward to a most active season as soon as the winter is ended. This feeling of optimism extends to real estate men, who report a good demand for investment property, and options have been taken in several cases looking to improvements in the early spring. A number of apartment houses are contemplated, and there will be numerous additions to manufacturing establishments. It is also expected that work on building in the "group plan" will be started as well as several new school buildings. The outlook for a good year from the standpoint of the wage earner in the building crafts is also regarded as bright, and unless there is trouble with labor, 1905 is likely to witness a most flattering degree of activity.

The figures of the office of the Building Inspector show that during 1904 there were 3911 permits issued for building improvements estimated to cost $6,562,590, while in the 12 months of 1903 there were 3226 permits issued involving an estimated outlay of $6,259,931. The operations undertaken during the year include a large number of steel, stone and brick structures, aggregating a value of something over $3,500,000, nearly 2000 permitting wooden structures and over 1600 of the permits were for additions, alterations and repairs. The greatest activity of the year was the month of October, when 430 permits were issued for improvements estimated to cost $811,820, February holding second place. It is interesting to state in this connection that the Building Inspector issued hundreds of permits for heating of various kinds, the removal of buildings, &c., which are not covered in the statistics already given.

### Harrisburg, Pa.

Not since the Department of Building Inspection was organized five years ago has the volume of building operations been so great in the city of Harrisburg as during the 12 months of 1904. The value of the improvements for which permits were issued is placed at $1,295,120, while in 1903 the value of the improvements was $840,000.

The outlook for the coming season is very bright and the projects which are under way will give the new year a very good start. Among the new structures in prospect may be mentioned a theatre, a hotel, important changes in a large department store and the remodeling of the building occupied by the *Daily Telegram*.

### Kansas City, Mo.

The present outlook is for a prosperous year in the building line, as architects are busy, numerous building operations are in contemplation and the labor situation is comparatively peaceful, with prospects of its so continuing for some time to come. The figures which are available through the office of Superintendent of Buildings S. E. Edwards show that during 1904 there were 4351 permits issued for building improvements, costing $8,816,757, as against 3644 permits for building improvements, costing $7,709,335 in the 12 months of 1903. This it will be seen is an increase over 1903 of 707 permits and a valuation of $1,107,442.

A feature of the operations during the past year was the increase in the number of dwellings erected, and while there was a falling off in the number of larger structures intended for office and commercial purposes, the record is considered as a whole, a flattering one. It is expected that there will be a larger showing in the ensuing year as regards the number of buildings devoted to manufacturing purposes, as architects are already busy on the plans for a number of buildings of this kind. Conservative contractors and builders are credited with the information that the total amount expended for buildings in Kansas City during 1905 will reach $10,000,000, if it does not exceed it.

### Houston, Texas.

The members of the Builders' Exchange gave a "smoker" in the rooms of the Business League on the evening of January 9, which was well attended and which proved to be a thoroughly enjoyable affair in every way. It was informal to the extent that there were no set speeches or prolonged discussions, but while cigars and refreshments were served matters of interest to the trade, especially to members of the organization, were carefully considered. The master of ceremonies was President W. W. Wilson, while Secretary F. F. Arnim acted in his official capacity. Communications from other builders' associations in Texas were received, these being of a highly complimentary and congratulatory nature. Before the evening was over it was decided to inaugurate a vigorous missionary campaign among builders with a view to largely augmenting the membership.

### Los Angeles, Cal.

During the year the number of building permits issued in this city was 7090 and the improvements authorized aggregated a value of $13,409,062, as against 6395 permits for improvements aggregating $13,046,338 in 1903, 4863 permits for improvements aggregating $9,603,132 in 1902 and 2730 permits for improvements aggregating $4,099,198 in 1901. The improvements authorized during the past year included among others one eight-story brick building, to cost $250,000; three seven-story brick buildings, $375,000; four six-story brick buildings, $390,000; five five-story brick buildings, $250,561; nine four-story brick buildings, $322,-892; 52 three-story brick buildings, $1,362,976; 66 two-story brick buildings, $697,479, and 71 single story brick buildings, $327,771. There were 767 two-story frame residences, costing $3,663,005, and 261 story and a half frame residences, costing $516,834; also 3516 single story frame residences, costing $3,385,784. There were 232 two-story flats, costing $995,173; 49 apartment buildings, costing $375,005, and 22 churches, costing $88,280.

In December 585 permits were issued for improvements amounting to $1,527,397, as against 535 permits for improvements amounting to $1,010,814 in December, 1903.

### Lowell, Mass.

While the situation in and about the city has been comparatively quiet during the past year, most of the contractors have had sufficient work to keep them busy and have employed their usual quota of men. Two of the cotton mills have erected new buildings, two new business blocks have been put up and a third is now in process of completion. This work, together with a new building for the Lowell General Hospital and the rebuilding of an old structure for the Young Women's Christian Association, makes up the sum of the important brick buildings. The number of residences, cottages and tenement blocks compare favorably with work of this character in recent years.

The rebuilding of old Huntington Hall and the Boston & Maine Railroad Station are as yet unsettled questions. The general trend of public opinion is in the direction of discontinuing the station and improving the facilities for the accommodation of the public at the Northern Station. The project is now being considered for the erection of a hall and public bath on the site of the Western Division train shed of the Boston & Maine Railroad, now out of commission, and if carried to a successful issue will undoubtedly prove highly advantageous.

An attempt will undoubtedly be made this year to have enacted an efficient building ordinance, as the necessity for such a measure has become more and more evident to the owners of buildings, the fire department and the general public. Under the existing rule just what building is included under the term "repairs" and allowable within the fire district is a somewhat uncertain question. The fire loss during the past year was something over $500,000 and the insurance about $320,000.

Indications for the ensuing year give promise of a good season. Two at least of the important corporations expect to erect new buildings, and several residences are now on the boards in architects' offices. The prosperity of Lowell depends much, however, but not entirely, on the condition of the mills, and with cotton at the present prices there is every reason to look forward to a busy season.

### Milwaukee, Wis.

The new year opens most auspiciously, with architects busy on spring work and the number of permits issued to date by the Inspector of Buildings in excess of those taken out during the same time the year before. Reports from the immediate surrounding country are of the same encouraging tenor, and unless labor troubles interfere the coming season should prove gratifying and profitable to all connected with the building business.

During 1904 there were 3546 permits issued for building improvements estimated to cost $8,131,765, of which $3,643,-705 was for frame buildings, $2,727,280 for brick and stone structures and $1,247,480 for additions and alterations. There was $513,300 expended for "brick cased" buildings or what are doubtless known in some sections of the country as brick veneer. In the 12 months of 1903 there were 2774 permits issued, involving an estimated outlay of $7,024,-607, of which amount $2,858,732 was for frame buildings and $2,654,400 was for structures of brick and stone.

### New York City.

Matters in the building world seem to be shaping themselves for a very active building year and one which is likely to compare most favorably with the 12 months of 1904. In the period named the heavy increase in the number of new buildings erected in the Bronx brought the totals to figures in excess of any year in the history of the city with two exceptions. These are shown in our editorial comments elsewhere in this issue. In the Borough of Brooklyn there were 5771 new buildings put up, costing $39,486,818, as against 3914 in 1903, costing $23,538,800, while in the Borough of Queens the report of Superintendent Joseph Powers shows that permits were issued in 1904 for 1921 buildings estimated to cost, with plumbing, $8,554,305, which is an increase of more than 50 per cent. over the year before. Of the total 277 buildings were of brick and 1641 were frame. Among the prominent new buildings of the year may be mentioned the Pennsylvania Railroad power house at Long Island City, costing about $500,000; a school house at Metropolitan to cost $130,000 and one at Long Island City to cost $135,000; a mortuary chapel at Calvary Cemetery to cost $120,000, and a number of manufacturing buildings costing all the way from $50,000 to $100,000 each. In the town of Jamaica 582 new buildings were put up, the majority being one family houses and costing from $2500 to $4000 each. It is expected that there will be something akin to a boom in the building line the coming season not only in Newtown and Jamaica, but in all parts of the town of Flushing, as large plots have been sold for immediate improvement. It is said by real estate men that the number of new buildings will be increased this year at least 50 per cent. over a year ago.

At the second annual election of the Architectural Dratfsmen's Club of New York the following officers were elected to serve on the Executive Committee for the year 1905: President, L. A. Cramer; vice-president, A. T. Rose; recording secretary, W. F. Anderson; corresponding secretary, W. T. Smith, 1133 Broadway, and treasurer, A. M. Hedley. The chairman of the Current Work Committee is E. H. Rosengarten, and the chairman of the Entertainment Committee is C. F. Winkleman. A programme of varied and interesting monthly prize competitions, combined with a series of discourses by prominent professional men, will constitute the year's current work.

### Omaha, Neb.

An interesting fact in connection with the prosperity of the city is the large number of frame dwellings which have been erected during the past year, and while perhaps less pretentious in style, are more substantial in finish and construction, averaging considerably in excess of the class of frame dwellings heretofore erected. The amount of work done in 1904 was in excess of that of the year before, or, in fact, of any previous year in the history of Omaha. The total value of the improvements was $1,890,995, as against a total of $1,071,057 for the 12 months of 1903, the number of permits being respectively 807 and 435. Altogether during the year there were erected 25 stores and office buildings, six churches, nine warehouses and factories, four educational institutions and 500 dwelling houses. While the past year has been unusually active, the indications point to the execution of a vast amount of work during the ensuing 12 months. Among the buildings in prospect may be mentioned that of the Young Men's Christian Association, to cost $200,000, a new store to cost $500,000, another involving an outlay of $100,000, and the building for the American Radiator Company to cost $75,000.

### Philadelphia, Pa.

The striking feature of the building situation during the year which has just passed has been the large number of new dwellings erected in the outlying wards of the city. Notwithstanding the fact that the cost of construction has materially increased during the past few years a vast amount of building has been done in the way of two, three and four story dwellings. According to the figures of the Building Department there were 5860 two-story dwellings put up the past year, 711 three-story and 64 four-story houses, costing $15,271,025, or nearly 55 per cent. of the entire amount expended for all kinds of building construction in 1904. This activity was in a large measure confined to West Philadelphia, where it is expected the building of the Subway and Elevated railroad will create a great demand for homes. The impression seems to prevail that owing to the growing desire of persons to reside in the outskirts West Philadelphia will within the next ten years be as thickly populated as the old section of the city.

The statistics for the year just closed show that 8398 permits were issued, covering 14,152 building operations estimated to cost $28,967,760, as compared with 7469 permits, co ering 12,000 operations and costing $32,509,595, in the 12 months of 1903. In that year the amount of building projected was in excess of that of any previous year since the Building Department was established.

The members of the Master Builders' Exchange celebrated the close of the old year on the afternoon of December 31, at which time a luncheon was served and a vaudeville entertainment and "smoker" were enjoyed. A pleasing feature of the afternoon's celebration was a tribute to the veteran first president of the exchange, John S. Stevens. His picture formed the center of the decorations on the main balustrade of the exchange, which was decorated with palms, roses and American flags. A number of invited guests were present and the affair was enjoyable in every way.

### Pittsburgh, Pa.

It can truly be said that the 12 months of 1904 have been remarkable in the degree of activity witnessed in the different branches of the building business. This city, in connection with others, has enjoyed a degree of prosperity in the building line that has been most gratifying to all connected with the business. The figures of S. A. Dies, Superintendent of the Bureau of Building Inspection, show that in the year just closed 3857 permits were issued for building improvements costing $17,502,680, while in the corresponding period of 1903 there were 3210 permits issued calling for an outlay of $16,962,699. Suburban sections are rapidly being built up and the improvements are extending over a wide territory and upon a corresponding scale. The outlook for the new year is of a nature to create a feeling of optimism in all branches, and it is expected that 1905 will witness the construction of buildings aggregating a total valuation which will compare favorably with any year in the history of the city.

The members of the Builders' Exchange League have completed arrangements for removal after April 1 from their long established quarters in Market street to new and commodious rooms in the Heeren Building at the corner of Penn avenue and Eighth street, this step having been brought about by the flourishing condition of the organization and the necessity for more room. The new quarters will be handsomely fitted up and provision will be made for rooms for committees, conferences, general meetings, offices, &c. The exhibition room for the display of various building materials, it is said, will be upon a scale never before attempted. In addition to this the League is to have a strong executive department with active officers who will give all their time to the development of the organization. We understand that the plans include active participation of the organization in public matters of special interest to the business of the city and a hearty co-operation in all moves for general business welfare on the lines of the Merchants' and Manufacturers' Association.

### Portland, Ore.

During the year 1904 the building permits issued by the city authorities numbered 1732 for construction estimated to cost $4,060,571. This is considered a good showing by local builders, who had anticipated something of a falling off in building for 1904, notwithstanding the fact that the coming Lewis & Clark Exposition would lead to considerable construction work. There is still an apparent shortage of rooms for the entertainment of the visitors who are expected at the fair, and it is understood that the early spring will witness a renewal of activity owing to this cause. There is a scarcity of modern office buildings, and architects are now drawing plans for several modern office blocks, which will be undertaken in the early months of 1905. Building for December showed the usual falling off due to the season. There were 101 building permits issued for construction, estimated at $153,605. During the month preceding the permits issued numbered 124 for work of the estimated value of $393,655.

The contract for the Oregon State Building at the Lewis & Clark Centennial Exposition has been let for $9270. This is the first State building contract let, and work on the structure will begin at once. This building will be 100 x 200 feet in dimensions and will be built of staff in the Spanish renaissance style of architecture.

### Richmond, Va.

It is probably safe to say that not since the city of Richmond was founded has there been such an amount of building carried on as during the 12 months of the year just closed. It is said by those who have given the matter their serious attention that never before in any three years has so great a number of structures been erected as during the period named. The improvements have been of a varied nature, including churches, office buildings, warehouses, factories, hotels, apartment houses, &c. Some idea of the increase in building may be gathered from the statement that the estimated cost of the improvements is something more than 22½ per cent. of the total assessed value of buildings within the city.

The most important business structure erected during 1904 was that of the Mutual Assurance Society of Virginia, at the corner of Ninth and Main streets, this being taller and larger than any structure within the city limits. It was designed by Clinton & Russell of New York City, contains 192 offices and is equipped with every modern convenience. The structure, however, which is destined more than others to mark the year 1904 is the capitol, this historic edifice being copied originally from the Maison Caree. The old structure has not been entirely torn down, but there have been added to its old walls two immense wings, making it a magnificent structure.

### Sacramento, Cal.

During 1904 the building operations undertaken in this city amounted to approximately $950,000, an amount which is considerably in excess of any previous year. This does not include the large office building and the still larger machine shops now being built by the Southern Pacific Company, which were commenced during the preceding year. Of the total amount, smaller work and alterations will reach $60,000. The balance of the total consists of residences to the amount of $650,000, eight churches, two warehouses, one large business block and a large fruit canning plant.

### San Francisco, Cal.

During the year just ended permits were issued by the City Architect for the erection of 2012 new buildings and 672 alterations calling for an estimated expenditure of $17,494,984, as against 1611 new buildings in 1903 costing $17,264,245. The lowest month for building in 1904 was January, when 111 new buildings were erected at a cost of $656,371; the highest month was April, when 225 new buildings were projected to cost $1,937,856. The total amount of new building work undertaken during December amounted to $1,192,306, as compared with $896,297 in November.

Builders report that during the year just past the work of building has continued to be steady. The erection of residences has largely taken the place of building of high priced flats and apartment houses, as the demand for the latter seems to have been supplied for the time being. The need of cheaper and more modern priced homes has been shown better during the year than previously, and this has resulted in a large amount of this class of building. A number of large structures are now under way or about to be undertaken, and the indications are that the feature of the early part of the new year will be the building of large buildings, though at present nothing is under way to compare with the large buildings just being completed. Builders report that the wealthier classes are now abandoning frame construction for homes and are turning their attention to brick, cement and stone. Several handsome brick dwellings are now under way.

The Board of Supervisors of San Francisco has finally passed the ordinance providing for a considerable extension of the district in which fire proof roofs are to be used exclusively. The ordinance will take effect on May 1, 1905.

### Seattle, Wash.

The complete report of the Building Inspector for 1904 shows that 6899 permits with a valuation of $7,783,315 were issued during the year, as compared with 6914 permits of a total valuation of $6,495,781 during 1903. The class of work undertaken during the year showed a distinct improvement over that of previous years, and both architects and builders predict a continuation of the improvement along this line. The greatest activity in building for the year was during the summer months. The early months of the year were remarkably quiet and the last quarter again showed a falling off. The building permits issued during December were 407 for work valued at $171,493, as compared with 578 permits valued at $462,930 during November. The most active month in building for the year just closed was June, when 570 permits valued at $1,443,574 were issued.

A complete report of the changes in the building laws proposed by the special committee of the Washington State Chapter of the American Institute of Architects is about completed. A number of important changes in the city building laws will be suggested.

### St. Louis, Mo.

The opening of the building season is expected to witness a gratifying degree of activity, as there seems to be nothing in the outlook at present to interfere with the realization of this hope. The amount of work projected during the past year closely approximates that of the previous 12 months, and the fact that it falls somewhat short is doubtless due to the unusual activity in building just prior to the opening of the Louisiana Purchase Exposition in the city. The estimated cost of the building improvements during March and April of 1903 approximated $50,000,000, or more than one-third of the total for the entire year.

Taking the figures of the Commissioner of Public Buildings for 1904 it is found that 6761 permits were issued for building improvements estimated to cost $14,075,794, while in the 12 months of 1903 there were 4802 permits issued, but which called for an expenditure of $14,544,430, showing that in 1903 the average cost per structure was considerably in excess of last year. The record for last year, however, is interesting in the fact that in only five months did the cost of the improvements fall below $1,000,000, the smallest month being December, when the cost of the projected improvements was placed at $652,000.

### St. Paul, Minn.

The members of the Builders' Exchange of St. Paul held their third annual banquet at the Hotel Ryan on January 11, there being in attendance about 400 people. There were delegates from Minneapolis headed by Vice-President J. W. Elliott of the exchange in that city, Duluth, Mankato, Faribault and other out of town points. The large dining room of the hotel was decorated in red, white and green, the effects being enhanced by the use of flowers and ferns.

The *menu* provided seven courses, and after the many good things had been duly considered Toastmaster J. J. Dwyer introduced the speakers of the evening. The first to be called upon was J. F. McGuire, president of the St. Paul Exchange, who bade the guests and members a most hearty welcome. In the course of his remarks he explained the purpose of the organization, making mention of the fact that it consists of a body of 175 firms and has nearly 320 members. The next on the list was Governor John A. Johnson, who was unable to be present, and his place was taken by Mayor Robert A. Smith, who in reply to the toast, "The City of St. Paul," recounted some of the history in the building of the city. He told of the engineering difficulties that lay in the way of the builders of the city and referred to other interesting features. Other speakers included Pierce Butler of the Omaha road, J. W. Elliott of Minneapolis, L. G. Hoffman, president of the Commercial Club; Louis Betz, L. W. Rundlett, Commissioner of Public Works; Thomas Cochran of the Real Estate Exchange and others.

The affair was strictly informal and the toasts assumed more the character of plain talks as between man and man. The speaking was interspersed with vocal and instrumental music, and the third annual dinner is likely to long linger as a pleasant memory to those who were so fortunate as to be present.

### Tacoma, Wash.

During the year just closed building operations have shown a steady increase, month by month, over the year preceding. A summary shows that during 1904 there were 1434 permits issued for work valued at $1,911,052, as compared with 1315 permits valued at $1,690,334 in 1903. As usual at this season of the year building operations show a decrease as compared with the summer months. During December 101 permits were issued, with a total valuation of $141,781, as compared with 109 permits, valued at $219,875, in November. A noticeable feature of the building operations for December was the construction of new dwellings. Of these 68 were undertaken, valued at $64,935, showing an increase of over $10,000 as compared with the month preceding. Aside from the construction of new dwellings the only other important feature of December building operations was the commencement of work on two theaters of a total valuation of $61,000.

### Washington, D. C.

The bill to license builders, reference to which has already been made in these columns, has been approved by the Commissioners of the District and presented to Congress for consideration. It will be recalled that the measure provides for an annual license fee of $25 for a master builder, who must secure his license by passing an examination before a board to be composed of two architects, two master builders and the Building Inspector of the District or his assistant. No unlicensed person under the proposed law can engage in the work of constructing or reconstructing buildings in the District of Columbia.

### Winnipeg, Manitoba.

The members of the Winnipeg Builders' Exchange held their annual meeting in December, with a large attendance. Various questions affecting the building trades of the city were discussed and committees were appointed to deal with them. Immediate steps will be taken to obtain a charter for the organization and also to appoint representatives to the Board of Trade. New and more commodious quarters have been secured at 218 McDermot avenue and the members took possession the day on which their annual meeting was held.

The result of the election showed the following choice for 1905: President, G. W. Murray; first vice-president, A. T. Davidson; second vice-president, Joseph Bourgeault; treasurer, A. D. Robinson, and sergeant-at-arms, W. T. Lee.

A vote of thanks was tendered the retiring president, E. Cass, to which he replied in well chosen terms. The new president, who is the proprietor of the Royal Planing Mills, on being installed addressed the members, thanking them for the trust reposed in him and expressing his determination to do all in his power to further the interests of the exchange.

### Notes.

In his annual report of the business of his office Building Inspector Stevenson of Trenton, N. J., shows that 634 permits were issued for building improvements costing $946,984, while in the 12 months of 1903 there were 780 permits issued calling for an outlay of $1,144,443. It is explained that the decrease the last year was due more to the lesser amount of repair work than to any retrogression in the building of the city.

The year 1904 will go on record as the second most prosperous in the history of Allentown, Pa., so far as concerns the volume of building operations. In the year named there were 510 new buildings projected, as compared with 344 in 1903 and 366 in 1902. In the year 1901 there were 573 new buildings erected, which broke all previous records.

The Carpenters' and Builders' League has just been organized at New Castle, Pa., with E. S. Moore, T. E. Clark and F. A. Curty, trustees, for the ensuing year. The membership includes journeymen and carpenters who have recently withdrawn from the Carpenters' Local Union of New Castle.

According to the annual report of Leslie B. Miller, Superintendent of Buildings of the city of Newark, N. J., there were 2155 permits issued during the past year, calling for an estimated expenditure of $6,242,872. Mr. Miller looks for a continuance of the building activity during 1905.

The year which has just closed has been a record one in the matter of building operations in the city of Camden, N. J., the annual report of Building Inspector Steinmetz showing that there were constructed during the year 358 brick dwellings, 58 frame dwellings and 34 factories, as compared with 130, 49 and 22 buildings respectively in the 12 months of 1903. Of the new factory buildings, 21 were brick and 13 iron and frame. The Building Inspector predicts that building operations for the current year will far eclipse those of the last 12 months.

# LAW IN THE BUILDING TRADES.

#### ISSUANCE OF CERTIFICATE TO CONTRACTOR BINDS HIM AS TO SUBCONTRACT.

Where a building contract was completed to the satisfaction of the architect, according to the certificate of the latter, and the contract price paid to the contractor, he could not avoid payment to a subcontractor on the ground that the work under same was not done in accordance with the subcontract; but the subcontractor could not recover as extra work for work which he was ordered to do as a part of the contract by the contractor and architect, though it was rendered necessary by imperfections in the work of the contractor.—Grave *vs.* Parker, 87 N. Y. Supp. Rep., 156.

#### CONTRACTOR RELEASED BY DESTRUCTION OF BUILDING BY LIGHTNING.

The provision of a contract, for the construction of an annex to a building, that the owner should not be "in any manner answerable, accountable or responsible for any loss or damage" that might happen to the work, could not be extended so as to make the contractor answerable for a destruction of the original building by fire, caused by lightning, before the completion of the work, and the owner could not impose on the contractor an obligation to complete the work by offering to restore the old building.—Krause *vs.* Board of Trustees, &c. (Ind.), 70 N. E. Rep., 264.

#### EFFECT OF CLAUSE AS TO ALTERATIONS ON CLAUSE AS TO DELAY.

Where a building was erected under a contract providing a penalty for delay, and declaring that, should the owner at any time during the progress of the work request alterations such alterations should not effect or make the contract void, but should be added to or deducted from the contract price, at a fair and reasonable valuation, the alteration clause did not bind the contractor to finish the building within the time specified, or pay the penalty for delay caused solely by the making of the alterations.—Small *vs.* Burke, 86 N. Y. Supp. Rep., 1066.

# DESIGN FOR A FARM HOUSE

THE elevations, floor plans and constructive details presented herewith relate to a dwelling adapted to meet the requirements of the rural districts, and especially those sections in which farming operations are conducted upon a moderate scale. The exterior is unpretentious, and rather severely plain. The interior arrangement shows on the main floor a good sized front hall, a parlor, dining and sitting rooms, a kitchen, bathroom and one bedroom, while on the second floor are four sleeping rooms, each having opening from it a convenient clothes closet.

According to the specifications of the architect, the foundation walls are 14 inches thick, with a 2-inch air space. The frame is of balloon style, the sills being 2 x 8 inch yellow pine with 2 x 8 inch joist bearers on the center walls and 6 x 6 inch yellow pine supports. The plates are 2 x 4 inches, the ceiling joist 2 x 6 inches, the way are of yellow pine, the risers being of ⅞-inch stuff and the treads 1¼ inches. The outside door, as well as the sliding doors, are of white pine 1¾ inches thick and of the five-panel variety, as shown in the details. The hardware is of old copper of substantial design, with mortise locks throughout and Ives sash locks and lifts, the sash weights being hung on Silver Lake braided sash cord.

All white pine finish inside has two coats of Wheeler's wood filler, while the yellow pine has one coat of filler and one coat of Murphy's light coach varnish. The outside of the building is primed with one coat of lead, ocher and oil, and is painted two coats of lead and oil.

The farm house here shown was designed by F. B. Dysart of Superior, Neb., who estimates the cost to be in the neighborhood of $2500. Some of the leading items he enumerates as follows:

Front Elevation.—Scale, ⅛ Inch to the Foot.

*Design for a Farm House.—F. B. Dysart, Contractor, Superior, Neb.*

rafters 2 x 4, with hips and valleys 2 x 6 inches. The frame of the building is covered with 8-inch yellow pine ship lap laid diagonal, over which is one thickness of rosin sized building paper, this in turn being covered with 4-inch white pine lap siding.

The roof is covered with 8-inch yellow pine sheathing, on which are laid red cedar shingles, exposed 4½ inches to the weather, the shingles being dipped in Cabot's stain before being laid and having a brush coat afterwards. The porch has 2 x 6 inch yellow pine joist, placed 16 inches on centers, with a floor of 1¼ x 2½ inch white pine, laid in white lead joints. The porch is ceiled with ⅝ x 4 inch yellow pine strips.

The building throughout is lathed and plastered three coats, two being brown and one a white coat. The floors, with the exception of the kitchen, bathroom and pantry, are of 4-inch yellow pine, the others being of 4-inch vertical grain. All interior finish is yellow pine. The kitchen is wainscoted 3 feet high, with ⅝ x 4 inch strips, and the bathroom is wainscoted 4 feet high, with the same kind of material, molded at the top and quarter round at the bottom. The casings, base and front stair-

| | |
|---|---|
| 55 yards of excavating, at 30 cents | $16.50 |
| Foundation and chimneys | 182.00 |
| 950 yards of plastering, at 27 cents | 256.00 |
| 17,500 feet of dimension lumber, at $20 | 350.00 |
| 2,500 feet "C" lap siding, at $35.00 | 87.50 |
| 2,800 star "A" shingles, at $30 | 84.00 |
| 2,875 feet 4-inch yellow pine flooring, at $25 | 71.88 |
| 275 feet 4-inch vertical grained flooring, at $30 | 8.25 |
| 600 feet 1¼ x 2½ inch white pine flooring, at $35 | 81.00 |
| 3,000 feet of finished lumber, at $40 | 120.00 |
| Molding, stairwork, porch work, windows and doors | 286.22 |
| 1,000 feet of 4-inch yellow pine ceiling, at $30 | 30.00 |
| Painting | 165.00 |
| Hardware and tin work | 150.00 |
| Carpentry work | 500.00 |

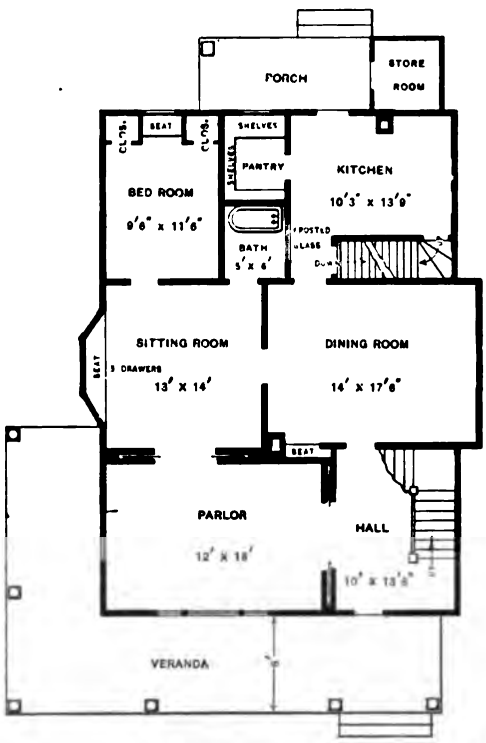
It is probable that as the estimate was based upon conditions existing about two years ago, the above figures will vary according to local conditions.

A MOVEMENT is on foot in New York City leading to the establishment by the Carpenters' Union of a co-operative mill for turning out trim, and in connection with which, we understand, it is the intention of the union to run a contracting department for all kinds of carpentry work. This is one of the important outgrowths of the carpenters' strike in the city and is directly traceable to the report that the Building Trades Employers' Association would endeavor to prevent the delivery of trim and other building material to all independent employers and contractors.

## The First Reinforced Concrete Dwelling.

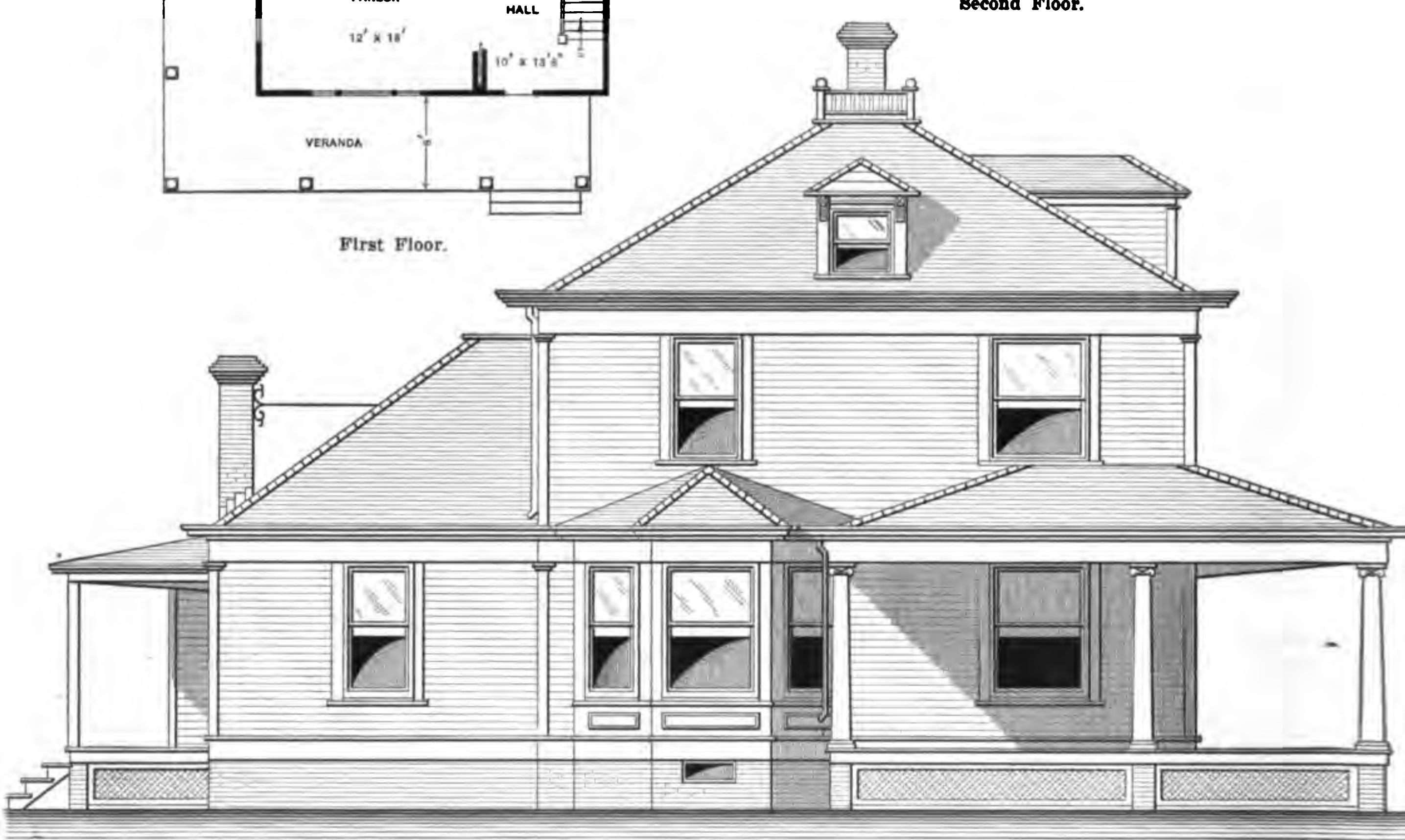
What is said to be the first reinforced concrete residence to be put up in this vicinity is now under way at the corner of Eighth street and Castle Point Terrace, West Hoboken, N. J. The structure will be two and one-half stories and basement in hight and cover an area 41 x 51½ feet. On the first story is a large veranda, a glass conservatory, library, parlor, dining room, kitchen, reception hall, butler's pantry, main stairs, servants' stairs, dumb waiter and circular bay windows. On the second floor are five sleeping rooms, sewing room, two bathrooms and extra toilets. The attic will contain five sleeping rooms, trunk room and servants' bathroom. The floors are to be of concrete and the roof will be covered with Spanish metal tile. All outside walls and partitions are 9 inches thick of concrete reinforced with ⅜-inch iron rods running horizontally every 12 inches and every 2 feet vertically. The exterior will be ornamental and marked off in squares. According to the architects, B. W. Berger & Son of New York City, the interior will be trimmed with yellow pine, red birch and quartered oak, and will cost in the neighborhood of $20,000.

In this connection it is interesting to note that the first building of its kind erected in the Borough of Manhattan has recently been completed at the foot of East Thirty-first street and the East River. It is a five-story building of concrete, and was put up in accordance with the Guy B. Waite Company's system of construction for its own use, the concern named being a fire proof contractor.



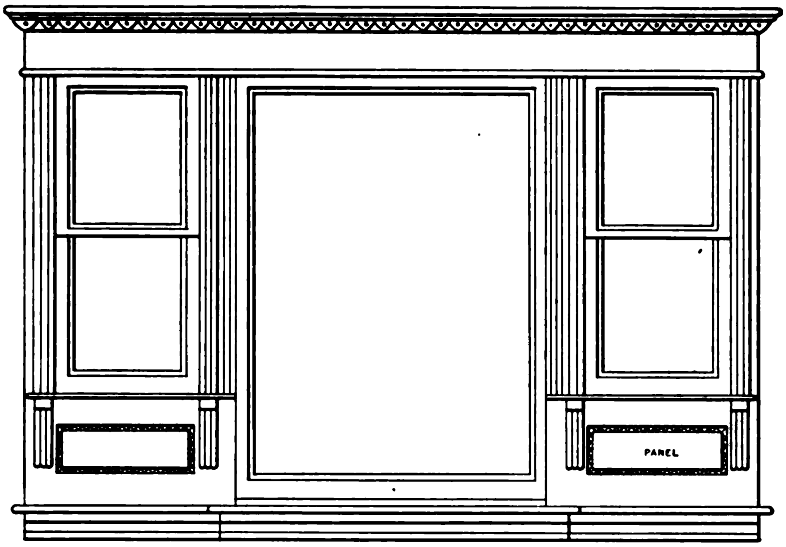

First Floor.


Second Floor.

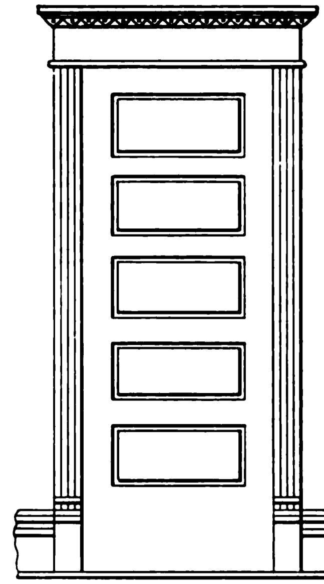


Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

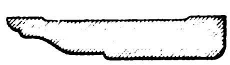
*Design for a Farm House.—Floor Plans.—Scale, 1-16 Inch to the Foot.*



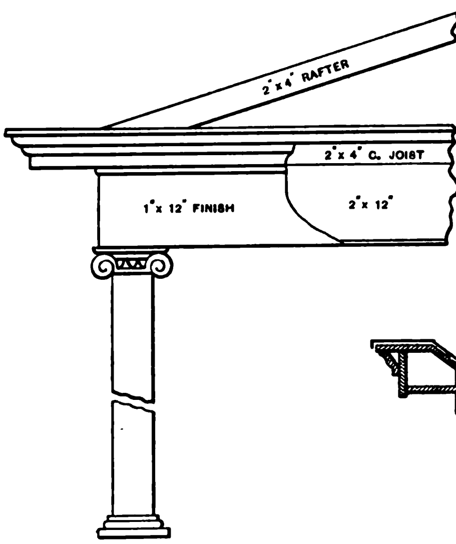

Detail of Trim for Plate Glass Window in Parlor.—Scale, ⅜ Inch to the Foot.



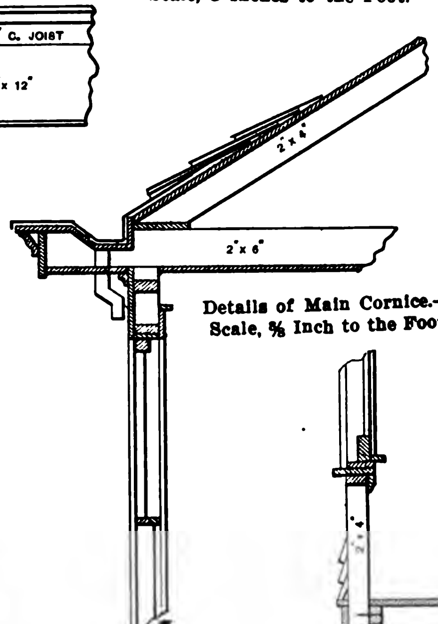
Elevation Showing Door Trim.—Scale, ⅜ Inch to the Foot.



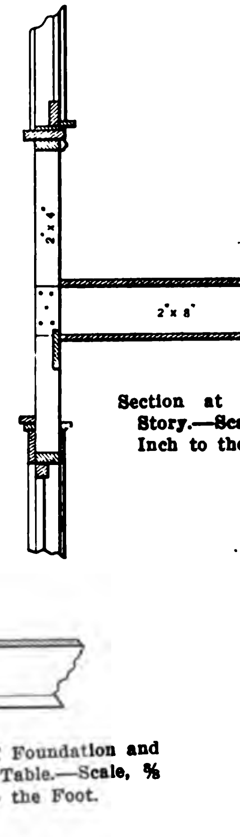
Section of Inside Casing.—Scale, 3 Inches to the Foot.



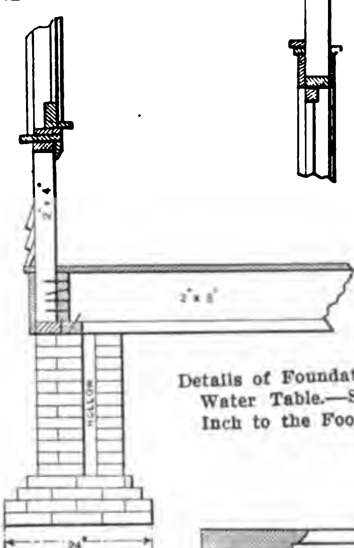

Details of Front Porch Column and Cornice.—Scale, ⅜ Inch to the Foot.



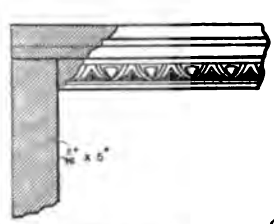

Details of Main Cornice.—Scale, ⅜ Inch to the Foot.



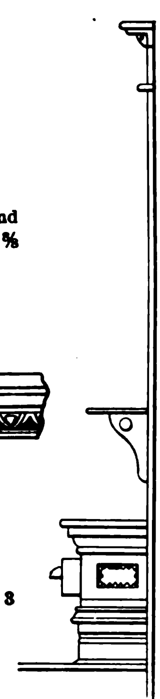

Section at Second Story.—Scale, ⅜ Inch to the Foot.



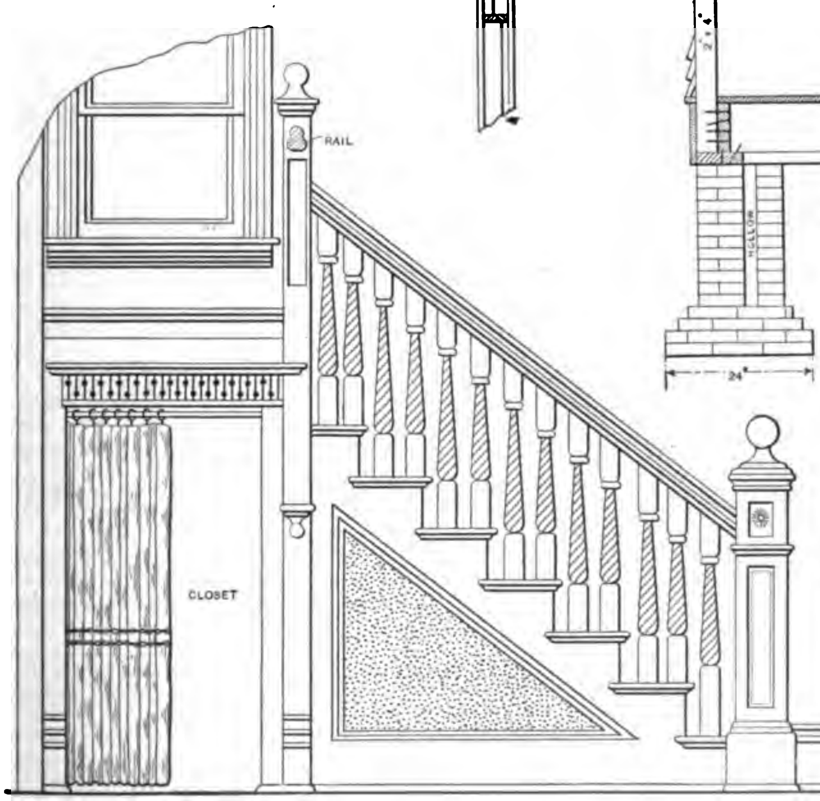

Details of Foundation and Water Table.—Scale, ⅜ Inch to the Foot.



Detail of Trim.—Scale, 3 Inches to the Foot.



Section through Trim for Plate Glass Window in Parlor.—Scale, ⅜ Inch to the Foot.




Partial Elevation of Main Staircase.—Scale, ⅜ Inch to the Foot.

*Miscellaneous Constructive Details of Design for a Farm House.*

## Builders' Exchange League of Pittsburgh.

The members of the Builders' Exchange League of Pittsburgh gathered on January 9 for the election of officers for the ensuing year, the choice resulting as follows: President, Samuel Francis; first vice-president, Robert K. Cochran; second vice-president, S. Keighly; secretary, E. J. Detrick, and treasurer, T. J. Hamilton.

In presenting his report, Secretary Detrick, among other things, said:

With industrial peace established we should make it one of our first principles to secure the confidence and trust of the honest and law abiding element of labor organizations.

We should show to them that it is not our purpose or intention to discriminate or oppose or antagonize the organizations of labor associations, but that it is our desire to co-operate with them and to assist them and to benefit them in as far as they confine their demands to their legal rights and privileges, and in as far as they do not encroach upon the legal rights and privileges of the employers. We should not hesitate to show to them that it is our intention and purpose to put a premium upon skilled and honest labor and to abolish the premium on incompetency and laziness, I have every reason to believe that skilled and honest labor does desire the help and support of this organization to establish this principle, believing that it is to the best interests of all, and that it creates a motive and an object of encouragement to the laborer, the apprentice and the mechanic to strive for something better and a tendency to elevate labor to a higher and better plane.

We should establish ways and means to enlighten our members on the rights of labor and labor organizations so that we may not, as individuals or as an association, encroach upon their rights.

These principles should quickly be established by the employers to disprove the assertions of labor agitators in their claims that the employer is the enemy of labor.

We should endeavor to show to the public that this organization is a self constituted temple of justice for the establishment of fair dealings to all, honesty and unity of action, appreciation of and protection to labor, as well as to its members, and that it stands for the protection and best interests of the public, of the architect and the prospective builder all of the time.

With industrial peace assured, we should not let our munitions get rusty, but, like our Government, which stands for peace, keep them active and ready for service.

### Benefits of Co-operation.

Much good can be done and strength and power added to our local organizations by aiding and co-operating with our State and national associations, and these should receive the support of every subordinate association and member in the League. These organizations need and must have our assistance to enable them to create a force and a power with which to supply our local organization in times of weakness and distress. Each of our members should unhesitatingly be willing to sacrifice his time now and then to assist in the work required to keep up this organization, which tends toward the permanency of industrial peace in the labor world.

The by-laws of the League should be amended to cover new issues that have arisen since its first construction, and this League should insist that each subordinate association obey its mandates by revising its by-laws to conform to that of the League, and all of these should be made harmonious with those of the State and national associations of employers. More time and study should be given to this work by the active and working element in each association, so that all can be arranged and planned to avoid conflict and friction between members on account of varying rules and obligations, and so that all may form one grand interassociate and harmonious whole. This is not at all impossible or as difficult as would first appear if proper and united action is taken in the matter.

The advances of certain kind of material over others being the evolution and progress of the times is one of the causes of delay in the progress of a building, and this question of trade disputes between organizations of labor should be discouraged, as it is no more possible to stop or halt the onward march of the evolution and advancement of the products of the earth than it is to change the course of the globe. There should be no discrimination as between the workmen in their various trades, and in their individual right to work at any or as many trades as best befits them, or their right to advance with the times. The same rule should and must apply to the master or employer.

Each employers' association should admit to membership in the respective associations all reputable employers upon the payment of a reasonable initiation fee and the assuming of a reasonable obligation necessary for such membership, and where labor unions are recognized by the employers, they should insist upon these same rules applying in as far as the workmen applicants represent honesty, skill, industry and sobriety, and these qualifications should be the only ones necessary to admit a workman to membership in a trade organization. In short, there should be no restraint of trade either in capital or labor.

The question of arbitration should be one broadly discussed and considered by the members for their future action, and subjects that are the legal rights of the individual granted under the laws of the State and the nation and privileges that are granted under agreements should not be subjects of arbitration or permissible for arbitration simply upon the demand of a complainant.

Legitimate arbitration should be encouraged, and I would recommend that a general arbitration board be appointed by the League to take up and make final decision on appealed questions of dispute. This board to be in the form of a joint arbitration board composed of representatives of labor and of capital, and to which all disputed questions shall be referred when the arbitration agreement of the League proves ineffective.

### Working Rules.

The following agreement was submitted by the master builders to the labor unions, and was signed by the plasterers, the painters and stone trades. The plasterers have signed a wage scale calling for 52½ cents per hour, and an eight-hour day for 1905. The marble and tile setters, turners and plumbers have not at this writing signed the agreement, although they appear to be in favor of accepting it. The only trade refusing to consider the agreement is the electric workers, the men in this line being at present on strike. As matters at present stand the master builders expect to reach a satisfactory agreement with the unions in the building trades on or before February 1.

*Uniform Working Rules to Govern Employers in Their Relation to Each Other, Also Between Employer and Workman, from January 1, 1905, to December 31, 1905.*

ARTICLE I.

Section 1. That eight hours' work on the job shall constitute each day's work. Regular working hours shall be from 8 o'clock a.m. until 12 o'clock noon, and from 12.30 to 4.30 o'clock p.m. This article not to apply to crafts operating over eight hours per day.

Sec. 2. That there shall be no limitation as to the amount of work a man shall perform during his working day.

ARTICLE II.

Sec. 1. When a workman works overtime he shall be allowed time and half time, excepting when employers desire to work double turn; in such case the employer reserves the right to employ two sets of men, one set for day turn and one for night turn, each at single time, and if the day turn men desire to work on the night turn they shall be permitted to do so without interference.

Sec. 2. That no person shall have the right to interfere with workmen during working hours.

Sec. 3. Workmen shall be paid double time for Sunday and the following legal holidays: Memorial Day, July 4, Labor Day, Thanksgiving and Christmas Day.

ARTICLE III.

The use of apprentices shall not be prohibited or restricted.

ARTICLE IV.

Sec. 1. No agreement shall be entered into that will deny any man the right of employment.

Sec. 2. That all workmen are at liberty to work for whomsoever they see fit.

Sec. 3. That employers are at liberty to employ and discharge whomsoever they see fit.

ARTICLE V.

There shall be no restriction or discrimination against any employer or member of a firm or corporation who may desire to perform skilled or manual labor for his or their firm, or for any member of this association.

ARTICLE VI.

Work outside of Allegheny County may be done according to the prevailing conditions and prices in such territory.

ARTICLE VII.

Sec. 1. There shall be no restriction of the use of machinery or tools.

Sec. 2. There shall be no restriction of the use of any manufactured material, except prison made.

ARTICLE VIII.

The rate of wages per hour for mechanics and helpers shall be governed by each association, and may be graded according to the ability of the workman.

ARTICLE IX.

That the foreman shall be the agent of the employer and need not be a member of a trade organization.

ARTICLE X.

There shall be no cessation of work in a shop or on a job on account of any dispute or misunderstanding, but any dispute

**or misunderstanding shall be referred to a committee of the employers' association and a like committee from the workmen. Officers of either association, parties to the dispute, shall not be eligible to serve on either of these committees.**

ARTICLE XI.

**That should either party to this agreement or working rules desire any change at their expiration, or desire to terminate the same, three months' notice prior to the termination of these working rules shall be given the employers or workmen; otherwise this agreement is to remain in full force for another year.**

## Wrecking the World's Fair.

Next in difficulty to the task of building a great exposition is the task of wrecking it and making a profitable disposition of the multitude and endless variety of materials which enter into its construction and equipment. The contract has just been closed by which the St. Louis Exposition authorities sell to the Chicago House Wrecking Company everything on the fair grounds belonging to the exposition authorities except the trees. The amount paid was something over $500,000. In addition to this the same company has made individual purchases of State buildings and private structures that did not belong to the exposition authorities. Wrecking has already commenced, but the maximum activity of the work cannot be reached for some months, until after the exhibits have been safely removed. The great $50,000,000 city of ivory is now a junk proposition. The magnitude and variety of materials that will be sold are shown by the following figures:

*Lumber and Finished Articles.*—100,000,000 feet of lumber, 1,000,000 square feet of sash, 4000 doors, 1,250,000 square feet of skylight, 1,500,000 square feet of roofing, 500 staircases, metal and wood, and several hundred carloads of telegraph poles and fence posts.

*Iron and Steel Articles.*—50,000 feet 4-inch cast iron water pipe, 50,000 feet 6-inch cast iron water pipe, 10,000 feet cast iron water pipe larger than 6-inch up to 36-inch diameter, 500 carloads wrought iron and steel pipe, $500,000 worth copper and steel wire, including trolley wire; 10,000 feet iron fence, 8000 tons rods, bolts, washers, &c.; 6000 tons 60-pound steel rails, 2000 tons lighter sections, and 2 11-foot steel stacks.

*Plumbing, Steam Fitting, &c.*—1700 closets and lavatories, $500,000 worth 8, 10 and 12 inch gate valves, and thousands of filters and coolers.

*Fire Apparatus.*—The complete fire protection service of the fair will remain in operation under the ownership and control of the purchasers of the fair until such time as fire protection is no longer necessary, when the equipment will be placed on the market. This will probably be some time next summer. This equipment includes, among other things, 4 chemical hose wagons, 5 fire engines, 10 deluge sets, 100,000 feet hose, 1½ to 2 inches diameter, 100 revolving standpipes, automatic sprinkling system in two large buildings, 5000 galvanized water buckets, and 12 18 x 12 x 10 inch Worthington underwriters' pumps.

*Electric Lighting Supplies.*—One of the items that cost the Exposition company the largest amount of money was the equipment of the lighting service. This throws on the market 100,000 electric lamps never used, 350,000 electric lamps used, 250,000 lamp receptacles, and millions of yards of lamp cord.

*Machinery.*—The list of machinery sold to the wreckers has not yet been tabulated, but it includes some of the boilers and engines used to furnish power for the fair, as well as 75 motors from 100 to 500 volts; 2 traveling cranes and a vast amount of hoists, tackle, blocks, chain, trucks, scales, safes, &c.; several electric passenger elevators, 6 road rollers, 15 sets of architects' and surveyors' instruments, 200 electrical turnstiles, 50 dump wagons and hand cars, 60 other vehicles, 500 lawn mowers, 500 wheelbarrows, and the like.

As a matter of curiosity it can be stated that the wreckers also have the problem of disposing of 5000 flags, 2000 feet of burlap, 2000 army cots, 2500 opera chairs, 25,000 kitchen chairs, 2000 iron beds, mattresses and hospital equipment, 300,000 flower pots and the buildings and contents of the vast greenhouses at the fair grounds.

Of course the largest item on the list is that of lumber, and the company is rapidly installing saw mills, planing mills and other machinery for working up this lumber into merchantable shapes and sizes, including plans for converting into salable kindling wood several million feet of lumber that will not be available for the lumber trade. The announcement that the cast iron pipe laid at the grounds is to be placed on the market will be received with surprise by many of our readers, as it was understood that at the time the sale was made to the exposition company it contained a provision prohibiting the sale of this pipe as scrap, the intention of the sellers being to avoid a repetition of the demoralization of the pipe market which followed the World's Fair at Chicago.

The Ferris wheel is being taken down and will probably be erected at some pleasure resort, though a definite contract has not yet been closed. In case this is done it will be the fourth time the wheel has been erected—namely, first, at the World's Fair in Chicago; second, at a resort near Lincoln Park, Chicago, and third, at the World's Fair, St. Louis.

The wreckers are compelled by their contract to do much of the work incident to restoring the grounds to their original condition, including the uncovering of the De Pere River, which was planked over during the fair. This stream ran under part of the Pike, and many of the buildings along that thoroughfare were actually on bridges over the stream.

The wreckers have gone about their herculean task in a systematic manner. Even before the fair opened they had in their possession lists of practically everything on the grounds, with the original purchase prices. These lists were made the basis of their bids and will be made the basis of their selling prices. The policing of the grounds after about March 1 will be in the hands of the wrecking company, and very rigid supervision will be exercised with the view of preventing incendiarism, which wrought such havoc at the World's Fair, Chicago.

## Heating and Ventilating Foundries and Shops.*

There are several systems of distributing the supply of heated air. A method usual in public and office buildings, and sometimes employed in factory buildings, is the vertical duct system by which the air is admitted through vertical flues or ducts built in the walls at a point about 8 feet above the floor. A method of distribution quite similar to this is one where the air is first blown into brick ducts placed underneath the floor. From these ducts vertical galvanized iron risers are arranged along the walls.

This system is also frequently very successfully employed in foundries. Advantages of this system are, first, that there is no overhead piping in the way of cranes, &c.; second, that the greater portion of the distributing ducts are brick and are not subject to deterioration. The third and principal advantage is that the air can be distributed by this means where most needed. This system is sometimes somewhat modified by placing the outlets close to the floor and blowing downward directly along the floor. This secures a perfect diffusion of the heated air at the floor line and avoids any drafts which would be objectionable.

Another system which has proved very satisfactory is that in which a distributed air return duct is employed. This approaches very closely in principle to the plenum system used in public buildings, and is a combination of both plenum and exhaust systems. In the Philadelphia & Reading shops at Reading, Pa., instead of employing one or two large units, seven separate sets of apparatus have been provided, placed in small fan houses built at intervals at either side of the building. The peculiar feature in this and similar installations is that no distributing ducts or piping for the heated air are used; the air being blown directly into the building at about 8 or 10 feet above the floor through an outlet branching in three directions, and through which the air passes at a comparatively high velocity. The distribution is effected entirely by return vent ducts, distributed at frequent intervals along the walls, opening into large return air tunnels, which are provided on either side of the building and serve the additional purpose of affording a convenient place for locating steam and water mains, and also electric light and power mains. Provision is made for taking a portion of the air from without doors to secure a plenum. One great advantage of this system is that it removes all cold air leaking into the building at the floor line, as well as that produced by the cold down draft next to the walls. Further, a perfect distribution is secured in all parts of the building, and the cost of installation is reduced to a minimum.

Excellent results can be secured by the use of over-

* Concluded from page 12, January issue.

head piping, providing it is not placed at too great a distance above the floor. The chief advantage of the overhead system is the saving in first cost, since on account of the high temperature and velocity of air in the distributing pipes a great amount of heat can be transferred with a very small amount of material. The cost of the galvanized iron distributing system of air ducts is usually a small portion of the total cost. The best results are secured with outlets at from 12 to 18 feet. Above this hight it is preferable to use drop pipes extending downward along the columns where they will not interfere with traveling cranes.

In many instances a system of elaborate distribution is impracticable or undesirable. In such cases a centrally located apparatus or discharge pipe may be used. From this point the air is blown in all directions, and a circulation is produced by an exhaust connection to the fan inlet. In such instances very effective heating has been secured even where it was required to blow the air long distances. Perhaps as good an example of the successful operation of such a system may be found in the Buffalo Forge Company's installation in the foundry buildings of the General Electric Company at Schenectady. This foundry, which is probably one of the largest in the world, is heated in an entirely satisfactory manner with a few large branch outlets. Since the plant was installed a large addition has been built on one end of the building. This addition is satisfactorily heated by a branch inlet situated at over 200 feet from the further end, which shows how thorough a distribution may be secured by a forced circulation.

## New Publications.

**The Building Estimator.**—By William Arthur, 105 pages. Size 4½ by 6½ inches. Bound in board covers. Published by the author. Price, $1.50, postpaid.

This, as its title indicates, is a work designed to assist the builder in making his estimates, while at the same time there is presented much data of incidental interest to those in the trades addressed. The little work is divided into two parts, the first of which deals with approximate estimating, covering such features as excavating, piling, concrete brick work, cut stone, carpentry, mill work, tin and galvanized iron, paint, &c., while touching upon the question of percentage, relative cost of brick and glass, &c. In the second part estimating in detail is considered, and here the builder will find the data presented in a way to prove of great assistance to him in figuring the cost of work on which he may desire to bid. It is a well-known fact that the profit or loss in connection with a job of work depends very largely upon the way in which it has been estimated by the successful bidder. If his estimate is correct and no important items have been omitted in compiling the figures, the chances are largely in favor of a satisfactory outcome on the part of the contractor, but if his estimate has been deficient he is likely to find when the work is done that the balance is on the wrong side of the account. It is therefore essential that every builder who desires to be successful in his chosen calling should become proficient in making estimates, and the little book above mentioned is of a nature to aid him to this end.

**Elementary Course in Mechanical Drawing, Part 1.**—By Arthur W. Chase, instructor in machine drawing and design in the R. T. Crane Manual Training High School, Chicago. 189 pages. Size 7 by 9 inches. Oblong. Illuminated by 97 figures and diagrams. Bound in cloth covers. Published by Howland Speakman. Price, $1.50, postpaid.

This work has been brought out with a view to meeting the requirements of manual training and technical schools, and deals with the selection and use of instruments, geometrical problems, orthographic projections and shades and shadows. The matter is presented in a simple style, free from too technical language, while time consuming exercises designed solely to give skill in the use of instruments are entirely omitted. The course presents a brief drill in a few fundamental geometrical problems, while orthographic projection is introduced by the use of models, thus beginning with the concrete instead of the abstract conception. Specifications are given for each problem, thus giving the pupil a drill similar to that he would experience in practical work. One of the interesting chapters deals with the conventional lettering of drawings, a phase of drafting which will strongly appeal to those who are desirous of turning out neatly lettered work.

AN American sewing machine company has just erected in St. Petersburg what is said to be the handsomest structure in Russia, it being 11 stories high and built of granite. It is said to be the first building in the empire in which the American steel construction system has been used.

A FRENCH architect, M Pénin, who has recently been building on the site of the Hotel Mascani of Paris, an old mansion dated 1678, has nothing good to say of its construction. The floors, he says, sank by their own weight. In general, there was little where there ought to be much, and much where there ought to be little. To this decline from the perfection of French construction in the Gothic centuries, some clue is given by M. Pénin's account of a flue which was carried of small—and presumably of reduced—girth through the middle of the floor beams. An architectural conception thrust upon the plan instead of proceeding from it falsified construction all through.

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A TWO-FAMILY HOUSE OF FRAME CONSTRUCTION RECENTLY ERECTED IN WORCESTER, MASS.

JOHN P. KINGSTON, Architect.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
232-238 WILLIAM STREET, NEW YORK.
MARCH, 1905.

## More Model Tenements.

An encouraging step in practical and sensible philanthropy was announced a few weeks ago in the statement that Henry Phipps, the well-known Pittsburgh iron master, had given $1,000,000 for the purpose of building model tenements in New York City. Probably the matter of housing the poor in decent and sanitary dwellings is the most important economic problem of the day in our great cities, and the fact that Mr. Phipps has not only made this munificent gift but has provided for the application of the money for the purpose designated, through a committee composed of men who have made a sympathetic and practical study of this subject, is especially gratifying. The fund will be administered by an organization of which Mr. Phipps himself will be the president and Robert W. De Forest, former Commissioner of the Tenement House Department of New York City and author of the New York Tenement House law, will be chairman of the Executive Committee. In addition to Mr. De Forest Alfred T. White of Brooklyn, who has built a very successful block of model tenements, and Dr. E. R. L. Gould, president of the City & Suburban Homes Company of New York, will be among the active managers of the trust. Each of the men named and the others connected with the organization has been or still is actively concerned in endeavoring to make better the tenements in the congested districts of New York City. The model tenements that will be erected will embody the prime requisites for such buildings. They will be sanitary, fire proof, decently and comfortably arranged and open to light and air, with space outside for the children to play. One important point about it is that this gift is not to be regarded as in the nature of a charity, for the investment is expected to make a return of at least 4 per cent. on the capital. The profits, however, instead of reverting to an owner will be applied to the building of other tenements of like character, and thus the benefaction will be, so to speak, progressive. The fact that model tenements can be made to pay a reasonable profit to the owners has already been demonstrated in New York by the City & Suburban Homes Company, before referred to, and in other cities in this country and Great Britain, and the demonstration of this fact offers an absolute refutation of the claim that capital cannot get its due return from well built and decently arranged tenements such as are contemplated under the New York Tenement House law. No more commendable use of great wealth can be made than just along this line, and the example of Mr. Phipps is one which others may follow with benefit to the world at large and the working man in particular.

## Opposition to Trade Schools.

In his recent inaugural address Governor Douglas of Massachusetts strongly advocated the establishment of trade schools in connection with the various industries of the State as a substitute for the apprenticeship system, which, in the course of modern industrial development, has practically fallen into disuse. He pointed out that, under present conditions, there is but little opportunity for young men to learn a trade, and that to-day most workmen understand but one small part of an industry, instead of gaining that practical knowledge of a trade as a whole and of the scientific principles upon which it is founded that is necessary to enable them to secure advancement. Thus many bright young men, through lack of the broader training, are compelled to work indefinitely at the machine or bench. Mr. Douglas expressed his emphatic approval of the principle of State aid for trade schools, as a means for keeping Massachusetts at the front in the industrial world. This attitude of the chief executive of their State—himself one of the largest employers of labor in the Commonwealth—has been positively condemned by the labor unions of Massachusetts. At a meeting of the Executive Committee of the State Federation of Labor in Boston a few weeks ago a resolution was adopted in the following terms: "We are opposed to trade schools in the shoemaking industry or any other trade, as objectionable, because they never learn (? teach) the practical parts of a business, only giving a smattering of theoretical knowledge that makes its victim a poor workman, incapable of getting a good job, and yet a menace to every other man in the craft." It was also decided that the Federation should present its views to the Massachusetts Legislative Committee on Labor, with the object of checking any indorsement by the Legislature of the Governor's recommendations in the matter.

## Value of Trade Schools.

The fallacy of the above statement of the Massachusetts labor leaders is obvious to those who have given any study to the trade school question. The beneficial results achieved by these institutions in Europe—notably in Germany—and to an unfortunately limited extent in this country, have amply demonstrated the value of trade school training in the industrial advancement alike of the individual tradesman and of the entire trade. In short, it is becoming more clearly apparent that the country, the State, or the community that neglects the trade and technical training of its youth will inevitably lose ground industrially, and the business it should secure will go where such training is encouraged and fostered. The opposition of labor unions to trade schools is founded ostensibly upon the allegation that trade schools turn out poor workmen, who are a menace to others in their trade. That such a charge is unfounded can very readily be proved by the records of one such institution in this country—the New York Trade School—which is yearly turning out, not fully equipped and skilled journeymen, but young men so thoroughly grounded in the theory and practice of their craft that they are able in a comparatively short time to become full fledged journeymen, of a type, as to knowledge, skill and intelligence, that readily secures for them steady employment wherever they may locate, and facilitates their advancement to positions of responsibility and profit. Many such young men have been enabled at a comparatively early age to embark in business for themselves, an achievement that would not have been possible had their trade school training done them the injury the Massachusetts labor leaders would have the public believe that it does.

It is unfortunate that the opposition of labor, of which the Massachusetts instance is but the latest example, founded on a selfish misconception, should have so successfully impeded the spread of the trade school movement in this country up to the present.

## Fire Losses in 1904.

The annual fire waste in the United States is a serious problem, for in spite of all precautions that are being taken in modern building construction and the wide adoption of every improvement in the way of fire prevention and fire fighting, the losses from this cause are growing steadily from year to year. In the last calendar year the total fire losses for the United States and Canada, as compiled by the New York *Journal of Commerce*, reached a larger sum than for any preceding year, with the single exception of that of the great Chicago conflagration, 1871. The aggregate fire waste for the 12 months is figured in excess of a quarter of a billion dollars, the actual amount being $252,364,000. Of course this sum was immensely swollen by the $70,000,000 loss involved in the Baltimore fire of February and also by the $12,500,000 loss in Toronto, Canada, and a serious fire in Rochester, N. Y., which involved a loss of $3,200,000; but, eliminating these three sums, the total of the smaller and moderate fires is still found to be greatly in excess of that of any recent year, being $166,664,000, as compared with $137,365,000, the average for the 10 preceding years. The effect of these great losses has been disastrous to the fire insurance business, resulting in the retirement in Baltimore of all but three of the local insurance companies, while a number of smaller companies throughout the country have also given up the struggle during the year. No less than 3100 fires occurred in 1904, each of which represents an aggregate loss of over $10,000, as against an average of about 2400 fires of similar range in preceding years. From the fact that these losses represent to a large extent the absolute wiping out of property and wealth it will be seen how serious a drain on the country's resources the annual fire losses represent.

## Building Trades Workmen Organize in New York.

What is probably the largest central body of unions in the building trades ever formed in the United States effected a permanent organization the first week in February in New York City under the name of the Associated Building Trades. A constitution was adopted and officers elected, as follows: President, Thomas A. Hughes of the Amalgamated Sheet Metal Workers' Union; vice-president, John Follam of the Plasterers' Helpers' Union; secretary, D. R. Tompkins of the Tile Layers' Union; treasurer, William O'Neill of the Tar, Felt and Water Proof Workers' Union, and sergeant-at-arms, Arthur Dunn of the Progress Association of Steam Fitters' Helpers. The new body represents 33 unions in the building trades, embracing both skilled and unskilled labor, with an aggregate membership of about 75,000, which makes it a much stronger body than either of its predecessors, the old Board of Building Trades and the Building Trades Alliance. The only union of any importance connected with the building trades not so far represented in the new organization is the Housesmiths' and Bridgemen's Union. Strong efforts, however, are now being made to bring this union also into the central organization.

The Associated Building Trades differs from the old organizations which it succeeds in that it is not composed merely of walking delegates, but is made up of five representatives from each affiliated union, with an inner organization termed the Board of Representatives, which acts as a kind of Executive Committee. This committee will order strikes only when empowered to do so by the Associated Building Trades. The constitution of the new organization includes provision for arbitration, with the statement that strikes will only be undertaken as a last resort. It is understood that a committee from the organization will shortly wait on the Building Trades Employers' Association to demand a conference in order to formulate a new arbitration agreement and to end the present lockout which exists in connection with some of the unions. In case of failure to come to an agreement on these heads it is understood that arrangements will be made for a stubborn fight this spring.

## A Carriage House and Stable.

*(With Supplemental Plate.)*

An interesting example of barn construction, embracing, as it does, both carriage house and stable, is made the basis of one of the half-tone supplemental plates which accompany this issue of the paper. The picture so clearly shows the general treatment of the exterior that very little comment would appear to be necessary. The building covers an area 44 x 56 feet and has 14-foot posts. The hight of the first story is 11 feet, with hay loft above. The carriage room is 32 x 43 feet, and the stable proper is 11 x 43 feet. In the latter are two box stalls and two corner stalls, all of which are fitted with improved drainage system. There is a harness room at the end of the stable and a wash rack in the carriage room. The building is trimmed throughout its interior with North Carolina pine, and cost to build a few years ago about $3000. It is heated by a hot water system which provides hot and cold water for all purposes. The carriage house and stable is located in Great Barrington, Mass., and was designed by and erected under the supervision of W. J. Steves.

## Suggestions for a Turkish Room.

*(With Supplemental Plate.)*

We show by means of one of our half-tone supplemental plates this month an interior view of the Turkish room in a residence in Los Angeles, Cal., a careful study of which cannot fail to afford suggestions to those who are interested in the interior decoration and treatment of apartments in fine dwellings. The architect of the residence was C. H. Brown of 515 Steinson Building, Los Angeles, Cal.

## Annual Meeting Mechanics' and Traders' Exchange.

At the annual meeting of the Mechanics' and Traders' Exchange of New York City, held at its rooms on Tuesday, January 31, the following officers were elected for the ensuing year:

*President*, Francis N. Howland.
*Vice-President*, Frank E. Conover.
*Secretary*, Ronald Taylor.
*Treasurer*, Stephen M. Wright.

The trustees elected were Charles A. Cowen, Alphonso E. Pelham, Augustus Meyers, John J. Roberts, Thomas M. Mulry, Francis M. Weeks and Edwin Outwater.

The Board of Examiners of the Building Department elected were Warren A. Conover and Lewis Harding.

The Inspectors of Election selected were Edward Vaughan, Michael Larkin and Richard R. Latourette.

THE new building which has just been completed for the Manual Training High School in Brooklyn, N. Y., covers a lot of 205 by 200 feet in plan, is five stories in hight and has an auditorium which will accommodate 1500 students. There are 40 classrooms, in addition to the shops for carpentry and sheet metal work, blacksmith shop, machine shop, printing office, bindery and rooms in which the girls will be taught sewing, cooking, millinery, dressmaking, &c. Sixteen rooms will be devoted to science and to drafting, and there will be two study rooms, a music room and two science lecture rooms.

# AN APARTMENT HOUSE FOR THREE FAMILIES.

A TYPE of building which will doubtless be found of interest to many readers of this journal, more especially as apartment or flat houses are rapidly growing in popularity in the smaller cities and towns of the country, is illustrated upon this and the pages which immediately follow. The half-tone picture which adorns this page is a direct reproduction from a photograph of the completed structure and affords an excellent idea of its appearance in its finished state. The floor plans show the arrangement of the rooms, while the details give an indication of the construction employed. The house was built by the day for J. H. White, and is located at the corner of Broadway and the Parkway, South Boston, Mass. It may be interesting to state in this connection that Broadway is about 100 feet wide and that the front and side windows of the house command a magnificent view of Marine Park and Boston Harbor.

The work was done in accordance with drawings prepared by Arthur W. Joslin, of 21 Alpine street, Roxbury, Mass., who states that the foundations are of block granite laid in cement mortar, the underpinning is of pressed brick and the cellar window sills, front steps and the buttress caps are of cut granite. The frame of the building is of spruce and of the sizes indicated on the details and framing plan. The walls are covered with matched spruce and under floors and roof with square edged spruce. The sheathing boards are covered with No. 1 spruce clapboards laid 4 inches to the weather and with a layer of Neponset paper between. The shingles are of cedar laid 5 inches to the weather. The gutters, conductors and flashings are of copper. The outside finish is of pine. The kitchens, pantries, bathrooms and rear halls are finished in North Carolina pine, these rooms being wainscoted 3 feet 6 inches high. The dining rooms and front staircase halls, as well as vestibules, are in quartered oak, molded finish, while the balance of the house is in whitewood and cypress. The parlors and sitting rooms are painted white with enamel finish.

The floors, except in the parlors, where they are of spruce, are rift Georgia pine of 2½ inch face, matched and blind nailed. The plumbing is of the latest type of open work, the bathtubs being standard iron enamel with roll rims, siphon jet closets with hard wood seats and tanks chiseled Italian marble bowl slabs with 12-inch backs and 14 x 17 inch oval bowls, the laundry tubs and sinks being of soapstone. The ranges in the kitchens are brick set and connected with 30-gallon boilers. All exposed piping, traps, &c., are of brass, nickel plated, and all pipes are suspended in Boston hangers. The soil pipe is 2, 3 and 4 inch extra heavy iron, with ventilating cast and wrought iron pipes of ample size. In the cellar are located three hot water heaters, there being one for each floor.

The house is painted three coats outside and four coats inside, with floors shellacked and waxed. The dining rooms are fitted with built-in sideboards, and in the rear staircase hall is a dumb waiter suitable for raising coal, trunks, &c.

Perspective View, Reproduced from a Photograph.

*An Apartment House for Three Families.—Arthur W. Joslin, Architect, Roxbury, Boston, Mass.*

## A Machine Shop of Reinforced Concrete.

The increasing use of concrete, reinforced and otherwise, in connection with building construction renders interesting any reference to peculiar conditions under which it may be employed for this purpose. Buildings have been put up in which concrete in various forms has been used for walls, floors, partitions, &c., but the first example of the floor construction of a building being entirely of reinforced concrete is that of a machine shop just completed in the city of Philadelphia. Outside of the floor construction an interesting feature is the two-section saw-tooth roof over a one-story portion in the rear. This roof is built entirely of reinforced concrete, galvanized iron and glass, and is carried at each side and on the ends by the walls of the building, while a row of reinforced concrete columns support it at the middle. The roof consists of a 3-inch reinforced concrete slab, supported on inclined reinforced concrete beams.

The structure is rectangular in plan, with a frontage of 120 feet and a depth of 100 feet. The main front was designed to be 5 stories high for a depth of 53 feet and the remainder of the building was to be one story high. There is a basement 10 feet in the clear beneath the front part of the building, which has a cement mortar floor laid on a concrete base. This concrete was left as it came from the forms and was painted with a coat of cold water white paint.

As is well known the principal feature of reinforced concrete construction is the use of iron bars bedded in the concrete in such a way as to give the material great rigidity and strength. The centering and the molds were of 2-inch dressed plank, and in doing the work of erection 1½ inches of concrete was first laid in the molds and thoroughly tamped. Straight bars were next laid and another inch of concrete placed, after which the camber rods were put in and held in place at their ends until the remaining concrete had been poured. The reinforced rods of a slab at the end of each day's work were made to project so as to engage the adjacent work the next day.

The concrete was mixed in the proportions of 1 part Portland cement, 3 parts clean gravel and 5 parts trap rock of a size to readily pass through a ¾-inch ring. We understand that the contract price for the construction of the girders, floors and columns, including the roof but exclusive of the walls and the finishing of the building, was 55 cents per superficial square foot.

THE Trenton Carpenter-Builders' Association, which includes practically all of the larger contractors of the city, has formally declared for the "open shop." This action was determined upon at a meeting of the organization held on February 1, when the members agreed to stand together in the movement.

## Carpenters' Wages in Germany.

The following is a translation of the terms of the labor contract between the boss carpenters and their workmen in Freiburg, Germany, which went into effect for a period of two or more years on the 15th of March, 1904. The information is contained in a report recently made by E. T. Liefeld, United States Consul at that place:

The daily hours of labor shall be: March 16 to October 15, ten hours; October 16 to November 15, nine hours; November 16 to December 31, eight hours; January 1 to February 15, eight hours; February 16 to March 15, nine hours.

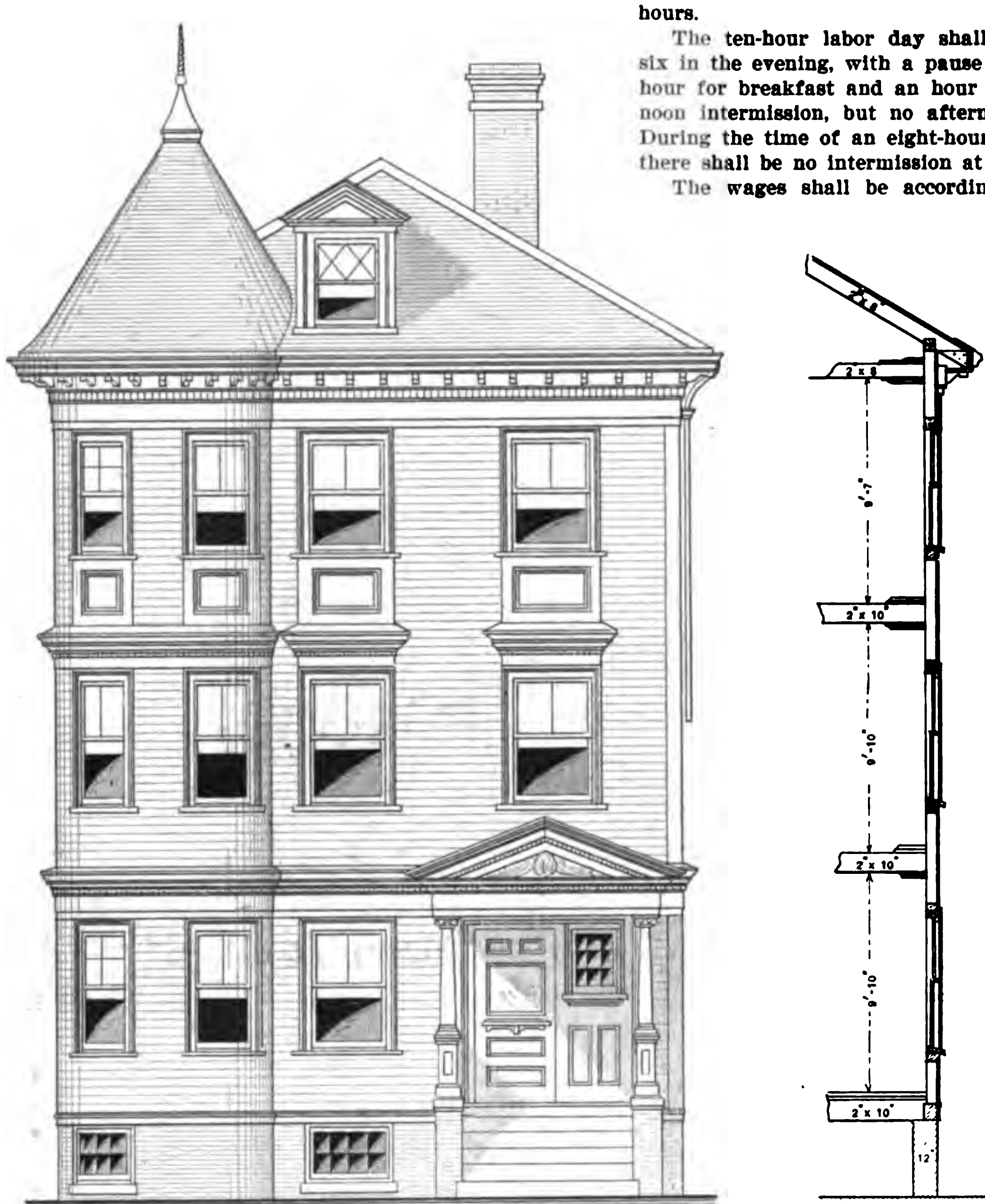
The ten-hour labor day shall last until six in the evening, with a pause of half an hour for breakfast and an hour and a half noon intermission, but no afternoon pause. During the time of an eight-hour labor day there shall be no intermission at all.

The wages shall be according to work accomplished, yet the lowest pay for the laborers who are not yet 25 years of age shall be 37 pfennigs (8.8 cents) an hour, and for those who are older than 25 years 41 pfennigs (9.76 cents) an hour.

For extra work beyond the regular hours, if that ever becomes necessary, an extra sum of 10 pfennigs (2.38 cents) an hour is to be paid.

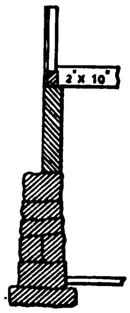
Night and Sunday labor can be required of the workmen only in cases of urgent necessity, and double the usual pay must then be given. The time from 8 in the evening until 5 in the morning shall be considered night labor time.

Work done outside of the city limits within a radius of 6 km. (3.73 miles), if the regular labor time can be

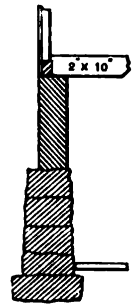


Front Elevation and Section.—Scale, ⅛ Inch to the Foot.

*An Apartment House for Three Families.*

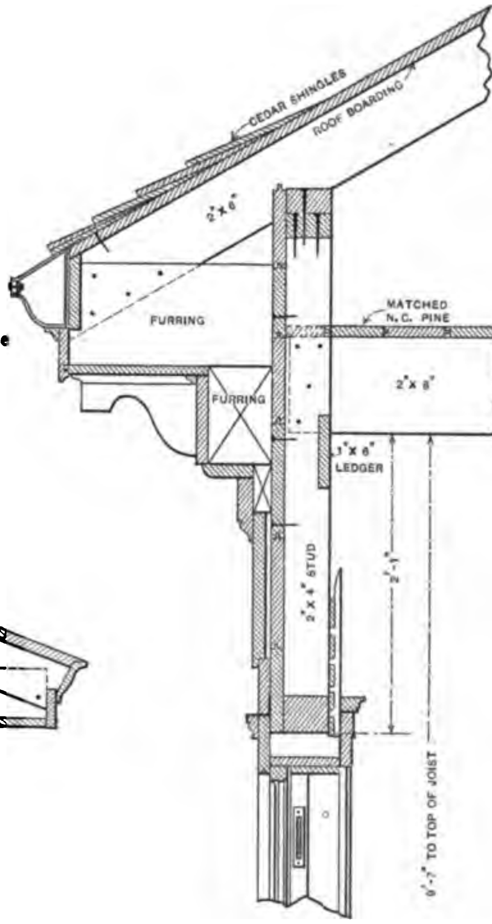


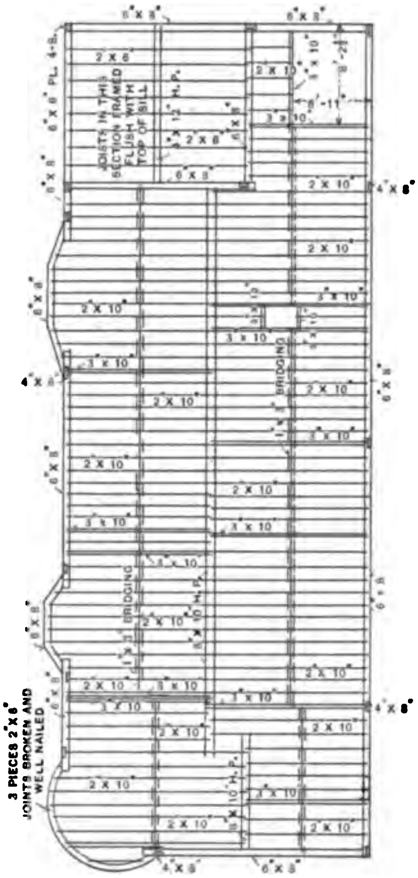

Section through Foundation Wall on Line A A of the Plan.

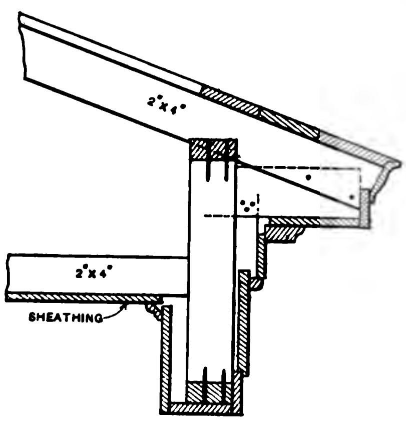



Section on Line B B.

Scale, ⅛ Inch to the Foot.



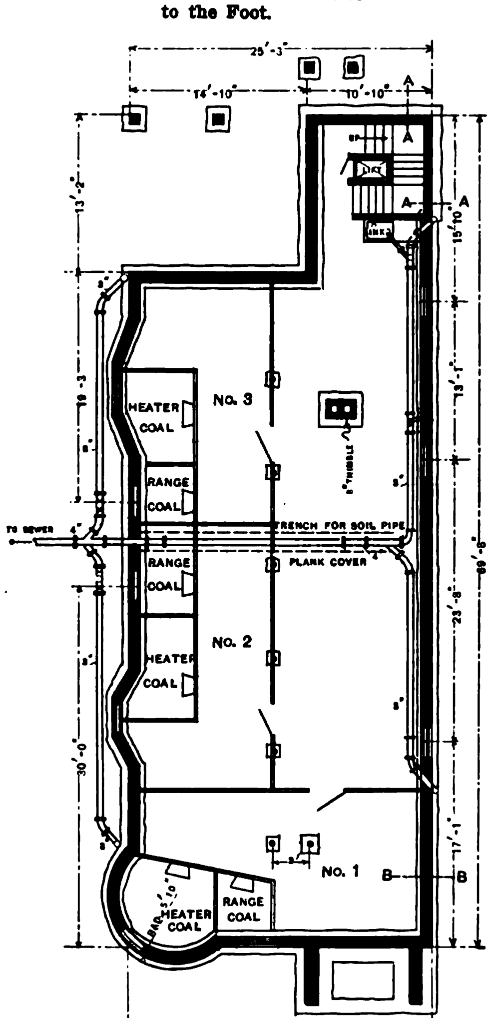



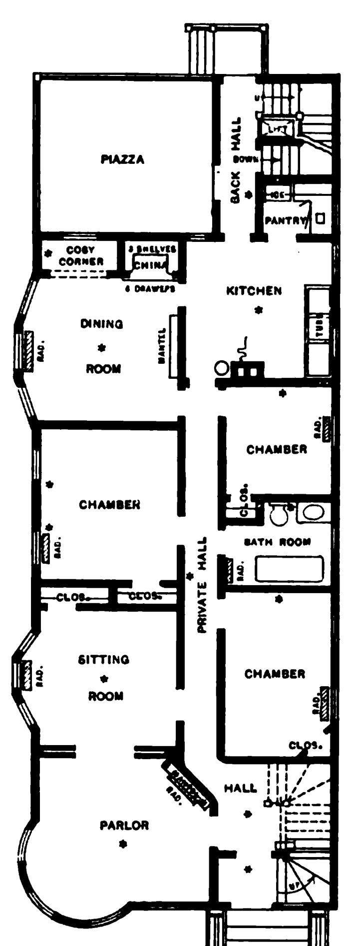

Detail of Porch Cornice.—Scale, ¾ Inch to the Foot.

Main Cornice.—Scale, ¾ Inch to the Foot.

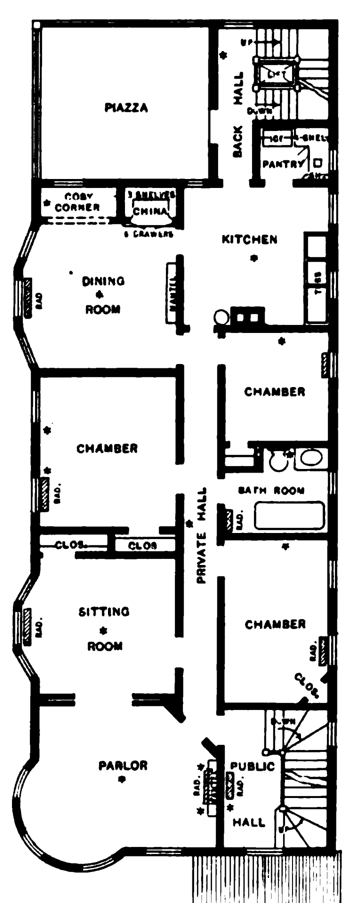
Framing Plan for First Floor.—Scale, 1-16 Inch to the Foot.




Foundation.




First Floor.




Plan for Second and Third Floors.

Scale, 1-16 Inch to the Foot.

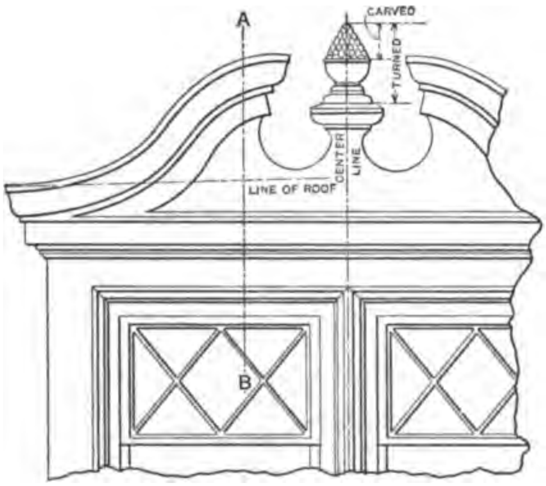
*An Apartment House for Three Families.*

observed and a daily return to the city is possible, shall be paid an increase of 10 pfennigs (2.38 cents) an hour. At greater distances, when a daily return is not possible, an increase up to the limit of 1.50 marks (35.70 cents) a day shall be paid, the amount depending upon local circumstances and requirements. In the case of married employees the terms of this article shall be followed according to mutual understanding and arrangement.

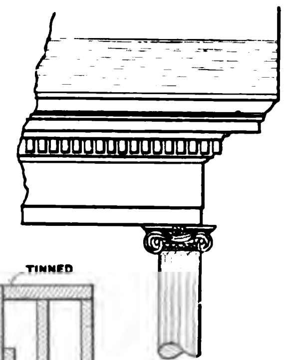
There shall be no time or term of notification to stop work required from either side.

In case of serious difficulties or misunderstandings a committee consisting of representative employers and employees shall take the matter into consideration for suitable action.

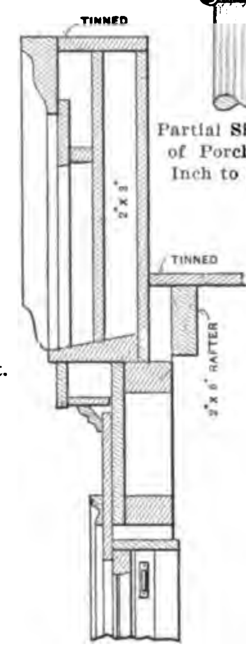
This agreement shall be valid from March 15, 1904, until March 15, 1906. If by January 1, 1906, neither side has raised any objections nor made any new recommendation, then it shall remain in force for another term of two years.



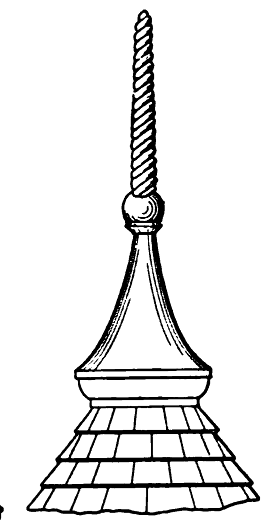

Partial Elevation of Dormer Window.—Scale, ¾ Inch to the Foot.



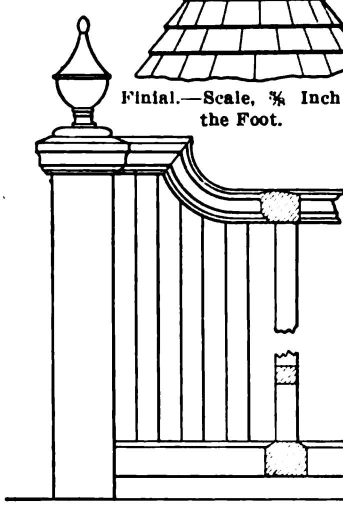
Partial Side Elevation of Porch.—Scale, ⅜ Inch to the Foot.



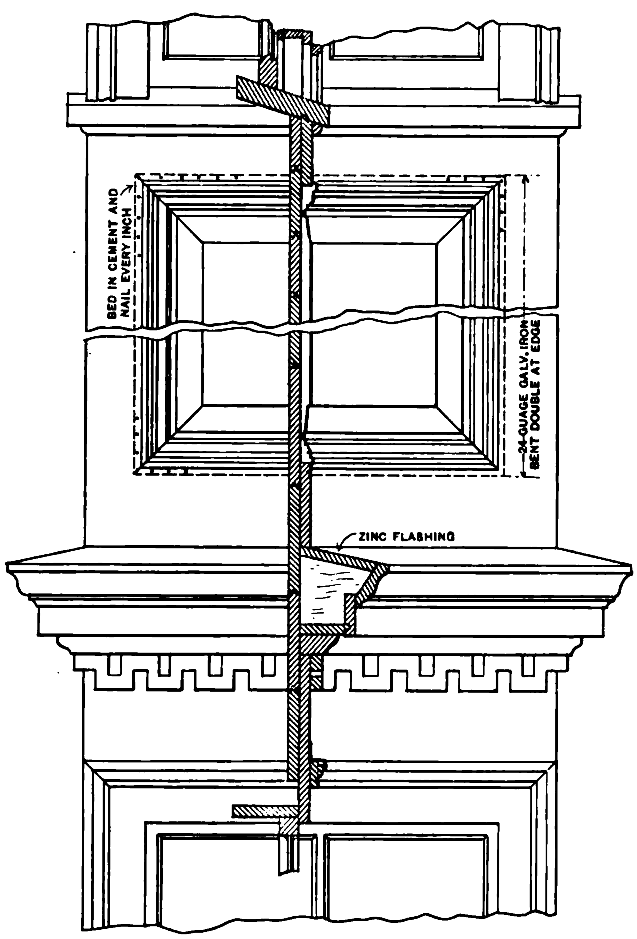

Section through Dormer Window on Line A B.—Scale, ¾ Inch to the Foot.



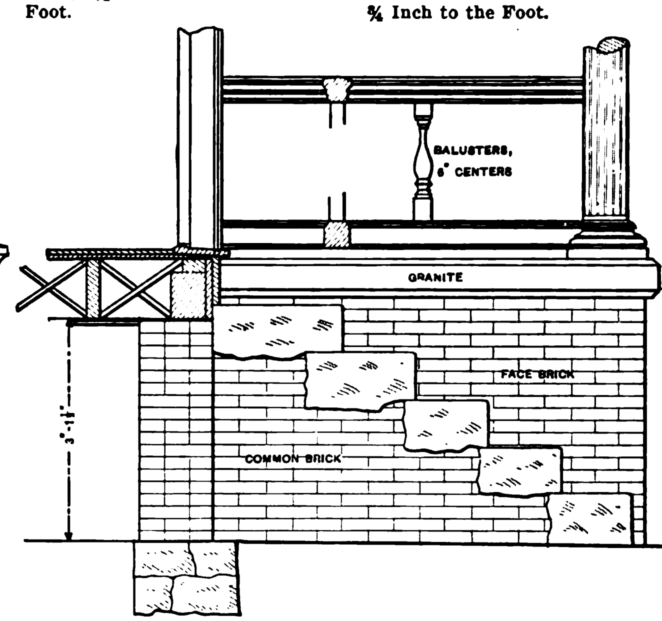
Finial.—Scale, ⅜ Inch to the Foot.



Detail of Roof Balustrade.—Scale, ¾ Inch to the Foot.




Details of Window Cap and Metal Panel at Second Story.—Scale, ¾ Inch to the Foot.




Section through Threshold and Stone Steps, Also Elevation of Buttress.—Scale, ⅜ Inch to the Foot.

*Miscellaneous Constructive Details of an Apartment House for Three Families.*

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ONE result of the differences which have existed for some time past between employers and workmen in the building trades in Wilkes-Barre, Pa., has been the organization of what is known as the Contracting and Building Co-operative Association, the members being competent and experienced mechanics in the building line.

# Convention of New York State Association of Builders.

THE tenth annual convention of the New York State Association of Builders, which was held in the Elks' Hall, Pabst Grand Circle, Fifty-ninth street and Eighth avenue, New York City, on Wednesday, January 18, called together builders and contractors from all the leading cities of the State. The gathering was thoroughly representative and from very early in the day until the afternoon session members were continually dropping in to swell the numbers. Prior to the opening of the morning session the delegates improved the opportunity for fully an hour, renewing old acquaintances, forming new ones and informally discussing subjects of mutual interest. Upon entering the anteroom of the hall each delegate was given a badge, round in shape and carrying the words, "N. Y. State Association of Builders," on a white ground set in a gold frame and backed by the national colors in the form of a double bow knot. The badges worn by the officials were mounted on white silk as a distinguishing feature.

### President's Remarks.

It was in the neighborhood of 11 o'clock when Charles A. Cowen, president of the State Association, rapped for order and opened the convention in the following words:

It gives me great pleasure to stand before you this morning and acknowledge in your behalf the kindly welcome that the New York builders have extended to us. I feel satisfied that if we lose nothing more than our pocketbooks and our watches we will not ask the police to search the town for them, but will try and earn others when we get back to business—that is, if we can get the conductor of the train to let us off this side of Buffalo.

The New York State Association has now completed the ninth year of its existence, it being founded in October, 1895, at Baltimore, and the permanent organization in New York City, December 11, 1895, with Isaac A. Hopper, the present Superintendent of Buildings of this city, as its first president.

The motive that draws you to this meeting is one of the highest that can move a private citizen to action. That is the desiring to serve the common welfare. Upon common welfare depends the welfare of each individual.

The purpose of the State Association is one of common welfare, and to see that those to whom are intrusted the duty of devising the laws of our State are instructed as to the best methods that they may protect the interests of both the employer and employee. The labor question is the greatest problem of the age; particularly has it grown to large proportions in the larger cities of our State, and I believe it is a part of our duty to endeavor to lend our aid to bring about an honest adjustment of this difficulty. I do not wish to lay too much stress upon this at this time, but I think it is a matter that should be thought of and, if time permits, discussed.

We do not want to do anything that is not for the best interest of the building industry and the State at large, for we have a common interest, and what is for our welfare is for the welfare of the community of the State.

We want also to disabuse the minds of the public of the belief that there is a "Chinese wall" about any of our cities, and that our business is not open to all concerns whosoever they be. During the past year, as many of you know, this city has had a very unsettled business condition, and we of this town have suffered very much from the state of affairs, both as to health and finance, but we hope that the coming spring may bring peace and prosperity for all of us.

The remarks of the president were closely followed and the address was received with manifest appreciation. President Cowen stated that the secretary desired a list of all the delegates filed with him as speedily as possible, and while this list was in process of preparation Secretary James M. Carter of Buffalo read the minutes of the last meeting, which were approved. Next in order was the report of the treasurer, which showed a flourishing condition of affairs, with a goodly balance of cash on hand. It was then moved and carried that a Press Committee be appointed by the president, to consist of the secretary as chairman and three others, the president naming as the additional members Stephen M. Wright and Lewis Harding of New York City and Fred Gleason of Rochester.

The report of Secretary Carter was read and approved, after which the president announced a five-minute recess in order to permit of the report of the delegates. After the recess the various cities reported as to the scale of wages paid and the general situation then existing, with incidental reference to important happenings during the past year.

### Delegates Present.

The following delegates were shown to be present:

*Amsterdam.*—K. B. Schotte, Jno. G. Turner.
*Albany.*—Richard Wickham, Jas. Fleming, M. A. Knute.
*Buffalo.*—Wm. Allen, B. I. Crooker, F. W. Carter, Wm. Carter, J. M. Carter, P. Christman, C. A. Criqui, T. M. Dyer, A. I. Holloway, Geo. Hager, H. C. Harrower, Geo. Hartmetz, C. B. Jameson, F. C. Kempf, F. L. Lane, Frank C. Farrar, Jno. Feist, Henry Schaefer, Gus Schrearer, M. A. Reeb and Geo. W. Morris.
*Binghamton.*—Geo. N. Balcom, E. W. Seymour, F. O. Seymour.
*Ilion.*—Elmer Cole.
*Herkimer.*—Chas. Metzler.
*New York.*—Frank E. Conover, P. J. Carlin, Wm. N. Croxton, Chas. F. Hart, Hugh Getty, John I. Downey, Thomas B. Leahey, Jas. McEntee, J. C. Vreeland, Frank H. Wakeham, Lewis Harding, George M. Smith, Jas. Thompson, Fred. R. Usher, Henry A. Maurer, Frank Kessing, B. D. Traitel, J. R. Strong, R. F. Tucker, Robert Christie and A. N. Chambers.
*Rochester.*—John Luther, F. L. Hughes, H. H. Edgerton, Wm. Morse, F. Sauers, J. Young, Frank H. Phelps, R. Williamson, H. Knapp, J. Stewart, Chas. Hetzler, B. McSlen, Geo. Swan, E. Swan, John Fredericks, Chas. Morse, G. Doscshston, G. Carson, H. Stallman and F. Gleason.
*Utica.*—Wm. Fisher, R. G. Lloyd and W. R. Hughes.
*Olean.*—B. U. Taylor and Dan Dean.
*Jamestown.*—C. A. Swanson.
*Little Falls.*—J. D. Clark.

The reports of the delegates from the various cities constituted a most interesting feature of the meeting, for not only did they bring out the rates of wages in force in the different branches of the trade, but they showed the relations then existing between employers and workmen and the progress which was being made in bringing about more harmonious relations in the building industry. Reference was also made to the agreements existing between the employers and employed and the satisfactory results which had been brought about through such understandings. In some cities eight hours constitute a day's work, while in others the men work nine hours.

### Conditions in New York City.

Naturally much interest centered on conditions in New York City and the report of the situation here was made by Lewis Harding, who gave a graphic account of the relations existing between builders and workmen, stating that in many trades the employers are in better position than they were three years ago, although in his opinion the unions, numerically, had gained in strength. He touched briefly upon some of the more important features of the building situation in the metropolis, pointing out the difficulties that had been encountered in conducting operations and presenting figures showing the results upon the membership of some of the labor organizations growing out of the strifes in the building trades. He also stated that one of the results of the conditions recently existing among the workmen was the organization of a new carpenters' union with a membership of 2500 to 3000 and a new cabinet makers' union with a membership of between 500 and 1000. At present the employers, he said, have all the mechanics in both these lines that they need, and have an agreement with both unions which is satisfactory to the employers. He intimated that one of the difficulties encountered was not so much a question of the scale of wages as it was the quality and amount of work which the man should turn out.

Some interesting light as to the increase in the scale of wages of bricklayers which was to go into effect on March 1 was given by Mr. Conover, who stated that primarily the increase was based on the increased cost of living in New York City. He also referred to a clause which was put into the agreement with the Bricklayers' Union as being due to the latter insisting that the mason builder should install the fire proofing in a building and that it should not be done by the producer of the material. He described an instance where great disadvantage and danger to the men working on the lower stories resulted from the fire proofing arches being put in by an outside concern that allowed the iron work at one time to advance seven stories beyond the fire proofing, although the law says that it should never be more than three, thus making it necessary for the mason builder to scaffold or cover a number of floors in order to protect his men working below. Mr. Conover was of the opinion that experience had shown that it was to the interests of the mason builder to install the fire proofing as well as to the interests of the bricklayers themselves. In his opinion the conditions existing to-day were very much better than they were before they had any agreements with the bricklayers, and he thought that the understanding between the Masons' Association and the members of the bricklayers' unions was better by reason of these agreements, and that an advantage resulted "when they rubbed shoulders with the men with whom they were working." The whole desire of the Master Masons' Association was to treat the men fairly and squarely, and when any differences arose they were willing to leave them to an Arbitration Committee made up equally of representatives from each side where the questions could be thrashed out, the different views could be expressed and the men remain at work while these questions were being settled.

Benjamin D. Traitel of the Tile, Grate and Mantel Association then briefly outlined the conditions existing in the city as he saw them. In 1903, he said, the builders and allied branches of the building trades found themselves against such a condition with the employees that it became necessary to organize. The uppermost question to be considered was whether they should make an endeavor for the open shop or endeavor to make agreements that could be maintained with the unions. "It seemed to us here," he said, "where the labor element was thoroughly organized, and had been for many years, that the only solution that would bring about peace was through agreements with the labor unions, if those agreements could be maintained. As the first proposition toward harmonizing the interests of the employers and employees and to put into effect machinery that would bring about peace, we established, by the aid of the other side, as we may call it, an arbitration plan, which, however, took a great deal of effort to make the unions understand that it meant fair play. We believe that peace in the industry in dealing with unions is assured for a long time to come, because through the efforts of the employers' association they have been brought to realize that there is an organized body of employers here who mean just what they say, and that any differences shall be settled without a cessation of work. I believe the condition is such now that we shall go along uninterruptedly toward peace in the building industry in New York City."

President Cowen at this point announced that further discussion would be deferred until after luncheon, and appointed a committee to nominate officers for the ensuing year, consisting of Henry Schaefer of Buffalo as chairman, stating that each city would appoint its own representative to act with Mr. Schaefer on that committee.

### Luncheon.

Mr. Wright on behalf of the New York committee called attention to the fact that on the floor below there was waiting "a simple noonday luncheon," of which every visitor and delegate present was cordially invited to partake. He also called attention to the fact that in the evening, in the same room, a dinner tendered the delegates would be given and to which all were invited. The different cities then named the representatives to serve on the Nominating Committee, after which the meeting adjourned for luncheon.

On the floor below the hall in which the meeting was held long tables had been loaded with refreshments of the most appetizing order, and to which the delegates did full justice. The arrangements were highly creditable to the committee in charge, and the opportunity was improved to pass a most enjoyable social hour.

### Afternoon Session.

The meeting reconvened in the neighborhood of two o'clock in the afternoon, the first order of business being the report of E. F. Eidlitz, counsel for the association. He reported relative to the work of the Legislative Committee and gave an excellent idea of the scope of its operations. He described, among other things, the course of a bill through the Legislature from the time it was introduced to its final passage, making reference to some of the influences which have played a part in the enactment of laws. A thoroughly equipped information bureau is maintained at Albany and as soon as a bill is introduced it is at once made known to this bureau and its position and progress through a committee are reported from day to day.

A summary of the work for 1904 was a feature of the report, which showed that there were introduced in both branches of the Legislature 2379 bills, of which number 1427 were introduced in the Assembly and 952 in the Senate. All these bills were examined, and any which might be deemed of interest to the building fraternity were submitted to the Legislative Committee. Those upon which the committee passed were followed through the Legislature, but those opposed by the committee failed to become laws.

The report was followed with keen interest on the part of the delegates, and upon its completion Mr. Conover moved that copies be sent to all affiliated bodies, which motion prevailed.

### Election of Officers.

The report of the Nominating Committee was then read by Secretary Carter, which was to the effect that the best interests of the body would be served by a re-election of the present officers. At the suggestion of Mr. Harding of New York, Secretary Carter was instructed to cast one ballot for the candidates nominated and President Cowen then declared the officers re-elected for the ensuing year as follows:

*President*, C. A. Cowen, New York, N. Y.
*Vice-President*, Fred. Gleason, Rochester, N. Y.
*Counsel*, E. F. Eidlitz, New York, N. Y.
*Secretary-Treasurer*, J. M. Carter, Buffalo, N. Y.

In accepting his office for another term, President Cowen said:

I thank you very much for your good feeling and for the confidence that you have placed in me. I hope I may be able to deserve that confidence and to be able to preside at your next meeting. I will say that it is very gratifying to me since my first connection with the organization to see the steady growth that has been accomplished. We first met—a few of us—in Albany in a little room; for our next meeting we had a large assembly room in Albany, and the next was in the exchange at Rochester. Our meeting last year at Buffalo was still larger. I hope next session we shall have present a still larger body of business men connected with the building interests. I should like to hear from Mr. Gleason, who has been with us from the inception.

Vice-President Gleason among other things said that the history of the institution was like an open book. He did not believe there was one member connected with its inception but who had a good word to say for it. It had tried to deal with all its propositions with a fair and broad mind, and its officers had tried to do the best they could on a fair and honest basis. Counsel Eidlitz expressed his pleasure in accepting the position assigned him, while Secretary Carter said a few things which greatly pleased his hearers, and in a more serious vein asked for their co-operation in the year to come.

### Resolutions.

At this point in the proceedings President Cowen called upon Mr. Wickham of Albany to say a few words as a tribute to the memory of the late President Walsh of the association, after which Secretary Carter read a resolution which the association adopted in regard to the matter:

With much sadness the members of the New York State Association of Builders learn that since the last meeting E. A. Walsh, a past president of the association, has passed from us and entered the great beyond.

We have missed Mr. Walsh's counsel from to-day's session, and desire to record on the records of this body our sympathies at this seemingly untimely end, and recommend that the sentiment of this meeting be expressed to the family of our deceased friend.

Mr. Wright then spoke in eulogistic terms of his late associate, Mr. Hamilton, with whom he had been intimately connected in various charitable and beneficient works of the city. He referred to Mr. Hamilton's connection in the old Mechanics' Society, finding him always striving for the best interests of the organization, "and when absent from the city visiting his old home across the ocean," said Mr. Wright, "he invariably communicated with us to let us know that he was still with us in spirit. I remember when the National Association in 1895 conceived the idea of State associations Mr. Hamilton was one of the delegation from New York and presided at the temporary organization which resulted subsequently in the permanent association which is meeting here to-day. He was successful in business, a man of strong individuality and one who loved his fellow man. We certainly here miss him, for we knew him well, and we were glad to hear from time to time that cheery, sunny voice, and above all to realize the heart which God gave him to love his fellow man." Mr. Harding moved that a similar resolution be passed to the memory of Mr. Hamilton, which was adopted.

The place of the next meeting was referred to the Executive Committee for decision.

At the suggestion of Mr. Wright a vote of thanks was extended to the New York Lodge of Elks for the courtesy of the use of its hall.

Some interesting side lights were thrown upon the building situation by P. K. Stephenson, the new secretary of the Building Trades Employers' Association; Mr. Strong, a member of the Electrical Contractors' Association; Secretary Carter and others. The regular business having been completed a general discussion of building problems ensued, in the course of which Secretary Carter and others pointed out the benefits of membership in the New York State Association of Builders, describing its methods of work and the influence for good which it exerted. Opportunity was taken for showing the advantages likely to result to the Building Trades Employers' Association in becoming a member of the State Association, and in the discussion remarks were made by President Cowen, Vice-President Gleason, P. K. Stephenson, Mr. Traitel, Mr. Harding, chairman of the Press Committee of the Building Trades Employers' Association; Mr. Strong of the Electrical Contractors' Association and others. As a result of the discussion President Cowen appointed a committee of three to confer with the committee present from the Building Trades Employers' Association for the purpose of affording the latter full information relative to the benefits and advantages of membership in the State body.

The convention then, at 5 o'clock, adjourned subject to the call of the Executive Committee.

### The Banquet.

In the evening a complimentary dinner was tendered the delegates by the Mason Builders' Association and the Mechanics' and Traders' Exchange of New York City. It was given in the dining room of Pabst Grand Circle Hotel on the floor where the noon day luncheon was served, and immediately below Elks Hall, where the business sessions of the convention had been held. Some time before the hour set for the dinner the delegates began to gather in the meeting room, where "appetizers" were served and where the opportunity was afforded for passing a half hour in social intercourse. A little after seven all repaired to the dining room, which had been prepared for the occasion. On a raised platform on the Circle side of the hall covers were laid for the officials of the association and their invited guests, while about the room were placed small tables seating five and ten each. This admirable arrangement permitted the grouping of little circles of friends and acquaintances and offered an excellent opportunity for an exchange of social courtesies. The occasion was one of informality in that there were no set speeches and no programme of toasts and responses. It was a thoroughly delightful affair and tended in a marked degree to strengthen the friendly feeling at present existing among the members of the State Association and affiliated bodies through their representatives who were in attendance. After the *menu* of eight courses had been properly considered and the cigars had been passed around Stephen M. Wright, chairman of the committees of Arrangement and Entertainment, read a letter from Otto M. Eidlitz regretting his inability to be present, Mr. Wright intimating that it was unfortunate from the diners' standpoint, as the writer had been expected to speak on the question of arbitration. Mr. Wright called the attention of his hearers to the fact that their host on the present occasion was probably the oldest organized body of builders of any existing in New York, stating that the Mechanics' and Traders' Exchange was more than half a century old. He then introduced the president of that organization, Francis L. Holland, who expressed his pleasure in performing the duty of welcoming the delegates to the city of New York and of learning how much good an association like that represented before him was doing for the building trades at large.

In introducing the next speaker Chairman Wright said: "We of the Borough of Manhattan have frequently differed with Tammany Hall on some of its issues, and things have not always been satisfactory to some of us, but we are perfectly willing to forgive Tammany for what it has done in the past for its wisdom in the present instance in its selection of the type of man that should be Superintendent of Buildings—a thorough and successful man in the building trades. The interest he has manifested in this association from its inception entitles him to our greatest consideration, and I take pleasure in presenting Isaac A. Hopper, Superintendent of the Bureau of Buildings, and the first president of this State Association."

### Mr. Hopper's Address.

When the applause which greeted his rising to respond had subsided Mr. Hopper said:

Mr. Chairman, members of the State Association of Builders and fellow craftsmen: I want to thank Mr. Wright for the compliment he pays me. I am asked to say a few words to you. I want to say first that I am very much pleased to be with you to-night. I am pleased to see such a representative and such a social body of men. I remember the inception of the State Association, for I was one of the delegates from New York to Baltimore and I participated in the discussions. I congratulate you gentlemen on the outcome. Perhaps you have not succeeded yet in perfecting the organization to your liking, but you are in a good position now to go forward to greater achievements. It is needless to call your attention to the fact that by united effort much can be accomplished. In the legislative line I think united effort of the builders can save the individual much, very much indeed, and in that direction I have reason to believe that you have done a great deal. You will in this session of the Legislature be as watchful of the interests of the building community as you have in the past. We find in every Legislature a lot of people who are ready to scheme and work to impose upon others. But by the efforts of this association you have checked and turned aside many things that would have been a hardship upon you and no real advantage to anybody.

Mr. Wright in introducing me referred to the fact that I was selected to take charge of the executive work in the building bureau of this borough. I have been there just about a year, not quite, but I have been 25 years in business in the city and have had more or less dealings with the department. I had, however, no idea of what the department had to go through daily until I had spent a week in office. The department has much with which to contend; it has a great work to perform, and it is to the builders of the State Association and to the local associations that the Building Department should and will look for the carrying out of the laws affecting building in the city and State of New York. We can do much work together through our Legislative Committee, and much work that will inure to the benefit of the community and peace and comfort to those engaged in the building trades. This association has a great future, and I sincerely hope that you will redouble your efforts and that you will go on keeping up your good work, devoting all your efforts in the direction of the improvement of your craft.

There is one question in the building trades that gives all engaged in them much concern and that is now occupying public attention to the extreme. It is the question of labor. Mr. Eidlitz made a remark a moment ago about using the word arbitration. I have been engaged in the building business as an employer since 1885, and you can possibly judge and realize that in almost 30 years I must have had some experience. I have been a member of the Mechanics' and Traders' Exchange since it organized. Naturally this question has given me much thought, as it has undoubtedly every one of you. We have suffered materially in this borough in consequence of the differences between employer and employed.

In the Borough of Manhattan last year we granted permits for 1005 new buildings, some 2100 alterations and 1400 permits for repairs. The material work was the new buildings; 1005 new buildings in this town is only just about one-third of what it ought to be. You can judge how the trade suffered the past year, and I mean both the employer and the employed when I speak of the trade. I have been a member of the Mason Builders' Association since 1884. When I started I was an enthusiastic believer in arbitration, mediation and conciliation. That was our platform. To-day I feel we need to deal with the other side as a body. I felt as an individual it would be an interminable affair and therefore I became an enthusiastic union man. The first question I asked a man who presented himself for employment was, "Are you a union man?" For 15 years I held the belief that the solution of the wage question—the social problem in the building trades—was in union on both sides. I nursed that feeling to the fullest extent. After 15 years' work in that direction I began to feel it was not a success and that the members of successive labor unions, drifting into unscrupulous hands, were being led astray. I felt that it was the wrong theory. We should go back to first principles and have what is commonly spoken of as the "open shop."

These were my feelings the past five years. Every man stands on his own individuality; that was the practice before the unions were introduced or thought of. For the past year I began to feel that the "open shop" would not be successful, and I have come to feel now that we will never find a solution to the problem until we get to control strikes and lockouts by some court procedure. I begin to feel that it will be necessary in the very near future to establish a third court in this country to meet and settle this question between employer and employee. We have under our Constitution a civil and criminal court. I believe now we have come to that time when we must have a court to settle differences between employer and employed. I believe that the thing can be successfully carried out, and I see in the appointment of another Cabinet Minister, known as the Secretary of Commerce and Labor, the first step in that direction. It commences, however, at the wrong end. It begins at the top and indulges in theory. What we want is a tribunal in the country where the laws will make a lockout or strike a misdemeanor. I have given the question in the three stages very much thought, and after my experience I feel that the last is the one solution of our difficulties. There would be much detail, of course, in working out the scheme, but it is a thing that can be done and will be done.

The counsel of the association, Ernest F. Eidlitz, was then introduced and referred briefly to the strength of the organization and to the future which opened for it. He was followed by Mr. Taylor of Olean, who entertained his hearers with some clever remarks and emphasized his points with illustrations which touched his hearers.

Chairman Wright then called upon the president of the association, Charles A. Cowen, who responded, in part, as follows:

Mr. Toastmaster and gentlemen of the New York State Association of Builders: I thank you for this very kind and courteous treatment. I beg to say that I shall endeavor in my official capacity, with the aid of Providence, to do all that in my power lies to perform the duties which you have so kindly intrusted to my care. I want to say that the State Association to me has been one of great interest, and that ever since its inception I have followed it through all its stages, have seen it grow from the little acorn to—I will not say mighty oak—a fair sized tree. I am only sorry that the city of New York has not seen the necessity of this State Association as I personally have. I have no doubt to-day's convention will instill into the minds of those who are the backbone and sinew of the city a more enthusiastic interest in its workings the coming year. I would like to say in conclusion that as your executive officer I can do nothing to upbuild this association unless with your aid, and I humbly ask each and every city and town in this State to give the secretary and myself its earnest and hearty support in trying to bring about what we hope this State Association will be able to accomplish in the near future.

Mr. Wright then in a rather humorous vein introduced Vice-President Gleason, who thanked the members for the honor conferred by his re-election. He was followed by Judge Green of Brooklyn, who kept the delegates in a roar of laughter by numerous stories and recitations, the latter including a poem by Eugene Field entitled "The Clink of the Ice."

Colonel Feist of Buffalo followed with a few words, after which Mr. Traitel of the Building Trades Employers' Association outlined his views as to the method of bringing about peace in the trades. He was followed by Charles L. Eidlitz, president of the Building Trades Employers' Association. He told some of his inimitable stories, and at the same time referred in a somewhat humorous vein to the duties which he was called upon to discharge in his official capacity. He desired it to be distinctly understood that on the present occasion he was speaking simply as an individual and not as a president. After H. K. Stephenson had told a few funny stories Mr. Wright said he realized the fact that "the white lights were still burning," yet he wanted to thank his hearers for the magnanimous manner in which they had treated him and which he appreciated most heartily.

The committee having charge of the entertainment consisted of Stephen M. Wright, chairman; Ronald Taylor, secretary; Frederick J. Ashfield, Luke A. Burke, William Crawford, Warren A. Conover, Edward A. Choate, Lewis Harding, Francis N. Howland, Augustus Meyers, Thomas M. Mulry, Edwin Outwater, Edward E. Paul, Alphonso E. Pelham, John J. Roberts, Harry Stevenson, Walter Reid, Jr., William C. Smith, Frank M. Weeks, George J. Wills and Jacob A. Zimmermann.

## Meeting of Master Builders' Association of New Jersey.

The seventh quarterly meeting of the Master Builders' Association of New Jersey was held in Times Hall, Montclair, on January 30, there being present 82 members, representing Elizabeth, Montclair, New Brunswick, Perth Amboy, South Amboy, Jersey City, Morristown, the Oranges, Long Branch, Newark, Paterson, Ridgewood and Westfield. The secretary's report for 1904 showed the number of associations in the membership at the close of the year to be 36, and that the total membership on January 1, 1905, was 1230, showing a net increase of 157. An association from Ridgewood, Bergen County, was added at the meeting named, making the total membership at that time 1250.

As the result of a rather spirited election officers were chosen for the ensuing year as follows:

President, Hugh D. King of Bloomfield.

VICE-PRESIDENTS, FOR

Essex County, Henry W. Egner of Newark.
Union County, H. Roolvink of Elizabeth.
Middlesex County, George B. Rule of New Brunswick.
Hudson County, E. E. Phillips of Jersey City.
Morris County, L. F. Sturgis of Morristown.
Monmouth County, R. H. Hughes of Long Branch.
Passaic County, A. Dickinson of Paterson.
Bergen County, P. G. Zabriskie of Ridgewood.
Secretary, Alexander E. Pearson of Orange.
Treasurer, A. J. Crowder of Newark.

The following resolution was adopted:

*Resolved*, That we, the Master Builders' Association of the State of New Jersey, in convention assembled, do declare and say that whenever or wherever any master association or associations that are affiliated or may hereafter become affiliated with this association shall deem it to their interest to declare for the open shop, and do so declare, that we extend to such master association, or associations, our entire approval and moral support, as well as any other support we may be able to impart at that time.

The meeting adjourned at 7 o'clock to meet in April in Orange. After the meeting a bountiful repast was served by members of the Montclair Association.

## Convention of Brick and Tile Men.

The Iowa Brick and Tile Association held its twenty-fifth annual meeting at Ottumwa, that State, on January 18, the attendance being one of the largest in the history of the organization. The president, J. L. Raney of Fairfield, delivered his annual address, in which he stated that one of the benefits of the various meetings was the gaining of new ideas and the getting out of old ruts.

A number of interesting papers on trade topics were read and discussed. The election of officers resulted in the following choice: President, Charles A. Rawson of Des Moines; vice-president, J. L. Stevens of Boone; secretary, L. W. Dennison of Mason City, and treasurer, C. J. Holman of Sergeant's Bluff.

It was decided to hold the next meeting of the association in Des Moines.

# ORNAMENTATION OF BALUSTERS AND TURNINGS.

By C. Tobyansen.

IN continuing the discussion of the subject of balusters, the evolution of which was outlined in the last issue of the paper, we will now take up the ornamentation of plain turnings. While not desiring to detail automatic machines built for special purposes and which require but little mechanical skill, we wish to see what can be accomplished mainly by the means at hand in the average planing and turning mill. The shaft of a baluster may be cut many sided—octagon being the customary style—or it may be fluted or beaded finely or coarsely, as the taste decrees.

There is a contrivance on the market used for this special purpose in conjunction with the variety molder, whereby these operations can be well and speedily performed. This device is illustrated in Figs. 1 and 2 of the engravings, representing an end and side view of a head stock. Referring to the illustrations, A is a toothed

bers, 8, 12 and 16, can as a rule be made to answer. The screw plate F is very handy for molding rosettes and other face work, also for short pieces like newel tops and the like. The set screws I I must be kept down tightly in order to give sufficient friction in the bearings to keep the mandrel from turning except by exertion of the lever.

The tail stock is shown in end and side views in Figs. 3 and 4 and requires no comment, except the statement that the hand screw N should be kept hard down lest the hand wheel O turn around from the jar of the cutters and allow the stuff to fly out from between centers, a happening that might prove disastrous indeed, both as regards material and operator. It must be understood that the head and tail stocks must be fastened to a bed piece at whatever distance apart the stock is to be molded. This bed piece, the form of which is indicated in Fig. 5, should have a groove, P P, cut in it to receive

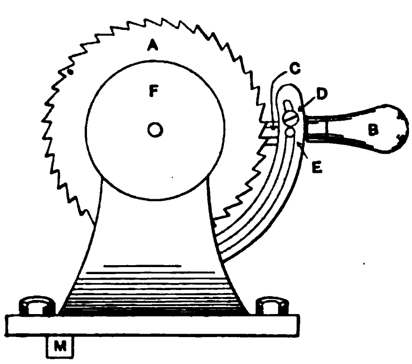



Fig. 1.—End View of Head Stock.

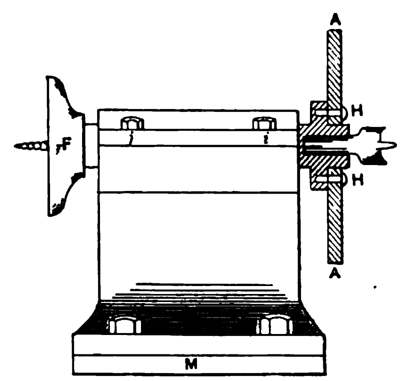



Fig. 2.—Side View of Head Stock.

Fig. 6.—A Represents Variety Table; B, Bed Piece; C, Head Stock; D, Bolt.

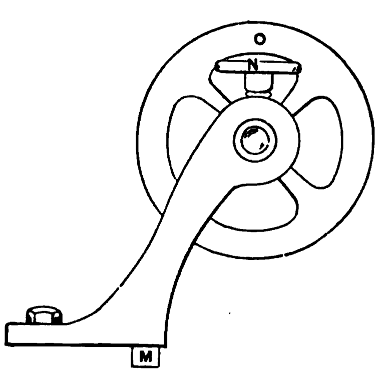



Fig. 3.—End View of Tail Stock.

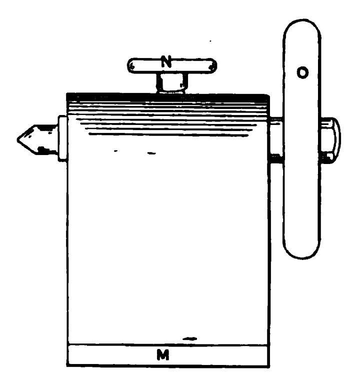



Fig. 4.—Side View of Tail Stock.

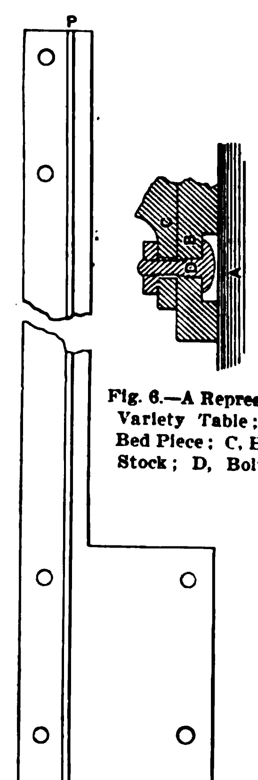



Fig. 5.—Plan of Bed Piece.

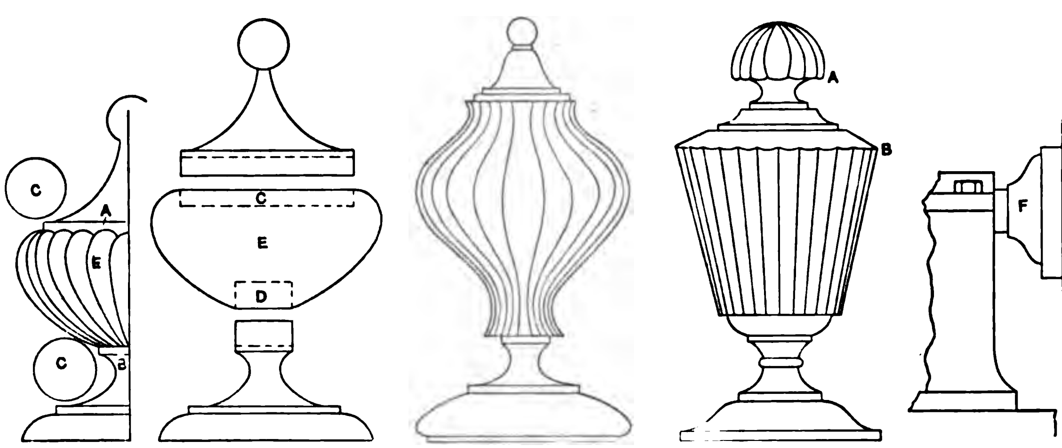
*Ornamentation of Balusters and Turnings.*

plate, B is a handle or lever with a ratchet, C, which engages the teeth and carries the mandrel around as far as the abutment point allows; D shows an adjustable abutment, limiting the upward movement and thereby regulating the number of teeth or segment of circle carried forward at each movement of the lever. The plates A A are interchangeable and are fastened to the mandrel by screws, as clearly indicated at H H of Fig. 2. In order to make the construction plain the lever B is not represented in this view. The plates are differently divided as to teeth, thereby allowing a wide range of spacing. If, for instance, we have a baluster between centers and desire to cut 8 flutes, we would put on a plate with 48 teeth and take 6 teeth to each turn. If we wish 12 flutes, the same plate would answer by taking 4 teeth. For a spacing of 10 flutes we would need another plate, however, and we would fasten on one of 60 teeth and take 6 teeth to each turn. A plate of 48 teeth would allow a spacing of 4, 6, 8, 12, 16, 24 and 48. A plate of 60 teeth gives 3, 5, 6, 10, 12, 15, 20, 30 and 60. A plate of 42 teeth would give us 6, 7, 14, 21 and 42. This will be as many changes as practically required for this purpose. There are some spacings not obtainable, as 9, 13 and 17, but their next preceding num-

the flanges M on the head and tail stocks, thus keeping the centers in line. The stuff should be heavy enough to allow a recess underneath for bolt heads, all as clearly indicated in the sectional view, Fig. 6, so as to allow the bed piece to rest evenly on the molder table. Referring to Fig. 6, A represents the variety table, B the bed piece, C the head stock and D the bolt.

It is generally desirable to run a pattern of the shaft to be molded against the mandrel of the variety molder rather than have the stock itself rub against the collar, as it usually gets more or less marred and requires a great deal of time to clean up. In some cases, however, such as newel tops, the shape is of a nature to render this impracticable. In the style of top shown in Figs 9 and 10 the piece may be turned as a whole and then molded between centers. When a style like that shown in Fig. 7 is desired it should be built up as indicated in Fig. 8, for by this method the job can be brought to a finish on the machine, thus avoiding a lot of hand work. It is evident, as indicated in Fig. 7, that the cutting circle C C cannot finish up in the sharp corners, and also that any further progress of the cutters would ruin the fillets A B. We consequently turn the body E of our top separately and fasten it on the screw plate F of our contrivance in the position indicated in Fig. 11. We can now mold it with ease without fear of spoiling any adjacent member. The recess C D of Fig. 8 must be turned in after the piece is molded. Care must be taken that the parts fit closely and also that the material be well seasoned, as any shrinkage would leave the joints open and unsightly, if indeed it did not fall apart altogether.

A shape which may be handled the same way, except that in this style the top part only would need to be inserted as indicated by the dotted lines, is represented in Fig. 12 of the sketches. It will be noted in Fig. 10 that the lower extremity of the beading at A and the upper part at B shows a slightly scalloped effect. This is obtained by beveling, as shown at B, or by cutting under, which is done at A. Very pretty and varied effects may be obtained by differing degrees of bevels and shallows or deep undercuts. In Figs. 13 and 14 we show two styles of rosettes, the first design to be sunk into and the other planted on the material to be thus ornamented. The shape Fig. 14 can be turned as a whole and finished on the molder. Here also may be noted the effect of the bevel at A. In order to be entirely finished by the machine the rosette in Fig. 13 must have the central button A inserted as shown.




Figs. 7, 8, 9, 10 and 11.—Views of Various Styles of Newel Tops Beaded on Shaper.

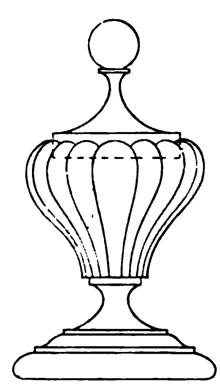
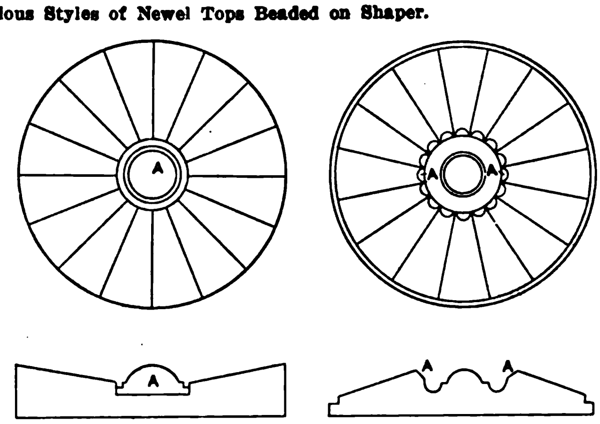


Fig. 12.—Another Example of Newel Top Beaded on Shaper.




Figs. 13 and 14.—Beaded Rosettes.

*Ornamentation of Balusters and Turnings.*

In all of these beading operations a cutter of the shape shown in Fig. 15 must be used, unless the shaft or body of the baluster, top, newel or whatever the subject may be is entirely straight—that is to say, of the same diameter at both ends—when a cutter like that shown in Fig. 16 of the proper size of head may be used. As it cuts the complete head at once and not in two halves, as in Fig. 15, the job is somewhat cleaner of appearance and needs less sanding. For fluting the shape of cutter shown in Fig. 17 may be found useful for flutes of slight taper, cutting on the same principle as Fig. 15—by halves. In fact, it is the only shape of cutter which can be used on undulating forms. In Fig. 18 is shown a cutter which is always used for straight flutes, and can be used for tapering flutes by means of patterns so shaped as to draw the stuff slightly and gradually away from the cutters.

A writer in the *Mechanic* describes a method by which spiral beading is executed. I quote as follows: "I once did some work on a shaper which I never saw performed by any one else, and that was the cutting of spiral beads on the turned post of a baluster 2 feet long (see Fig. 19). The way I managed it was this. I first raised the cutter head A, Fig. 21, as high as possible and then made a pattern the shape of the baluster, Fig. 20, with ends B B raised so I could cut under the baluster between them, fastened by a screw, C C, at each end. The screws were to go into the lathe center holes so I could turn the baluster. Then I made a false table, B, Fig. 21, to go on top of the shaper table C, with an end raised high enough by the vertical post D so that the cut on the baluster would be horizontal. I next made my knives so they would cut the groove and a little over half way on the bead each way; I also had a piece of iron, Fig. 22, to fit the groove. It was the shape of the knives, only it was not sharp. This I placed about 8 inches from the knife on the side from me, fastening it very firmly, so that after the knife had cut the groove this piece would enter it. As I pushed the baluster forward and down the incline this iron would turn the baluster, and by a little steadying with my hand I cut the beads perfectly even. Of course I first spaced for the baluster, dividing it into equal parts, so that the last cut would come out right. I had no trouble doing the work and doing it well, after I had things once fixed to suit me."

The reader will realize that the top part, Fig. 21, resting on the incline with the baluster suspended between centers, is a side view of Fig. 20. Personally I have never had occasion to test this manner of producing spiral beading on a baluster, but it appears perfectly practical. It appears to the writer that if the contrivance shown in Figs. 1 and 2, with its automatic spacing, was so used in conjunction with the incline plane and guiding irons, Fig. 22, an effective and practical way of obtaining the ends required would be secured. In this case, however, the mandrel of the head stock would have to be loosened in the bearings sufficiently to allow the guiding iron to turn the stuff. This would only require a slight loosening of the set screws I I.

It is the intention of the writer to next deal, at least in part, with the turning and boring of balls and spindles for grill work and touch upon some of the practical details of scroll work and design in this connection.

## New Grand Central Railroad Station.

The plans for the new Grand Central Station in New York City, on which architects have been at work for nearly two years past, call for a structure or series of buildings which will have a frontage of 680 feet on Vanderbilt avenue, 625 feet on Forty-fifth street, 460 feet on Lexington avenue, 275 feet on Forty-fourth street, 260 feet on Depew place and 300 feet on Forty-second street. The building will be set back from Forty-second street a distance of about 40 feet and back from Vanderbilt avenue a distance of about 70 feet, so as to afford a generous approach to the station. The existing building now used as a station for the New York Central & Hudson River Railroad Company will be done away with almost entirely. Some idea of the magnitude of the new one may be gathered from the fact that while the present station occupies an area of about five blocks, the new terminal will cover nearly 19 blocks.

The main entrance to the new station will be on Forty-second street, its architectural composition consisting of three massive arches, each arch being 33 feet wide and 60 feet high. Beyond these arches will be a ticket lobby 90 x 300 feet on a level with the street. On the right, and practically a part of it, will be the outgoing baggage room. The tracks for express trains are on a level with the grand concourse, which is overlooked by a gallery and which is approached by four staircases, each 25 feet in width. It is said that this will be the largest in the world, being 160 feet x 470 feet, and 150 feet high. Adjoining this concourse will be the usual waiting rooms, cafés, telephone and telegraph facilities, &c. Through this concourse pass the departing and arriving passengers, but incoming and outgoing are separated so as to avoid all confusion. The suburban trains will be on a lower level than the express trains, thus separating the commuter from the express passenger and affording better facilities for both. The suburban concourse will provide for nine tracks, while the express concourse, slightly depressed below the street level, will provide for 34 tracks, making 43 in all, with platforms so connected by subway and elevators that baggage may be quickly transferred without crossing the tracks.

The baggage room, with 1300 feet of street frontage, will have 47,000 square feet of floor space. To the north of the concourse, and carrying the cornice line around the entire building, will be placed the company's offices, containing about 250,000 square feet, exclusive of corridors, elevators, &c. These offices will be built around a court, thus providing light for each office and for natural light in the higher part of the train room.

## The Carnegie Technical Schools.

The model for the new technical schools at Pittsburgh having been approved by Andrew Carnegie, the donor, the plans for the part to be erected this year were recently made public. In a general way, the building is computed as having a capacity of 500 students—200 day and 300 night pupils—while the number of applications for instruction is said to exceed 6000. The building of seven wings, which is to be completed by October of the present year, if possible, shows the corner of the general scheme fronting on Woodlawn avenue on the west and Junction Hill on the north. The building will contain two stories and a basement, all of the wings being connected by a very wide corridor. Ground will be broken as soon as the weather will permit and all contracts in connection with the schools will be awarded as soon as possible.

## Attitude of the Pittsburgh Builders' Exchange League.

E. J. Detrick, secretary of the Pittsburgh Builders' Exchange League, in a recent interview as to the position of the league in the matter of the objections offered by the unions to certain clauses of the uniform working rules, published in our last issue, made the following statement: Considerable stress has been put upon the following rules of the league by the labor unions:

Rule No. 4.—No agreement shall be entered into that shall deny any man the right of employment; all workmen are at liberty to work for whomsoever they see fit, and all employers are at liberty to employ and discharge whomsoever they see fit.

Rule No. 5.—There shall be no restrictions or discriminations against any employer or member of a firm or corporation who may desire to perform skilled or manual labor for his or their firm or for any member of this association.

The Builders' League has publicly declared itself as not opposed to organizations of labor in so far as they confine their demands upon the employers to their just and legal rights, and as the best demonstration of this fact the Builders' League insists that its members shall sign agreements with the organized workmen, as outlined in their uniform working rules, which have been gotten up for the purpose of protection and industrial peace for the workmen themselves as well as for the employers, and for the interests and profit of the public in general.

By establishing uniformity of rules and principles to all alike in the building trades we eliminate the main causes of strikes, lockouts and disputes, and will secure a condition of industrial peace, which is so much desired by all and is necessary to the interests of prosperity in every territory.

Our rule No. 4 is not a discrimination against organized labor, but in view of the recent court decisions is necessary to make the agreement valid and is in uniformity with the said court decrees.

Our rule No. 5 is so plain that it should need no explanation, as the right of any employer or member of a firm or corporation to execute his own work must not and cannot be denied, and as members of an association of employers we surely reserve the right to aid one another when the occasion requires.

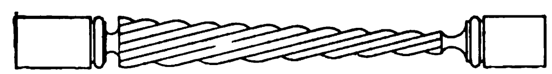


Fig. 19.—Example of Spiral Beading.

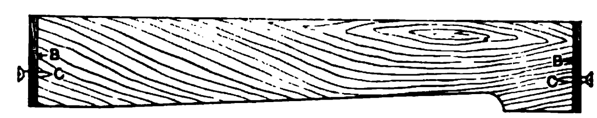
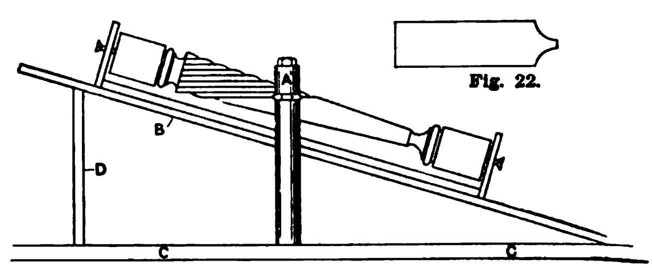
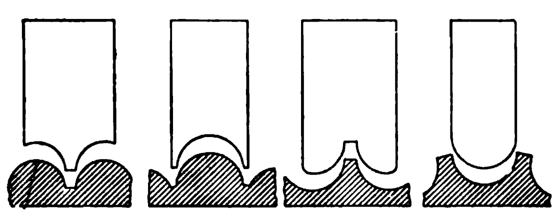


Fig. 20.—Pattern for Baluster





Figs. 15, 16, 17 and 18.—Cutters for Beading and Fluting.

Fig. 21.—Apparatus for Doing the Work.

Fig. 22.

*Ornamentation of Balusters and Turnings.*

# Convention Western Pennsylvania and New York Builders' Association.

THE third annual convention of the Western Pennsylvania and New York Builders' Association was held in Olean, N. Y., January 25 and 26. The meeting developed into the most satisfactory and successful one the organization has yet held, while the reports showed the association to have done a splendid, consistent work the past year. The association is unique in its style, really serving the same purpose that a Builders' Exchange organization does in an individual city

The following is a list of the cities represented, together with the delegates at the convention:

Dunkirk—P. Meister, Jr., A. J. Hoag, J. A. Taylor, W. C. Rice and A. J. Hock.

Olean—E. Troy, B. U. Taylor, S. A. Anderson, M. P. Derby, O. S. McClure, J. H. Havens, E. M. Tolhill, Jos. Burt, D. H. Miller, Geo. J. Ball, H. Shanaller, J. A. Sheldon, W. H. Simpson, Waldon Westen, W. More, C. P. Litter, O. W. Pierce and C. L. Calenbock.

Cuba—B. G. Sisson and J. J. Allen.

Wellsville—S. O. Richardson.

Warren—J. A. Sampson, W. A. Smith, A. L. Pixley, Theo. Swanson, C. W. Udhey and C. H. Ham.

Bradford—W. H. Dennis, E. A. Ward, H. H. Osgood, L. H. Blair, N. D. Jackson, Wm. Hanley, A. Unru and J. Hays.

Oil City, Pa.—J. T. Meals, Geo. C. Richards, H. C. Mundt, A. Pfindler, Jno. Anderson, H. H. Hallott, Otto Mundi, C. G. Servey, Jas. Reedy and E. M. Crouch.

St. Marys—Geo. Valentine.

Kane—Geo. T. Allen.

The first session of the convention was called to order by President C. W. Udhey at 2 p.m., the meeting place being Odd Fellows' Hall. President Udhey in his report called to mind the formation of the association three years ago, how a few pessimistic members believed the organization would die a-borning, but that notwithstanding this spirit of distrust on the part of a few the association had taken hold of the problems of wages and labor conditions in the district represented by the membership of the association and had successfully handled them, until now both employer and employee recognized the fact that the association stands for just, fair, frank treatment of the problems the solution of which was to their mutual interest.

Peter Meister of Dunkirk gave an interesting detailed report of the doings of the association the past year. B. U. Taylor of Olean gave a report covering the legislative work of the association. Robert K. Cochrane, president of the Pennsylvania State Association of Builders, gave an interesting talk on the State Association, and also dwelt on the labor situation at Pittsburgh, saying that he believed most of the union workmen would be locked out by the Pittsburgh employers on February 1, because the unions had refused to sign or sanction a set of working rules which the employers had insisted should be respected by the workmen. The main clauses the union objected to are:

1. Article 3. The use of apprentices shall not be prohibited or restricted.

2. Article 4. No agreement shall be entered into that will deny any man the right of employment.

Section 2. That all workmen are at liberty to work for whomsoever they see fit.

Section 3. That employers are at liberty to employ and discharge whomsoever they see fit.

3. Article 5. There shall be no restriction or discrimination against any employer or member of a firm or corporation who may desire to perform skilled or manual labor for his or their firm or for any other member of this association.

Jas. M. Carter, secretary of the New York State Association of Builders, gave a brief review of the labor conditions in New York State, saying that as a whole the labor situation in the Empire State was reasonably satisfactory, New York City being the only city in the State with disturbing labor conditions, and expressed the thought that the atmosphere there seemed to be clearing. Mr. Carter stated that building conditions in New York State were fairly active, everything indicating a good building year.

### Resolutions.

Mr. Dennis of Bradford, chairman of the Committee on Resolutions, presented the following resolutions, which were unanimously adopted:

*Resolved*, That we, the members of the Western Pennsylvania and New York Builders' Association, in convention assembled, do hereby affirm our adherence to the following principles, viz.:

*Resolved*, That the following eight cardinal principles will form the basis of all dealings with our employees:

1. That there shall be no limitation as to the amount of work a man shall perform during his working day.
2. That there shall be no restriction of the use of machinery or tools.
3. That there shall be no restriction of the use of any manufactured material except prison made.
4. That no person shall have the right to interfere with the workmen during working hours.
5. That the use of apprentices shall not be prohibited.
6. That the foreman shall be the agent of the employer.
7. That all workmen are at liberty to work for whomsoever they see fit.
8. That all employers are at liberty to employ and discharge whomsoever they see fit.

*Further, Resolved*, We believe that labor unions in their unjust demands, instigated and led by unscrupulous men, have become a menace to the liberties and constitutional rights guaranteed to the citizens of the United States. We therefore heartily commend the action of our Chief Executive in maintaining in the Government service the principles of the open shop.

We further declare as members of the Western Pennsylvania and New York Builders' Association that when existing contracts made with labor unions shall expire we will follow the example so nobly set us by the President of the United States and will refuse longer to perpetuate the unjust system of discrimination between union and nonunion labor.

We also agree that we, as contractors and builders, will resist in every legal and legitimate way the encroachments of what is known as the walking delegate, or business agent, and every other unjust demand of labor organizations.

That we will not knowingly underbid or cut prices of any contractors or builders who may have and hold membership in the Western Pennsylvania and New York Builders' Association in connection with the letting of any work or contracts.

We further agree that we will, to the best of our ability, at all times render a just and liberal interpretation of all agreements and contracts, to the end that membership in the association may be a guarantee to the public of the best and truest business principles.

We believe in discouraging the migration of unstable workmen, and believe that we ought not to employ any man in any trade who has left his former employer unfairly.

### Election of Officers.

The following officers were elected for the ensuing year:

President, Col. Geo. C. Richards, Oil City.
First Vice-President, H. H. Osgood, Bradford.
Second Vice-President, Chas. Ham, Warren.
Treasurer, Wm. Hanley, Bradford.
Secretary, Peter Meister, Jr., Dunkirk.

### The Banquet.

On Wednesday evening the Olean builders tendered the visiting delegates a splendid banquet at the Olean House.

After the good things to eat had been safely stowed away B. U. Taylor, acting as chairman, called on the following speakers, who responded to the toasts as designated:

Hon. J. H. Waring, Mayor of the city of Olean, "Our City and the Builder."

C. W. Udhey, president of the Western Pennsylvania and New York Builders' Association, "The Open Shop."

Col. Geo. C. Richards, Sixteenth Pennsylvania Regiment, Oil City, Pa., "The Subcontractor and His Trials."

W. S. Wilkinson, Olean, N. Y., "Organization."

F. L. Bartlett, President of the Exchange National Bank of Olean, "The Banker and the Builder."

Jas. M. Carter, secretary of the New York State Association of Builders, Buffalo, N. Y., "The State Organization."

D. E. Batcheller, superintendent of the Olean schools, "School Builders."

W. H. Dennis, president of the Tuna Mfg. Company, Bradford, Pa., "Profits Unseen."

B. McConnell, president of the McConnell Mfg. Company, Hornellsville, N. Y., "The Manufacturer and the Builder."

Robert K. Cochrane, president of the Pennsylvania State Builders' Association, "Are We Advancing?"

Fred Julian, capitalist and traveler, Emporium, Pa., "What a Builder Might Do in the Orient."

The talk of W. S. Wilkinson on organization contained many good, practical thoughts, his remarks being in part as follows:

Organization is as old as creation. Hear what the Scriptures say: God made two lights, the greater light to rule the day, the lesser light to rule the night. He made the stars also and God placed them in the firmament of the heavens to give light upon the earth, to rule over the day and over the night and to divide the light from the darkness. And God saw that it was good. Every one of the planets stood in intimate relation to all the others, and yet each had a special function to perform in bringing to pass the purpose of the Almighty. And that was organization, and from that time until now it has characterized the operations of men, and has been the most potent factor in promoting their financial, commercial, political, social and religious interests. It has been said that discovery, invention and organization go hand in hand in their relation to the development of the industrial and commercial progress of the world, and the struggles of our great discoverers and inventors confirm the truth of that utterance.

Organization is the key to the success of every enterprise. It has made Rockefellers of industries and Carnegies of finance, and while I am not here to urge, still we should learn the lesson to use but not abuse the best of the methods that they employed, and fail not to remember that most prominent among them is organization. But organization is not all of itself; standing alone, it is without power or force. It must be supplemented by a sense of responsibility. It requires loyalty and obedience to the rules and regulations of the association, and the failure of even one or two members to render such allegiance and obedience may render abortive and noneffective the purposes of the association in the community in which they operate. For many years men have been organizing themselves into societies, unions and associations that they might better their conditions. This they had a perfect right to do and in some instances it was a duty they owed themselves; but in the course of time evils have crept in and demands have been made that have seriously embarrassed the building and business interests of the country. These conditions must be met and it is only right—nay, it is necessary—that those whose interests have been thus menaced and injured should unite for their own protection, but let them not do so that they may be arbitrary and that they may dictate terms and fix remunerations, but, on the other hand, let them see to it that a spirit of liberality and a purpose to live and let live become the basal principles of the organization, and thus by a long pull, a strong pull and a pull all together success will crown their efforts.

# Convention of National Builders' Supply Association.

THE sixth annual convention of the National Builders' Supply Association opened auspiciously at the Hollenden Hotel, Cleveland, Ohio, on Tuesday, February 7, this being the second time that the association had met in the Forest City. There were 341 present, representing 19 States and the Dominion of Canada. The largest representation was naturally from the city of Cleveland, although Toledo, Akron, Philadelphia, Pittsburgh, New York, Chicago, Detroit, Cincinnati, Indianapolis and Youngstown contributed a conspicuous percentage. The sessions were held in the Palm Room, with President John A. Kling in the chair. The visitors were welcomed by City Solicitor N. D. Baker in place of Mayor Johnson, who was kept away by illness. William B. McAllister, president of the Cleveland Builders' Exchange, made an address of welcome in behalf of that organization, and John A. Kling, who has been the president of the Supply Association for three years, responded in its behalf.

General routine business occupied the members during the morning, the secretary's report showing the association to have at present 178 active members.

A feature of the afternoon session was a spirited discussion of the question of affiliation with the Bureau of Information of the Retail Lumbermen's associations of the Western and Southern States. The matter had been under consideration by the members of both associations for a long time and was carefully considered before final action was taken. Harry A. Gorsuch, secretary of the Southwestern Lumbermen's Association, and E. F. Hunter, secretary of the Lumbermen's Association of Illinois, addressed the members upon the subject.

In the afternoon a special car was provided for the ladies accompanying the delegates to the convention, and they were shown various points of interest about the city, the ride terminating at the Euclid Club, where refreshments were served. In the evening many of the members of the convention attended a theater party at Keith's, given by the local Entertainment Committee.

The morning session of the second day's proceedings was opened with a very interesting paper on "Concrete Construction," by Charles Matcham, of the Lehigh Portland Cement Company, a part of the speaker's remarks being illustrated by stereopticon views. This was followed by an address by J. M. McClave, who spoke upon the subject of "Sewer Pipe," and Charles Roe gave an interesting talk on "Cement Roofing and Floor Tile," showing the general improvements which have been made in the manufacture of these supplies.

Secretary Edward A. Roberts of the Cleveland Builders' Exchange invited the members of the convention to the offices of that organization in the Chamber of Commerce Building, where they were cordially welcomed. He explained the objects and scope of the exchange, pointing out its advantages, and then showed the arrangement of the various booths and other facilities for the exhibits of building materials. The party was conducted to the library and auditorium, where M. A. Havens told of the manner in which the Chamber of Commerce was conducted. A group photograph was then taken of the party.

At the afternoon session several papers were read, among them being one by W. F. Saunders, secretary of the St. Louis Business Men's League, on "The Association of Business Men." Following this, W. G. Hollis of the Lumber Secretaries' Bureau of Information made an address which met with close attention. C. L. Johnson had something to say on the subject of "The Salesman," while Peter Martin talked on "Common Lime, Its Uses and Abuses."

The active members then went into executive session and officers were elected and committees chosen, as follows:

President, John A. Kling.

Vice presidents—H. C. Godfrey of Bridgeport, Conn.; Charles Warner of Wilmington, Del.; E. M. Baltes of Fort Wayne, Ind.; C. J. Parke of Decatur, Ill.; C. O. Perkins of Des Moines, Iowa; Owen Tyler of Louisville, Ky.; A. G. Lincoln of Boston, Mass.; E. E. Evans of Bay City, Mich.; C. P. Cockey of Minneapolis, Minn.; Gordon Willis of St. Louis, Mo.; H. P. Cook of Newark, N. J.; M. A. Reeb of Buffalo, N. Y.; J. W. Eichelberger of Dayton, Ohio; J. J. Haas of Pittsburgh, Pa.; James G. Goff of Providence, R. I.; B. W. Marshall of Wheeling, W. Va.; C. P. Flatley of Green Bay, Wis., and J. O. Waters of Washington, D. C.

Treasurer, Charles H. Classen.

Members of the Executive Committee for the ensuing year were elected, as follows: William Irvine of Philadelphia, Pa.; Richard Kind of Toledo, Ohio; F. S. Wright of Chicago, Ill.; Charles H. Classen of Baltimore, Md.; J. N. Thayer of Erie, Pa.; Charles Weller of Milwaukee, Wis., and C. W. S. Cobb of St. Louis, Mo.

In the evening the members came together in the assembly hall, in which tables had been placed and other arrangements made for the annual "smoker." The evening's entertainment included a vaudeville programme and "Dutch" lunch, a stereopticon exhibition being a taking feature. Music, refreshments, cards and other entertainments were provided in a separate parlor for the ladies, with prizes.

The morning of the last day was devoted to an executive session of active members for the transaction of unfinished business, while the afternoon was given up to sight seeing, in which the manufacturers, their representatives and delegates with their ladies participated.

## Convention of American Institute of Architects.

According to the programme announced in our last issue the American Institute of Architects held its thirty-eighth annual convention in the city of Washington, January 11, 12 and 13. Evedince of the growing interest in these yearly meetings was clearly manifest in the large attendance, and the gathering was in some respects the most notable in the history of the organization. The business of the first day's sessions was largely devoted to routine matters in the shape of appointments of committees, reports of Board of Directors, treasurer and Auditing Committee, the presentation of a synopsis by the secretary of the reports of chapters, reports of standing and special committees and the consideration of other matters affecting the question of organization. The membership last year was 746, of whom 353 were fellows and 393 associates

Some extremely interesting papers were read and discussed, one of the more important being that by R. Clipston Sturgis of Boston and William B. Mundie of Chicago on "The Relations of Architects with Municipal School Work." This was followed by a paper by William H. Russell on "Financing Building Operations," which threw a very interesting side light on one of the functions of the architect in his practice of the present day. He pointed out how the sternly practical requirements and necessity of considering every expenditure as an investment and measuring all its worth by the returns in money which it will afford have influenced the design of a structure. Another paper on "Office Organization," by Grosvenor Atterbury, afforded opportunity for the presentation by the author of the systematic methods by which he keeps control of his business, his contracts and his office force. The printed forms which the author used so freely were illustrated by lantern slides, and all that the author had to say was closely followed by his hearers. "The Relations of Specialists to Architects" was a subject discussed by C. T. Purdy of New York and Edgar V. Seeler of Philadelphia.

The feature of the annual banquet, which was held in the large dining-room of the Arlington, was the address of President Roosevelt, who expressed his pleasure in meeting a body of men engaged in doing work for the Republic which is to count, not merely in the present generation, but during the lifetimes of many generations to come. The toast list was a long one, the speakers including Hon. Elihu Root, Cardinal Gibbons, Augustus St. Gaudens, Justice Harlan and others.

The second day's sessions were devoted to a consideration of papers, reports of committees, &c., while in the evening there was a paper, illustrated by lantern slides, by Frank M. Day on "Municipal Improvement," showing the progress made in the systematic grouping of buildings and parks throughout the country.

The last day of the convention was given up to reports of various committees apointed at the first session, and the election of officers, which resulted in the choice of the regular ticket—namely, president, W. S. Eames of St. Louis; first vice-president, Alfred Stone of Providence, R. I.; second vice-president, Cass Gilbert of New York City; secretary and treasurer, Glenn Brown of Washington, D. C.

## Meeting of Hard Wood Manufacturers' Association.

What is said to have been the largest gathering of hard wood manufacturers in recent years was that which occurred at the meeting of the Hard Wood Manufacturers' Association, held on January 24 and 25, in Nashville, Tenn. President R. H. Van Sant of Ashland, Ky., presented his annual address, in which he interestingly referred to the hard wood forests of the country, the status of American hard woods, the growing of lumber, &c.

The secretary's report was replete with statistics of interest to the hard wood trade, these showing, among other things, the stocks on hand of various kinds of wood at different periods.

A feature of the meeting was an address by Dr. H. Von Schrenk of the botanical gardens, St. Louis, who is associated with the Division of Forestry. His remarks on "Forestry and Forest Products" were followed with the closest attention by the delegates. In the course of his remarks the speaker touched briefly upon the so-called inferior woods, discussed the seasoning of hard woods and pointed out some of the methods of wood preservation. Others papers presented were that by John W. Love of Nashville on "Hard Wood Producing Centers," and that by R. M. Carrier, Sardis, Miss., on the "Development of Hard Wood Production in the Southwest."

The election of officers for the ensuing year resulted as follows: President, Rufus H. Van Sant; vice-president, John B. Ransom, and secretary, Lewis Doster.

On Tuesday evening a banquet was tendered the delegates by the Nashville Lumbermen's Association, covers being laid for 160 guests. James H. Beard acted as toastmaster and the chief speaker of the evening was ex-Governor McMilan.

## Pennsylvania State Association of Builders' Exchanges.

The Executive Committee of the Pennsylvania State Association of Builders' Exchanges held a meeting on the evening of Tuesday, January 31, at the Monongahela Club, the committee consisting of Robert K. Cochrane, E. J. Detrick of Pittsburgh; C. E. Woodnutt, J. E. Huffman of Williamsport; Col. G. C. Richards of Oil City, William Hanley of Bradford, Edwin S. Williams of Scranton, Harry T. Bales of Harrisburg, T. H. Snell of Pittsburgh, Albert E. Wales of Sharon and W. L. Campbell of New Castle.

It was decided to prefect an organization of builders in all the leading cities and towns in the State, the latter to be divided into districts and an organizer appointed in each to carry out the plan of campaign to be determined upon by the committee.

## The Woods of New South Wales.

In New South Wales the timbers of commercial value include white or she-ironbark, narrow leaved ironbark, broad leaved ironbark, mugga, or red ironbark; blackbutt, white mahogany, tallow wood, spotted gum, gray box, red mahogany, gray gum, forest red gum, Sydney blue gum and turpentine, the latter resisting the attacks of white ants. One of the most useful trees is the red cedar, the wood of which, somewhat resembling mahogany, is well adapted for the finer kinds of cabinet makers' work. Some of the cedar trees grow to immense size, as much as 2500 cubic feet of valuable timber having been obtained from a single tree. Many of the woods of the minor trees are beautifully grained, and capable of receiving the highest polish, while others are fragrantly perfumed. These woods are adapted to the finest description of cabinet making, and it is strange that their merits should have so long escaped attention. Among these trees may be mentioned the rosewood, tulipwood, yellowwood, white maple, white beech, myall, marblewood, mock orange and many others. Besides their use for cabinet making, many of the brush timbers are of great utility for the rougher kinds of carpentry, while some, both hard and soft woods, are admirably adapted for coach builders' and coopers' work. "Colonial deal" is an excellent timber and is obtained in very large scantling, the tree frequently reaching 120 feet in hight. It is soft, close grained, easily wrought, and remarkably free from knots. Its use, therefore, is extensive for cabinet makers' work and house fittings.

An interesting feature of the building outlook in the vicinity of Pittsburgh is the contemplated erection of 30 residences on Squirrel Hill, in accordance with plans prepared by Architects Hodgens & Burns. The dwellings will be of varied design, embodying the Colonial and English styles of architecture, and will be finely finished in hard wood. The building sites are 50 x 120 feet each, and the residences will cost $10,000 on an average. We understand it is the purpose of the Pittsburgh Land Company, which is conducting the operation, to build from 20 to 30 houses every year.

# BEVELS USED IN CARPENTRY.*

## A Short Treatise on the Principles of Geometrical Drawing.

BY GEORGE W. KITTREDGE.

THE application of the foregoing principles to the framing of a stand with slanting or flaring legs is shown in Fig. 10, and in the light of the previous demonstrations should require little explanation. The plan and elevation are first drawn in accordance with the requirements. A B of the elevation shows the exact hight of the stand, while A C and B D show half the width at the top and bottom, respectively. Since the plane of the side, of which A C D B is one-half, is not parallel to the plane of the view, but inclines at the angle shown by C D, its true dimensions and consequently its true angles are not shown in the elevation. A development of this surface must therefore be made as shown in the lower part of the illustrations. In it A′ B′ is made equal to C D, and the points C″ and D″ are obtained by projection from the plan as shown. The lines of the cross pieces in the development are located by measurements made on the center line to correspond with their positions in C D. A section through the center of one side is shown in the left of the illustration turned one-quarter around for the purpose of obtaining a correct plan of the lower cross piece. In this section the several cross pieces are fully shown, but since in the elevation they are beyond the leg they can there be shown only in dotted lines. The inner line of the leg showing its true width in the development is obtained from the point E of the plan as shown and not by measurement across the lines of the leg in the elevation. The development shows the correct lengths and widths on the face of all the pieces shown within its outlines as well as the correct angles or bevels at the end of each piece.

To obtain the true section or backing of the leg first construct the oblique view, as shown at the left. Assuming D′ C′ to be a horizontal line, erect lines, here shown dotted, as previously done in other oblique views, and make the vertical hight equal to A B of the elevation. If correctly done the length of the leg C‴ D‴ of this view will be equal to C″ D″ of the development. A right section of the leg may then be obtained by first drawing the line *a b* at right angles to C‴ D‴. Then on the line of the oblique elevation, which is derived from *c* and *d* of the plan, set off the distance *c d*, placing one-half on each side, as shown by *c′* and *d′*, and draw the lines to *a* and *b*.

Should the cross pieces have their upper and lower faces horizontal, as shown at F of the sectional view and at Z in the elevation, then a plan of one of the pieces will give the exact shape of its horizontal surfaces. The plan of Z is obtained in Fig. 10 by projections from both the sectional view and the elevation, showing that the level surfaces are cut square at the ends, while the bevels of the face are shown at Z′ of the development. Should it be desirable, however, to make the cross piece of timber which is perfectly square in section, placing it as shown at G of the section and Y of the elevation, then the shape of its upper and lower faces can be found by constructing a plan on a plane parellel to those faces, as shown above the elevation. To do this the section of the piece must first be placed in proper position, as shown at G′ in the elevation, and lines drawn from its back edges *r* and *s* to complete its elevation, as shown by Y. Its width in the oblique plan is then made equal *t r*, and the projections all made as shown by the dotted lines. This plan now gives the correct bevels for the top and bottom surfaces, while the bevels for the face are shown at Y′ of the development and are, of course, the same as for the face of Z.

The foregoing demonstration is equally applicable to the bevels on the edges of the boards forming the sides of a hopper. If the lines showing the cross pieces be omitted from the elevation the surface A C D B may then be considered as half of one side of the hopper, of which the development, or true face, is shown below. In the plan D′ C′ E *d* will represent the thickness of the board, and lines from D′ and *d* will be projected to the base line of the oblique elevation as before. The section of the corner will then be shown by *c′ a d′*, and the point *b* of the section and the line passing through it will be omitted.

In conducting the operations of projection the workman is advised to allow himself sufficient room on the paper to keep the several views well separated from each other. By keeping the direction of the view clearly in mind—that is, whether the part being drawn is to appear as seen from above, from one side or another or in an oblique direction—the imagination will the more readily suggest the line sought, even before its exact position can

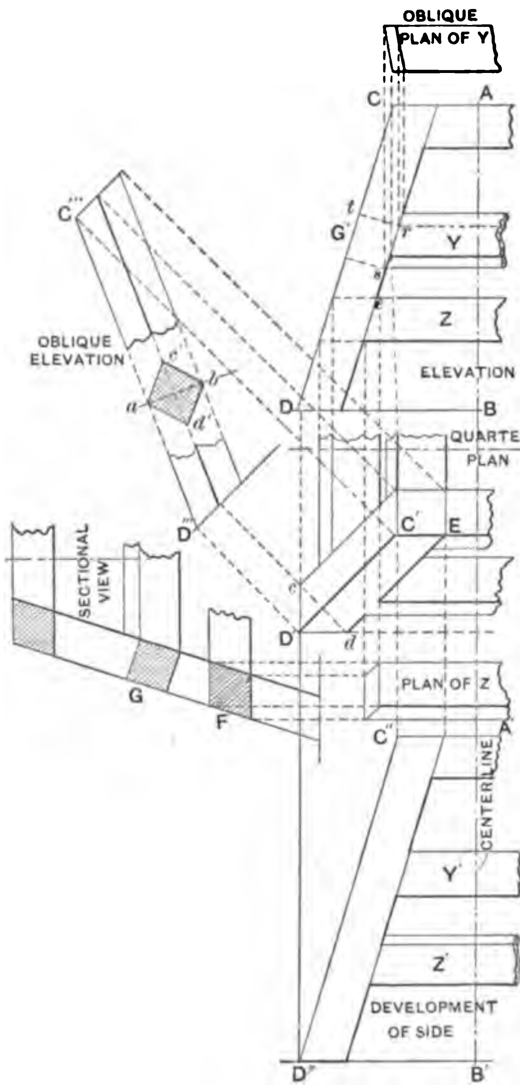



Fig. 10.—Method of Obtaining the Bevels and Sections of the Several Pieces of a Stand with Inclined Legs.

*Bevels Used in Carpentry.*

be determined. It is bad economy to allow any line to be common to two views, as, for instance, the line D *d′* of Fig. 8 is sometimes made to do duty as the base line G′ *c″* of the oblique elevation. Since two lines only are required to show any desired angle, the workman naturally tries to find these with as little work as possible, but with a chance of error and confusion if the lines of one view are allowed to cross upon those of another. It is worth while to draw as many lines as are necessary to complete the several views, as by so doing the imagination is assisted by the pictorial effect thus produced. The power to see the finished work in the mind's eye greatly facilitates progress. Of course these operations can, if necessary, be abbreviated by the omission of as many lines as may not be considered really necessary, but the conducting of the operations in full conduces to a systematic way of reasoning, or discipline of the mind, which is quite as valuable to its possessor as a system of obtaining bevels.

In conclusion, we may add that the greatest benefit which the reader can derive from the foregoing can only be obtained by putting the instructions therein given into actual practice. The descriptions have been necessarily brief, but we think sufficiently clear to enable the reader to follow them, and many operations have been suggested but not illustrated. A wide field for practice is therefore afforded to the reader if he will undertake to execute all of the operations mentioned, since much more can be learned by performing the operations one's self than by reading how they should be done. These may with advantage be conducted in the following order:

Draw all of the elevations and the roof plan from a different plan and to a larger scale than that shown in Fig. 2, adding the cornices and door and window trims.

Project sectional elevation of same house on any assumed line in accordance with instructions given; also several sectional details similar to Fig. 6.

Construct plan of hip and jacks for a roof, having the adjacent sides of different pitches, as suggested in the paragraph following the description of Fig. 8, laying out all of the required bevels.

Construct dormer or gable with inclined ridge, making all pitches different from those given in Fig. 9.

Make drawings and developments for stand, as given in Fig. 10, varying the detail at pleasure.

Make set of drawings for a hopper, applying principles explained in Fig. 10.

## Convention of Master House Painters' and Decorators' Association.

The twenty-first annual convention of the International Association of Master House Painters and Decorators was held at Milwaukee, Wis., February 7 to 10, and was attended by 400 delegates from all parts of the United States and Canada. The business sessions and trade exhibit were held at the Light Horse Squadron Armory on Broadway, within a few blocks of the Hotel Pfister, which was hotel headquarters. The convention was opened by S. J. Brown, chairman of the Executive Committee of the local Painters' Association, who introduced Mayor David S. Rose, who tendered the welcome of the city to the guests. The business sessions were well attended and the discussions lively and often very much to the point, particularly when on the subject of labor unions.

One of the strong papers read at the convention was that by John M. Stiles of Chicago on the subject "Frenzied Commercialism as Applied to Painting and Decorating in the West," in which he arraigned labor in its relation to capital and sharply criticised questionable methods used by some architects and real estate men in the manipulation of contracts.

A. C. Allen, an attorney from Chicago, read a paper on "The Legal Phase of the Labor Question," in which he contended that unions were going far beyond their legal rights in strike picketing and coercive measures. The association took a strong stand in opposition to the closed shop by unanimously passing the following resolutions:

*Resolved,* That the restrictions placed upon the employer and employee by certain labor organizations are illegal, oppressive, arbitrary and in direct violation of the rights of every man to employ or be employed wherever or whenever his personal and best interests demand and direct.

*Resolved,* That we are opposed to the closed shop principle as demanded and required by labor organizations and maintain that the employment of men in this craft should depend solely on individual merit; and, further, be it

*Resolved,* That we are opposed to the monopolistic tendency of our times, which limits individual opportunity and is contrary to the spirit of free government.

Other papers read at the convention were: "The Future of the Paint Shop," by Wm. G. Baxter of Hartford, Conn.; "The Relation Existing To-day Between the General Building Contractor and the Painter and Decorator as a Subcontractor," by Francis F. Black of Philadelphia; "Grading of Workmen," by W. J. Edwards of Cambridge, Mass.; "The Treatment and Painting of Cement Walls," by Thomas Gwilliam, Baltimore, Md.

The report of the Committee on Apprenticeship provides that apprentices may be taken at not less than 16 years and at the end of four years receive a certificate from the association. A court of appeals was established for adjusting differences and giving hearings to apprentices with grievances. A resolution was adopted favoring the grading of workmen according to the plan of W. J. Edwards of Cambridge, Mass., by which the local organization fixes the wage scale according to the ability of the individual man without consideration of union scales.

### Election of Officers.

At the closing session, held on Friday, the following officers were elected:

President, Robert L. Peters, Richmond, Va.

Vice-President, Stewart N. Hughes, Toronto, Can.

Secretary-Treasurer, Wm. E. Wall, Somerville, Mass.

It was decided to hold the next convention in the city of New Orleans.

### Trade Exhibit.

The trade exhibit proved a very interesting feature of the convention, the entire drillroom of the armory being given over to the display by the manufacturers of paints, brushes, ladders, lead and zinc preparations. The floor was divided into avenues, named after the various officers of the association, which were solidly lined with booths of the various exhibitors. Many of the manufacturers gave away attractive souvenirs.

### Social Features.

The social features of the convention were many in number and elaborate in character, including a reception at the Hotel Pfister Tuesday evening, a theater party at the leading theater Wednesday evening, a "smoker" for the men Thursday evening, given by the Patton Paint Company, and another theater party for the ladies the same evening, closing with a dance at the convention hall Friday evening.

On Wednesday an association of Wisconsin master house painters and decorators was organized at the Builders' Club with 20 members, with the election of S. J. Brown, Milwaukee, as president; James B. Murphy, Watertown, vice-president; Leonard Forrester, Milwaukee, secretary.

One of the exhibits of an educational character was that of the Grainers' Association of Boston and Vicinity, showing various woods treated to bring out the graining.

## Australian Hard Wood.

One characteristic feature of Australian hard wood trees, of which there exists an almost endless variety, is the great size of the beams which may be obtained from them as well as the extreme toughness and durability of their wood, the gray ironbark having a resistance to breaking equal to 17,900 pounds per square inch, as compared with a mean of 11,800 pounds for English oak and 15,500 for teak. None of the other timbers has so high a resistance to breaking as this description of ironbark, but nearly all the varieties have a greater strength than oak. The quality of the wood is materially influenced by the soil on which the trees grow, while the absence of branches for the greater portion of the hight enables the timber to be obtained to the best advantage; and as full grown trees of most varieties are rarely less than 100 feet high, with corresponding girth, the quantity of timber obtainable from the virgin forests is very great.

WORK is about to be commenced in McKeesport, Pa., on what is to be the first of half a dozen model tenement buildings which will be put up directly opposite the main entrance of the mills of the National Tube Company. Ever since the old buildings were razed to make room for the new tube mills a large number of laborers who formerly occupied the dwellings have been scattered about the city, and it is with a view to improving their condition that plans have been prepared for these model homes. The first structure will be four stories high, with spacious halls, modern equipment and such an arrangement as will give accommodations to a large number of people.

# CORRESPONDENCE.



### Cutting Circles of Glass.

*From* H K., *Wheaton, Minn.*—I have a question which I would like to ask the readers of the paper who have had experience in this line of work. What is the best way to cut circles of glass or cut out curved pieces? I have great trouble in doing the work and usually break the glass whenever I attempt to cut it.

### Copper Roof for Foundry.

*From* H. AYRES, *Rondout, N. Y.*—Noticing in a recent issue the inquiry from "H. B. P.," New Haven, Conn., relative to copper roofing for a foundry, I desire to express the opinion that copper ought to make a good roof for a foundry, and there are several ways of putting it on. If the roof is sheathed, the copper can be put on the same as a standing seam tin roof, or it can be put on over wood strips running up and down the roof, about 20, 22 or 24 inches apart. There is really no need to use the wood ribs, however, unless it is intended to have them put on for the sake of appearance, as the regular standing seam is a much cheaper and at the same time a much better way to lay the roof. If the wood ribs are used, the roof is sheathed over in the usual way. Then wood strips about 2 inches square are nailed up and down the roof about 20 inches apart. The copper is rolled out and 2½ inches turned up square on each side, then ½ inch is turned in square toward the center of the sheet. This

Now for the cost of this roof we would have the following items for each square:

| | |
|---|---|
| 140 pounds at 19 cents | $26.60 |
| 60 lineal feet of 2 x 2 inch wood strip at 2½ cents | 1.50 |
| 2 pounds solder at 20 cents | .40 |
| Cleats and nails | .50 |
| Putting copper together and putting on | 4.00 |
| Net cost per square for labor and material alone | 33.00 |
| Allowance of 10 per cent. for fixed charges, &c | 3.30 |
| Actual cost per square | $36.30 |

A nice way of closing up the edges after the caps are put on, and also of turning the same down slightly, is to take an ordinary seaming iron, such as is used on tin roofs, drill two holes through it on each side, bolt on hard wood strips on each side, thick enough to raise the iron to the desired hight, and then have it channeled out on one side to the desired bevel. Then, by running it along the seam, the edges can be closed tight with a

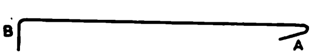



Fig. 2.—Form of Copper Caps.

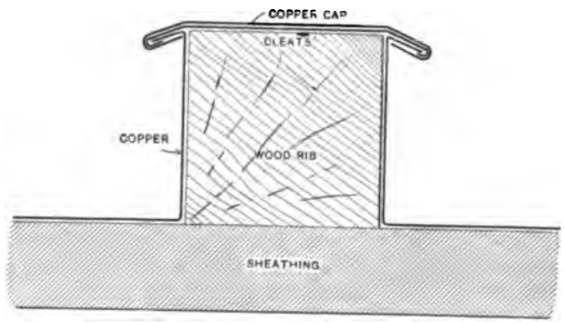



Fig. 3.—Method of Covering Wood Ribs.

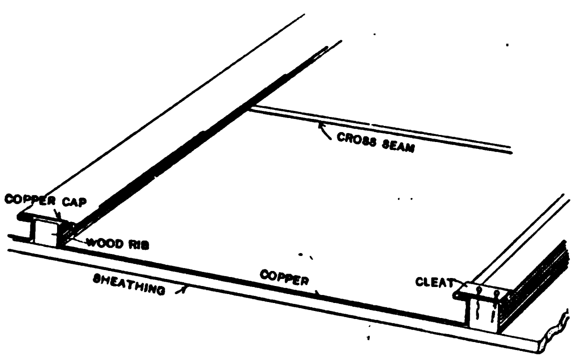



Fig. 1.—Diagram of Copper Roof.

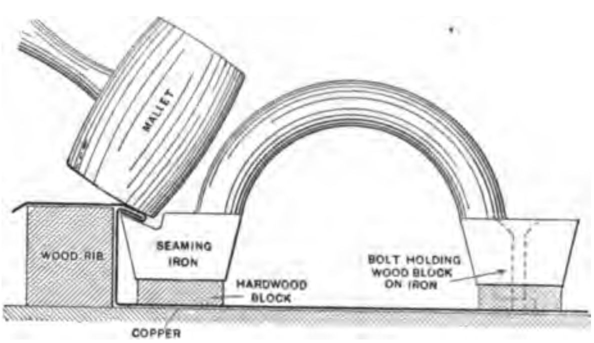



Fig. 4.—Closing Up the Edges of Copper Cap.

*Copper Roof for Foundry.*

edge is then cleated at intervals of about 6 or 8 inches to the wood strip. A cap strip of copper, cut about 4 inches wide, is then locked onto the edges of the copper, covering the wood rib and hiding the cleats. No nails should be driven through the copper. The sketch, Fig. 1, shows the method better than any written explanation.

Whether put on with ribs, as above described, or like a standing seam roof, the copper should be put together in rolls the same as tin; only it is preferable to use long sheets instead of 14 or 28 inch sheets, thereby lessening the amount of copper, solder and labor required. The caps can be gotten out with one side bent over closely and the other side bent square, as shown in Fig. 2. The side A is then slipped on one side of the rib and the side B pressed down and closed in with a hammer, both sides being pinned tight against the ½-inch edges turned out on the copper. After this, each edge should be turned down slightly, as shown in Fig. 3. If these ribs are spaced 20 inches apart it will be found that there will be required to cover the space from the edge of one rib to the corresponding edge of the other rib, 4 inches for the cap, *plus* ½ inch on the top of the course, *plus* 2 inches up against the rib, *plus* 18 inches to the next rib, *plus* 2 inches up, *plus* ½ inch out, or a total of 27 inches is required to cover 20 inches, net, of space. If 16-ounce copper is used, this would mean that for each square of roof would be required $\frac{27}{20} \times 100$ pounds $= 135$ pounds of copper, *plus* an allowance for cross seams, which would make about 140 pounds of copper.

mallet and turned down to the angle desired at the same time. This operation is shown in the sketch, Fig. 4.

If, however, the roof is sheathed, as would be required for the construction above described, a better roof and a great deal cheaper one can be obtained by using a first-class roofing slate laid over Neponset Red Rope roofing fabric and fastened with copper or composition nails. This would cost from $9 to $13 a square for the labor and material, *plus* the metal flashings, valleys, &c., required. If the roof must be fastened to the iron roof purlins, to use copper would require it to be corrugated and heavy; 24-ounce to 32-ounce copper would be needed, according to the span. This would make the price almost prohibitive, and as satisfactory a roof would be obtained by the use of tile fastened direct to the purlins at a cost of, say, $15 per square for the labor and material, *plus* $1.50 for fixed charges, or a total cost per square of about $16.50, exclusive of metal flashings and valleys. Of course these prices are subject to variations from a number of causes, such as locality, amount, efficiency of workmen, contour of roof, &c., but they are all approximately correct.

In putting on the copper great care should be exercised to see that proper provision is made for expansion and contraction, as copper is subject to greater variations because of this action than any other of the ordinary metals. Under no circumstances should a copper roof be nailed through the copper, except at the eaves. All other fastenings should be made by cleats. No copper roof of any size should be laid flat locked without providing expansion ribs at intervals of about 10 feet, and none of any size should be laid without cleats.

As to durability, a copper roof will last a life time in almost any climate, although, in some places, gases generated in the surrounding locality will act on it, and it is possible that this result would be found on a foundry. Trouble of this kind is found on the New York Post Office Building, where water tables, &c., near certain smoke stacks deteriorate very rapidly, while the main body of the roof, which is also of copper, retains its durability. Under the circumstances, slate or tile would probably be preferable for a foundry roof, slate being the better material if the roof is sheathed or covered with cinder concrete, and tile if it is desired to fasten the roof direct to the purlins. In this case, however, special iron work is needed to accommodate the tile, and this would be an addition to the figures above given for the cost of a tile roof. If concrete is put on and a slate roof covering is desired, it will be found advisable to imbed wood furring strips in the concrete to which to nail the tile, as cinder concrete is very poor material to which to nail slate.

If "H. B. P." had given a few more facts regarding the size of the roof, whether sheathed or not, &c., more specific information could have been furnished in a more concise form than the above. If he thinks slate would be too heavy, he should consider that it weighs only 6½ pounds per square foot, and the roof that will not support this weight is not safe to work on—or under, either—and is not strong enough to stand the wind pressure or snow load to which all roofs of one-third pitch or over are subjected in this climate.

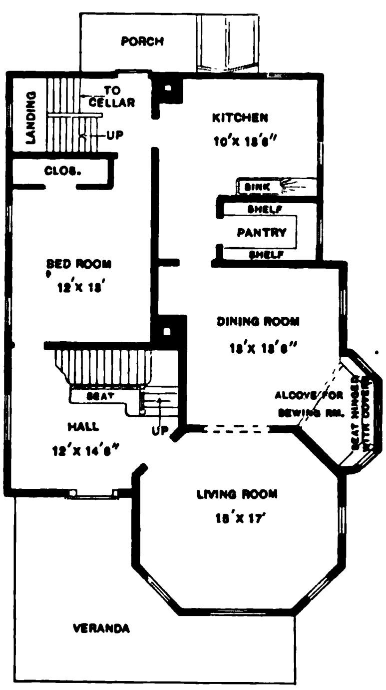
#### Construction of Ice Houses and Cold Storage Buildings.

*From* S. W. J., *Minnesota, Minn.*—As a subscriber to and reader of *Carpentry and Building*, I would like to receive through the Correspondence department some information from the practical readers as to the construction of ice houses and cold storage buildings such as would suit the smaller towns. Will a frame ice house built of 2 x 6 studs and sheathed on the inside and outside with matched lumber, giving an air space in the wall, and packed with sawdust, preserve ice without the latter itself being packed with sawdust? I wish some experienced builder of ice houses and cold storage buildings such as would be suitable for storing meat would present plans with full information for publication in the Correspondence department of the paper.

*Note.*—We shall be glad to have our readers describe their methods of constructing buildings of the character indicated, although we would point out for the information of our correspondent that in back numbers of *Carpentry and Building* these subjects have been considered at some length, illustrations being presented showing how to best construct the walls and arrange for ventilation in order to give satisfactory results. Progress, however, is constantly being made in matters of this kind, and there is room for still further consideration of the ice house and cold storage question.

#### Revised Girl's Floor Plans.

*From* A. B., *Proctor, Vt.*—I am sending herewith blue prints showing my revision of a "girl's floor plans." together with a few suggestions, as requested in the September issue of the paper. In the original plan the plumbing was widely separated and placed near the outer walls, thus increasing the cost and liability of damage from freezing. The alcove would look better on paper than when constructed. The kitchen stairs have also been relegated to the back hall, where they more properly belong. Several other changes have been made which will be readily noted by comparison of the original plans with those which I send at this time.




First Floor.


Second Floor.

*Revised Girl's Floor Plans.—Scale, 1-16 Inch to the Foot.*

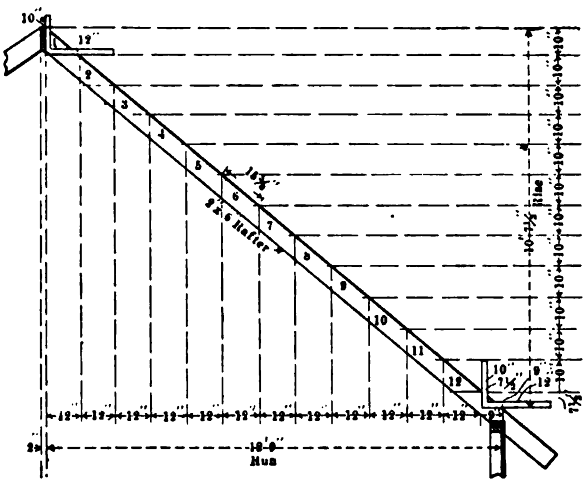
#### Views of L. Jerome Aimar Indorsed.

*From* J. L. T., *Bremen, Ind.*—In renewing my subscription to *Carpentry and Building* for another year I desire to say that I could not think of doing without the paper, as the Correspondence has been of a highly interesting and instructive nature. I want to say at the outset that L. Jerome Aimar has about voiced my sentiments and experience in the carpentry business. I have worked at the trade since I was a boy of 16, and must say that his lengthy letter just about fits my case all the way through.

Referring to the letter of "G. H. B.," who in the December issue comments on the communication of Mr. Aimar, I want to say that he surely must be a back number when he says that the chances are if he gets so he can lay 10 bundles of shingles on a solid roof, no hips or valleys, he can go away from the job satisfied that he has done a good day's work. Permit me to suggest that he ought to come out West and learn how to put on 5000 per day. I can do it in 10 hours, and have a man in my employ who can beat that by 1000 in the same length of time.

### Rule for Laying Out Roofs in Feet and Inches.

*From* A. E., *Hartford, Conn.*—I notice that "J. F. D.," of Dallas, Texas, wants a rule for "laying out roofs in feet and inches, as is done on the jobs." I have applied four or five different methods with equal success, and with the editor's permission I will try and explain a simple way of doing the work. Suppose the building is 25 feet 8 inches wide and the rise of the roof is 10 inches to each 1 foot of run or base and the ridge 2 inches thick. The horizontal distance or run of rafter from outside face of wall to the side of the ridge is then 12 feet 9 inches, and the vertical distance or rise of rafter from the top edge of its plumb over the face line of the wall to the top of the ridge will be 10 feet 7½ inches, because



*Rule for Laying Out Roofs in Feet and Inches.*

12 9-12 times 10 inches is 127½ inches or 10 feet 7½ inches. On the side of the upper end of the rafter apply the steel square as shown in the diagram with the 10-inch rise on the tongue and the 12-inch run on the blade in line with the top edge of the rafter. Do this 12 times along the rafter, but as the run in 9 inches more than 12 feet apply the square once more but with the 9-inch mark on the blade and the 7½-inch mark on the tongue. Parenthetically, it may be stated that 9 inches is three-fourths of 12 and 7½ inches is three-fourths of 10 inches. Mark at 9 and this will be plumb over the face of the wall. Work all plumb cuts by the tongue and all level cuts by the blade of the square. Always have the run equal 12 inches and make the rise as required for each particular roof.

In laying out the hip or valley rafters proceed in exactly the same way in every respect, except that the run will be 17 inches, which must be taken on the blade of the square in place of 12, as for common rafters. At the lower end, to get the 9-inch run, do not take three-fourths of 12 inches, but three-fourths of 17, which will be 12¾ inches. The rise will be the same as for common rafters 10 and 7½ for the last space, in this case.

To find how much each hypotenuse will gain per foot of run or base line, take the length of the base line on the blade and the rise on the tongue of the square and measure carefully with a rule across the square, diagonally from one point to the other. In the above case, 10 inches rise to 12 inches run, the hypotenuse will be nearly 15⅝ inches, or 3⅝ inches gain per foot of run. For example:

$$\sqrt{10^2 + 12^2} = 15.62.$$

If this distance is measured on the rafter 12 9-12 times, it will give the length of the rafter very nearly correct.

15⅝ x 12 9-12 = 199 7-32 = 16 feet 7 7-32 inches.

The correct length is 16 feet 7⅛ inches.

If "J. F. D." will study the accompanying diagram carefully he cannot fail to understand my solution and will, I hope, receive some benefit from my efforts.

### A Question in Miters.

*From* G. R., *Wilmer, British Columbia.*—Permit me to ask through the columns of the Correspondence department what is the rule for mitering a soffit board where the rafter rises, say, 4 inches to the foot?

### Camber Required for 50-Foot Truss.

*From* C. E. W., *Hagerstown, Ind.*—I have been a reader of *Carpentry and Building* for about 16 years and this is my first attempt at asking questions through its columns. Heretofore I have often thought of asking for a little information on some subject, but about the time I concluded to do so some one else would ask the very question I had under consideration and thus save me the trouble. The information I now desire is this: How much will a wooden truss of 45 or 52 foot span, carrying a slate roof, need to be cambered so that when the false supports are removed it will be straight beneath?

### Attaching "Grounds" to a Brick Wall.

*From* CARPENTER, *Petersburg, W. Va.*—Will some good joiner tell me the proper way to put in nailing grounds on a brick wall for inside finish, such as baseboards, casings, mantels, &c.?

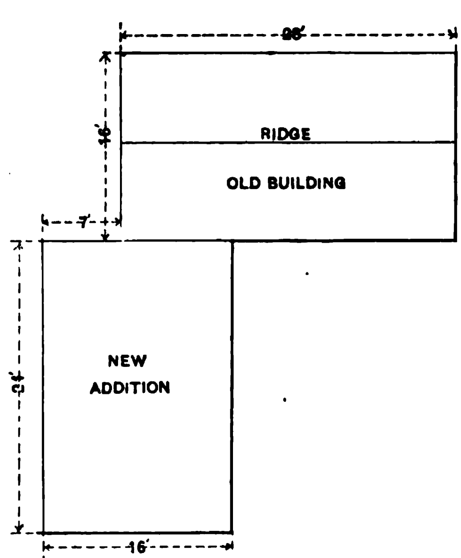
*Note.*—We shall be glad to have our practical readers describe their methods of preparing grounds for the purpose named, but we would suggest to the correspondent above that a good way is to "plug" the wall at the necessary points.

### Rule for Proportioning Doors.

*From* A. E., *Hartford, Conn.*—In a recent issue of the paper "J. F. D." of Dallas, Texas, asks for a rule for proportioning doors, and in reply I offer the suggestion that a good rule is to make the hight of all inside doors in a dwelling about two and one-half times the width of the principal ones. A catalogue from some door factory will give the stock sizes.

### Another Problem in Roof Framing.

*From* J. C. W., *Berlin, Pa.*—Allow me to ask some of those experts in solving problems in roof construction how to do the job with which I am at present confronted. One portion of the diagram which I send represents an old building, already constructed, of course, and the owner desires to put on an addition at the place indicated in the sketch. The building is two stories in hight, and what gets me is the way to connect the two roofs without changing the old one, the ridge on the old building running lengthwise, as indicated. I noticed from recent




*Another Problem in Roof Framing.*

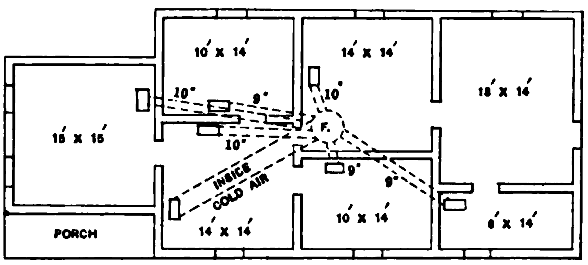
issues that "A. S. W." of Shawnee, W. Va., received quite a number of answers to his problem, and I hope I may meet with equal success.

### Bricks Made of Sand.

*From* E. H., *Hailey, Idaho.*—In the issue of the *Saturday Evening Post* for January 14 was an article bearing the above title and stating the composition to be 94 per cent. sand, 6 per cent. lime, thoroughly mixed and poured into molds in a semi-fluid condition. After hardening they are taken off the mold and exposed for four hours to live steam. They are hard and tough like rock. I would like to know if any of the readers of the paper have tried the scheme, and if so the plan may be of universal interest.

### Windows Sweat from Furnace Heating.

*From* J. O. T., *Brazil, Ind.*—**I have placed a hot air furnace in a one-story cottage in this city, as shown by the sketch herewith, and it is a success in every particular except that every window in the house is sweating and has done so since the furnace was put in, some time ago.**

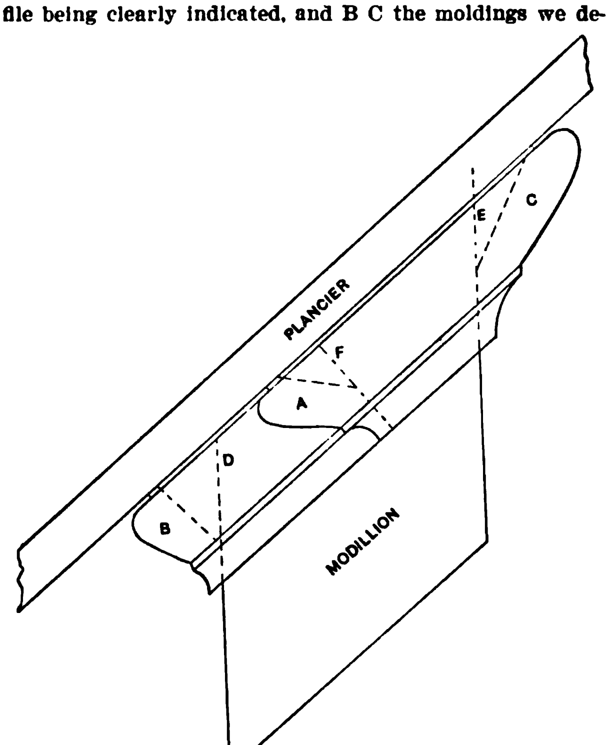



*Floor Plan Showing Furnace Connections With Different Rooms.*

**As this is the first trouble I have run up against in some years of practice in furnace work, I would like to know the cause. The furnace has a cold air supply of 420 square inches area, and the area of the hot air pipes amounts to 435 inches. The cold air is taken from the inside of the building.**

### Mitering Bed Molding Around Modillion Block in a Gable.

*From* W. A. E., *East Waterford, Maine.*—I come to the Correspondence columns asking for a little information from some of the many readers of your valuable paper in regard to mitering a bed molding around a modillion block in a gable. The sketch which accompanies this will show the way in which we have just executed a job of this kind. A represents the regular bed molding, the profile being clearly indicated, and B C the moldings we developed with which to intersect it on the lower and upper side of the modillion block, and to have the same spring from the plumb lines D and E as does A from F. They made a good intersection, but the smaller molding appeared too light when viewed from below, so we mitered the regular bed molding around and cut in and mitered at B and at the frieze, which saved using so many different cuts. I think it looks better from below, but it stands rather flat to look well when on a level with it. I would like very much to see the correct method of doing this work published, as we seldom have anything of this kind to do in the country towns. I have never seen such a question presented to the readers, although I have taken the paper for eight years, so perhaps it may be of interest to others.




*Mitering Bed Molding Around Modillion Block in a Gable.*

### Making a Five-Pointed Star with the Steel Square.

*From* JOHN L. SHAWVER, *Bellefontaine, Ohio.*—Here is a short rule which may be of use to "C. V. F.," who asks in a late issue how to make a five-pointed star by the use of the steel square. Describe a circle having a given diameter, on which indicate a chord equal to seven-twelfths of the diameter. The points where these chords intersect the circumference of the circle will be the five points of the star. Another rule which will apply to stars having any number of points is to divide 360 by the number of points desired, which will give in degrees the distance between points. Get the angle on the bevel square from the protractor, and start with any diameter as the base line, from which all the points may easily be obtained.

In Fig. 1 of the accompanying sketches is shown a circle with the base line on which the bevel square is laid

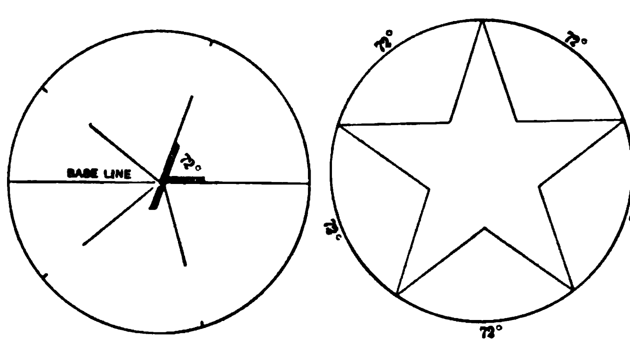



Fig. 1. Fig. 2.

*Making a Five-Pointed Star With the Steel Square.*

to get the first point. Use this line as a new base from which to get the second point. Reverse the bevel square on the original base line and secure another point and from this line secure the last point in the star. Join the points as shown in Fig. 2 and the star is soon complete.

### Information Wanted Regarding Construction of Turkish Bath.

*From* S. W. E. C., *Edmonton, Alta, N. W. T.*—I should take it as a favor if some of the readers who have had experience in this line would furnish for publication a few hints as to the construction of a Turkish bath, together with the probable cost of same.

### Bearing of Floor Timbers in a 12-Inch Brick Wall.

*From* W. A. E., *East Waterford, Maine.*—I have a question which I should like to submit to the practical readers of the Correspondence department, and that is this: What would be the proper bearing in a 12-inch brick wall for 3 x 12 inch floor timbers in a span of 19 feet—that is, what length of the timber should bear on the wall?

*Note.*—Common practice suggests that the ends of floor joists or other timbers should extend into a brick wall about 4 inches, although custom may vary this to some extent in different localities. The timbers should be secured every few feet with iron anchors. We should be glad to have our readers describe the practice current in their locality.

### Deadening a Dancing Floor.

*From* W. A. M., JR., *New York City.*—I would like some one of the many readers who has had practical experience in this kind of work to tell through the Correspondence columns how to deaden a floor laid on wooden beams so that dancing on the floor above will not annoy tenants in the rooms below.

# SOME COMMENTS ABOUT SHINGLING.

BY JOHN SANFORD.

IN the early days my father pressed me into service between school seasons, my first experience being at a distant country neighbor's house. A farmer by occupation, he had built his own home of logs, pole rafters and shaved shingles. The old gentleman was of a logical turn of mind and reasoned that the flatter the roof the fewer shingles it would require to make a good job. I might say for the benefit of those who are young in the business that riving and shaving shingles is no picnic. The roof as a consequence of the old gentleman's idea was therefore very flat. When shingling time arrived he reasoned that as there was more water to flow over near the eaves extra precaution would be necessary in the first part of the roof. As a consequence a triple course was put on at the start, the shingles being laid 2 inches to the weather. The length exposed to the weather was gradually increased to 4 inches. The doubling up of the courses together with the flatness of the roof gave the weather surface of every shingle a pitch downward toward the comb of at least one degree and some were five times as much. An idea of the appearance of the roof may be gathered from an examination of Fig. 1 of the sketches. To use the farmer's words as to the first falling water, "Instead of shedding water it had scooped every drop of it into the house." My father scarcely reached the top of the ladder before he came down smiling, and said if the roof had not leaked the only thing that could have kept it from pulling the house down under a heavy snow was the excellent dovetailing and pinning of the logs at the corners.

The roof was separated at the comb, jacked up, the rafters spliced and extra rafters set in so as to remedy the fall without taking off all the shingles. The farmer was told that as much skill was required in roofing as in any other feature of carpentry. At that time I thought my father took advantage of the opportunity to press the point, but it is true, however little care or thought may be given the subject or bestowed on the average job. There is room for profitable thought all along the line with old and young who have given it due reflection.

It is said that a roof well put on with poor shingles will outlast one of good shingles and poor workmanship. If true, there are advantages in laying or nailing or both that cannot be generally embodied by random work. Shaved shingles come nearest to running with the grain, but there is generally a choice of sides to the weather. Cut shingles are of random width—not a desirable feature—and are invariably cracked and checkered one side, as shown at B in Fig. 2, caused by the shingle curling away from the blade as it is cut from the block. The blade riven side of cut shingles should be put next the sheathing, for if turned to the weather frost will shorten its useful life. On account of this other advantages which might be gained by close attention to the grain cannot be ignored. One side of nearly every sawed shingle is decidedly better than the other to place to the weather. The grain is more or less oblique to the surface, and with one side up it will absorb the water as it flows over the shingle, while the other side if exposed to the weather effectually sheds the water. The idea is illustrated in Fig. 3. The frayed fibers and open pores of the side sawed against the grain readily gather and retain moisture when put on the wrong way and under action of frost deteriorate rapidly. If the grain of shingle wood was perfectly straight, as shown in Fig. 4, the grain of the shingles would still be contrary, and as both the wood and the shingles must be taken as chance rules it, discretion in putting on a roof is the only guarantee of good service.

If working for the best possible result, the writer would use shingles 4 inches wide, exposed 4 inches to the weather and use only full length shingles. He would put two nails in each shingle, nailing one-fourth of the way from each edge and far enough from the butt to be covered by the second course following. He would cast out all shingles with knots, dry rot or sap edge, using shingles of the same thickness in the same course, and turn the grain of every shingle so it would shed the water. If necessity compels the use of shingles with sap edge, he would have the sap come over good heart wood, and his endeavor would be to have the shingles uniform damp or dry by courses. On extra dry shingles the joints should be open to provide for swelling, while in the case of extra damp shingles the joints should be closed tight in order to allow for shrinkage. In the case of stained shingles, they should be dipped three-quarters of every length or more or else not at all.

In Fig. 5 is illustrated the shingling of a valley, this being a simple job on which many novices have met their Waterloo by trying to keep the butts even instead of the tails. The cut ends at the valley and the diminishing of the length from butt to tail as the courses vanish at the valley are plainly and correctly shown in this illustration. Carpenters sometimes cut a shingle as shown at A of Fig. 5 and place it with the length running up the valley instead of finishing the course to a feather edge. The merit of this method is questionable.

Mentioning the valley brings to mind a story: The Champion Ananias of the trade was at supper with his chums in the shack at a country job; a barn with four valleys yet to be covered was the subject. The champion declared he had once climbed up and asked for a job on the roof of a big barn, and noticed in the valley

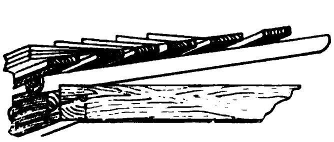


Fig. 1.—Theory that Failed in Practice.

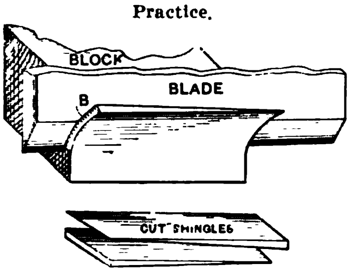



Fig. 2.—Illustrating a Fault in Cut Shingles.

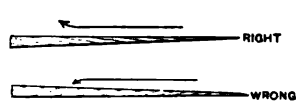



Fig. 3.—Turning the Grain So It Will Shed Water.

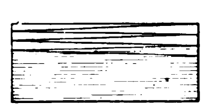


Fig. 4.—Grain Necessarily Crossed in Sawed or Cut Shingles.

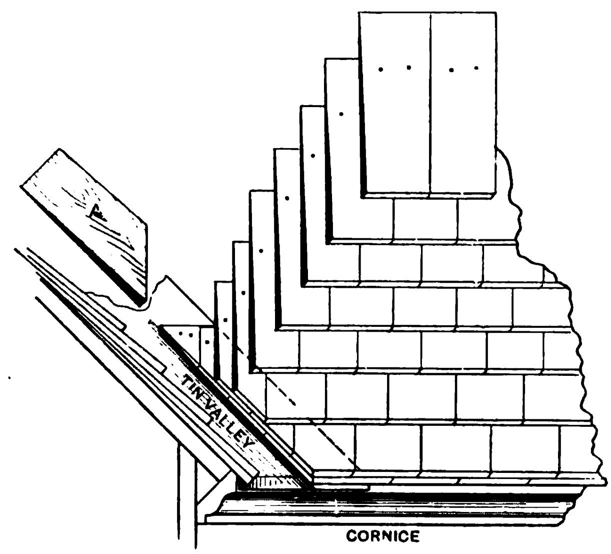



Fig. 5.—Shingling to Valleys.

*Some Comments About Shingling.*

where some greenhorn had tried to keep the butts even a place where the shingles were 22 thick. The foreman said, "If you will acknowledge that you believe some absent minded fellow forgot to open a bunch of shingles and just shingled over it, we will let the story pass." The champion refused to so acknowledge, and soon sustained his reputation when a comrade asked him if the saw he let fall from the roof that day was damaged. "Never went to see," said the champion, "I got in the habit of lettin' 'em stay while on the C. M. Q. pier at Mobile. We lost a carload of saws on that job. Why didn't we fish 'em out? We couldn't try till quit'n time, and by then the salt water had et 'em up." Supper ended with the remark by the foreman to the effect that to any man who claimed to be able to put on 4000 shingles per day he would rather pay the scale gratis to keep him off the job.

## Convention of Northwest Cement Products Association.

The first convention of the manufacturers of cement products in the Northwest was held in Minneapolis the last week in January, the idea of the gathering being to bring together the architect, engineer, contractor, builder and the users of cement. There was a large representation and great interest was manifested in the proceedings. There were numerous exhibits, embracing machines for turning out hollow blocks, also specimens of the work.

Reinforced concrete construction was discussed by James G. Houghton, building inspector of Minneapolis, and in the course of his remarks he referred to the recently erected 16-story Ingalls Building of concrete in Cincinnati. W. G. Engle thought that the insurance companies discriminated against concrete block buildings on the ground that they gave them no better rate than veneered buildings, while he thought they should be given the same as brick. William Seafert of Chicago stated that in that city they got a better rate than brick construction. Ernest McCullough of Chicago referred to the study which was devoted to the use of concrete by the insurance companies, and then pointed out some of the characteristics of building blocks and the extent to which they were fire proof. Professor R. L. Humphrey of Philadelphia spoke of the gigantic strides of the cement industry and referred to the results of some of the tests which were made under his charge at the World's Fair.

The second day of the meeting opened with a paper by J. P. Sherer upon "Coloring of Cement Blocks," in connection with which a great deal of interesting information was brought out. Prof. F. H. Constant of the University of Minnesota gave an extended talk upon the work of the University on following up concrete construction by tests and experiments. Another interesting talk was that by G. W. Cappelen of Minneapolis, in which he dedescribed some of the results of his experience with reinforced concrete construction. Other speakers referred to their experience in the manufacture of building blocks, the construction of buildings from them, concrete sewers, &c. A paper by G. W. Kirwan of St. Louis on "Water Proofing of Cement Blocks" elicited some discussion in which several participated and which brought out some valuable points in connection with this phase of the business.

The evening of the second day's meeting was given up to an illustrated lecture by C. A. P. Turner and to a "smoker," which was tendered the members of the convention by the Builders' Exchange.

The last day of the meetings witnessed the reading of a paper by J. A. Mitchell of Goshen, Ind., upon the manufacture of cement posts, this being followed by a paper on the mixture of concrete by A. L. Goetzmann of Chicago. In his opinion the block of the future will be cured under water. Several points brought out were discussed by different members and in connection with the question of cinders for concrete it developed that in the opinion of engineers they were to be avoided if possible, as they were uncertain and liable to crumble and disintegrate. The discussion continued for a time during the afternoon, when reports of committees were taken up. The Committee on Credentials recommended admitting to membership all who signed the register whose business was included in the objects of the association, and the Committee on Constitution and By-laws recommended that the organization be known as the Northwest Cement Products Association, its membership to be made up of cement users, architects, engineers and manufacturers or agents of cement and machinery or appliances for using cement.

The officers elected for the ensuing year were as follows: President, O. U. Miracle of Indianapolis; vice-presidents, James Wimmer of Perry, Iowa; Ernest McCullough of Chicago; E. H. Dow of Sioux Falls, S. D.; J. W. Cooper of Minneapolis, and H. G. Stanley of Hope, N. D.; secretary, F. H. Chapin of Minneapolis; treasurer, John M. Hazen of Minneapolis.

A vote of thanks was extended to those who had helped make the meeting a success, to the Builders' Exchange of Minneapolis, the Commercial Club and others. The association is to meet annually on the third Tuesday of January.

## A California Hardware Store.

A structure which when completed will be one of the largest buildings west of the Mississippi River is now in process of erection in San Francisco, Cal., on a plot having frontages of 275 feet on Townsend and King streets and 264 feet on Seventh street. It will be of the heaviest mill construction, with selected brick for the walls, laid in patterns, while the entrance on Seventh street will be in granite and sandstone and the vestibule in marble. Heavy brick fire walls will practically divide the main structure into three buildings, which will be three stories in hight. A basement will extend under the entire building, and there will be a floor space of about 7¾ acres.

The general offices will occupy about 25,000 square feet on the Seventh street frontage of the third story and will be amply lighted and ventilated by means of windows and skylights. An elaborate system of fire protection will be installed, consisting of 6000 sprinkler heads, numerous fire extinguishers and the necessary fire hose. All departments of the establishment are to be placed in quick connection with each other by means of pneumatic tubes and telephones. On the first floor will be the stockrooms and in the center the packing rooms and order department, while on the King and Townsend street fronts will be the shipping and receiving departments. Four hydraulic freight elevators and five electric freight elevators, with an electric passenger elevator, will furnish rapid transportation from the basement to the different floors of the building.

Adjacent to the main structure, occupying a piece of ground fronting 175 feet on King and Townsend streets and extending through the block 264 feet, will be situated a large iron and steel warehouse. This will be a one-story building, 30 feet high in the clear, and of exceedingly heavy construction. In it will be housed the stocks of boiler plates, boiler tubes, pipe and bar iron, &c. The two buildings are being put up by the Pacific Hardware & Steel Company, and it is estimated that they will cost $500,000. Direct railroad connections are secured by spur tracks, which will enable the loading or unloading of ten cars at a time. Trucks and wagons can receive and deliver goods from the King street front of the building, where a platform elevated above the street and covered by a glass hood 550 feet long protects the goods in process of loading or unloading from exposure to the weather.

PLANS for the new club house to be erected in New York City for the Engineers' Club were filed a short time ago with the Building Department. It is to be a 13-story structure of Colonial design, with a frontage of 50 feet on Fortieth street and extending back 197 feet to Thirty-ninth street, on which it will front 25 feet.

## Painting Cement Floors.

If the cement floor is of comparatively recent construction, that is, not over a few months old, a wash made of 12 fluid ounces of oil of vitriol (sulphuric acid of 66 degrees Be.) and one gallon of water should be applied. This must be mixed in an earthen or glass vessel and allowed to cool, then applied on the cemented surface by means of a large fiber brush or a swab made of cotton waste—a hair brush would be ruined. This treatment will change any caustic lime that may be present in the cement into the harmless sulphate of lime (gypsum), and at the same time it roughens the surface so as to make the paint hold on well.

Twenty-four hours after the wash has been applied a priming of well-settled, raw linseed oil (well aged, if possible) should be given, and if there is no especial haste this should be permitted to stand a full week, after which a coat of good linseed oil paint, preferably with pure lead and zinc base, should be applied and well rubbed in, finishing with a hard drying floor paint of the grade used on ferry boats and described in these columns. If such a floor paint is to be of lead color or spruce color, it is best made on a base of equal parts of lead and zinc in oil, thinned with equal parts of turpentine and japan to brushing consistency, tinted to suit requirements, and then mixed equal parts by measure with hard drying floor varnish of approved quality. Thus treated, says the *Painters' Magazine*, a cement floor will permit the paint to wear well, even where oil is spilled over it, as is the case in engine rooms and similar places.

## A Machine for Making Continuous Hollow Concrete Wall.

A company in the city of Chicago has recently placed on the market a machine for constructing a continuous hollow wall, the air space running from sill to plate and around the building, thus insuring imperviousness to moisture, heat and cold. The exterior wall can be made to represent cut stone in its various forms as easily as a plain surface and with no greater expense. The inside wall, supporting the floor joist, can be made thicker than the outside one, ledges being built as the wall progresses to give the joist proper bearing and still preserve intact the smooth interior air chamber. The machine forms the corners and angles of any kind for bay windows, and also finishes solid and tight around any window or floor openings. The wall is laid up in courses of about 12 inches, although higher or lower courses may be laid. The process is continuous, as by the time the machine has passed around an ordinary building the concrete will have set sufficiently so that another course may be started immediately, thus making a continuous and uninterrupted process until the work is complete. The inner and outer walls are bonded together at each course with reinforced concrete bridges or ties, which are cast simultaneously with the body of the concrete, thus insuring absolute rigidity.

## An English Cottage Hospital.

We have at intervals in the past presented in these columns designs of hospitals of a character to meet the necessities of the smaller cities and towns, where the requirements are obviously much less than in the leading cities, although the general scheme of treatment is very similar. While the plans heretofore presented have related to hospitals erected in this country, we show herewith the plan and elevation of a cottage hospital recently completed at Exmouth, England, and which clearly indicates the general scheme of arrangement of wards, operating room, laboratory, waiting room, bathrooms, &c., which prevails in that country. The building cost in the neighborhood of $20,000 and was erected in accordance with plans prepared by Tait & Harvey.

Front Elevation.

*An English Cottage Hospital.*

## Making Brick Work Damp Proof.

A process which is claimed to make brick work impervious to dampness consists in dissolving ¾ pound of mottled soap in 1 gallon of boiling water and spreading the hot solution over the surface, care being taken that it does not lather. After it has been allowed to dry 24 hours a solution formed of ¼ pound of alum dissolved in 2 gallons of water is applied in a similar manner over the coating of soap. The soap and alum decompose each other and form an insoluble varnish which the rain will not penetrate. Another method of accomplishing the desired result consists in using sulphurized oil as a varnish or paint, and this will tend to preserve the brick work as well as to improve its color. The solution is prepared by subjecting eight parts of linseed oil and one part of sulphur, placed in an iron vessel, to a temperature of 278 degrees. This, it is claimed, will keep out both air and moisture and prevent deposits of soot and dirt when applied to the surface of either brick, stone or wood.

IT is reported that Henry Phipps, the Pittsburgh steel magnate, will shortly announce donations of $1,000,000 for a model tenement in Philadelphia and a similar sum for the same purpose in Pittsburgh. The buildings will, it is said, be similar to the one he is about to give to New York City.

## Materials Used in the New Times Building.

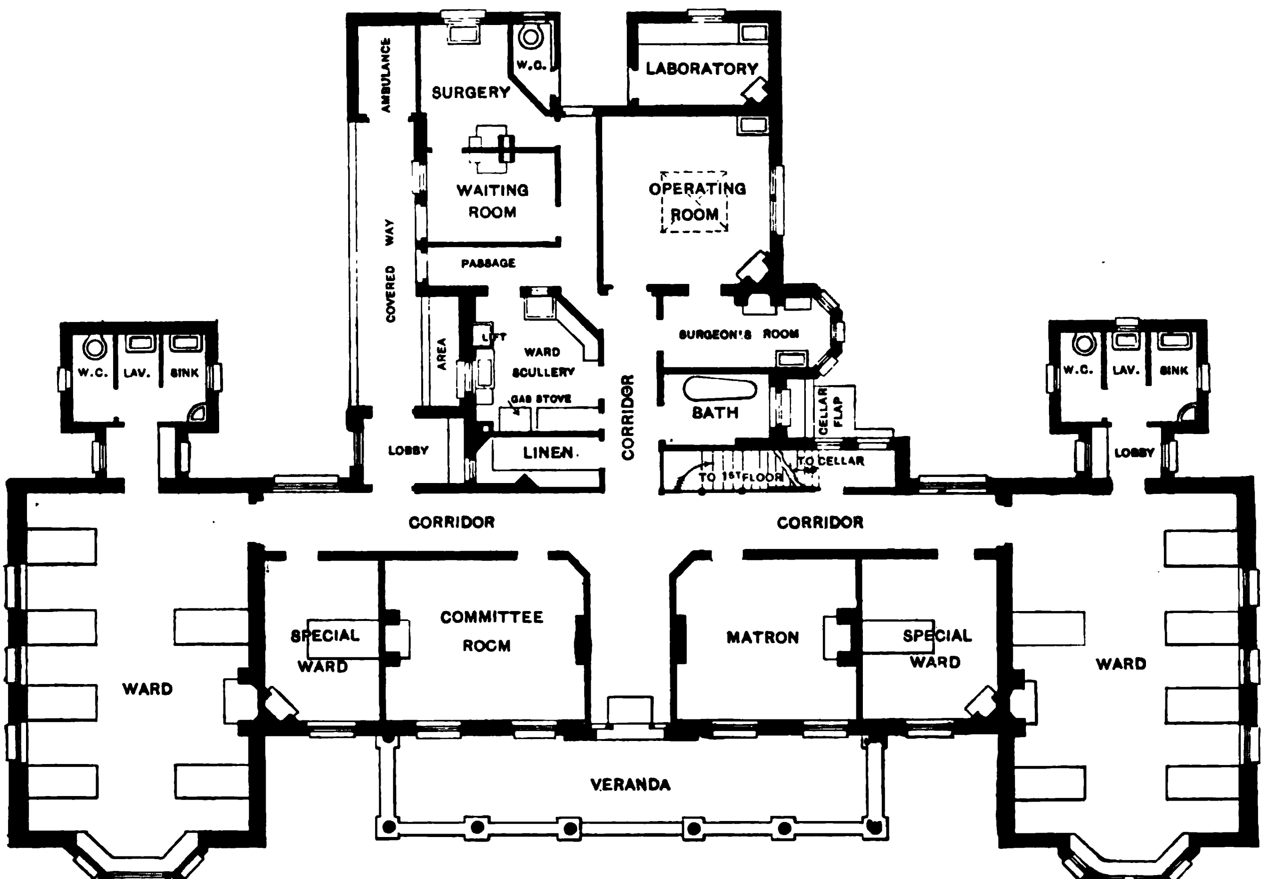
Supplementing what we have already published in these columns regarding the new building recently completed at Broadway and Forty-second street, New York City, for the *Times*, the following table will be found of particular interest, showing as it does the weights of some of the materials entering into the construction of the building:

| | Pounds. |
|---|---|
| Structural iron | 7,424,000 |
| Brick | 19,430,000 |
| Cement and mixed mortar | 14,662,000 |
| Plastering | 2,214,000 |
| Ornamental iron | 500,000 |
| Terra cotta | 3,662,000 |
| Wood | 1,472,000 |
| Sand | 2,364,000 |
| Marble | 630,000 |
| Terra cotta arches, partitions, &c | 5,024,000 |
| Electrical conduit, &c | 622,000 |
| Heating and plumbing | 700,000 |
| Vault lights | 84,000 |
| Sidewalks, fill, &c | 146,000 |
| Cinders | 616,000 |
| Air sweeping system, risers and outlets, mail chute and box, pneumatic tubes | 28,000 |
| Hardware, sash weights, &c | 69,000 |
| Limestone | 2 700,000 |
| Granite (ashlar only) | 390,000 |
| Roofing, tile and skylights | 94,000 |
| Glass | 56,000 |
| Elevator guides, sheaves and cars | 68,000 |
| Kalamein iron frames and sash | 80,000 |
| Rubble masonry in back fill, exclusive of 2,360,000 pounds of cement | 14,888,000 |
| Contents, including machinery, water in tanks, furniture, &c. (estimated) | 5,000,000 |
| Total | 82,923,000 |

A noteworthy feature in the structural work is the use of what is said to be the heaviest girder for its span that was ever used in an office building. This is the lowest girder across the short north end of the building and carries the weight of the north wall. It is 5 feet high and about 3 feet wide, weighs 30 tons and is composed of three built up I-beams. The load which it sustains is estimated to be 3,097,000 pounds. The structural steel used in the building is calculated to be about 46 pounds per square foot of floor area, or about 1 ton per 600 cubic feet of contents.

The ornamental iron work used in both the exterior and interior of the building adds much to its attractiveness. On the outside are the decorative framings, mullions, windows and doors on the ground floor, the window framings above the twelfth story and all of the railings protecting the sidewalk entrance to the basement, and inside are the stairway railings and elevator inclosures, both of which are distinctive because of their beautiful grille work. All of the show windows downstairs are set in iron, and the decorative cornices in each case are most artistic On the exterior of the upper floors of the building, where the windows form an especially large portion of the wall surface, the ornamental iron framings and decorative mullions form an attractive feature of the architecture. The iron work on the ground floor and the railings outside of the building are electro-bronze.

Electricity is used for numerous and various purposes in the building, involving wiring systems comprising some 74 miles of wire and 21 miles of conduit. There are 109 electric motors, with a combined capacity of 1175 horse-power; 2441 outlets for lights, 257 outlets for telephones and 246 outlets for other purposes. There are 6205 incandescent lamps used, 15 arc lamps, 26 mercury vapor lamps and various other means of light, such as vacuum, glower and search lamps and lights used in signs and bulletin service. An electric fan in the basement, connected with each room by pipes, is used for drawing all dirt or dust from floors or walls. Instead of sweeping, the cleaners use special devices operated with hose for drawing dirt into the pipes and taking it to the basement.




Main Floor Plan.

*An English Cottage Hospital.*

THE RITER-CONLEY MFG. COMPANY, Pittsburgh, Pa., received February 7 an order from Mexico for a steel building 50 x 200 feet, 40 feet high. It was on its way February 11. The steel had to be assembled from the mills and fitted for erection, making a record piece of work.

# WHAT BUILDERS ARE DOING.

REPORTS from leading centers indicate a degree of activity in the building trades which contrasts sharply with the conditions existing a year ago at this season. In nearly every instance the figures indicate large gains, the exceptions being Atlanta, Buffalo, Chicago, Omaha and Minneapolis. While there are evidences of friction between employer and employed in some localities, yet all indications point to an early adjustment of the differences existing and that by the time the spring season is fully opened work will be running smoothly.

### Buffalo, N. Y.

Notwithstanding the continued high price of building material, the outlook is that Buffalo will enjoy a building boom of considerable proportions during the coming spring and summer. A great deal of property is being improved, especially in the Twenty-fourth, Eighteenth and Fifth wards. There is also a good deal of building, present and in sight, in the other wards, but not so much as in these three.

The annual meeting of the Buffalo Builders' Exchange occurred on January 30, when retiring President C. B. Jameson gave a brief report covering the workings of the association. He showed the exchange to be in a flourishing condition, pointing out that the most satisfactory thing in connection with the organization was that the membership to a man stood united on any question or issue that might arise.

An extract from the report of the secretary, Jas. M. Carter, follows:

"The question is so often asked, 'What do we get out of a membership in the Builders' Exchange?' Now, as we have reached the close of the fiscal year, I ask you to bear with me for a moment and review some of the doings of the exchange for the past year.

"The exchange in January entertained the New York State Association of Builders. This association has an attorney in Albany all during the legislative period, and this attorney at our last meeting reported that he had examined 2379 bills submitted to the two legislative houses the past year; of this number 61 bills directly affected the building trades. Of this latter number not one became a law, this fact being almost entirely due to the opposition of the Builders' Exchange organizations of the State, our own exchange being no mean factor in the opposition fight. The exchange assisted the master electricians when their men were out on a strike extending from January 1 to March 8, and also assisted the master masons when their men were out from May 1 to June 21. In both cases the workmen demanded an advance in their wage scale and in both instances the men lost the strike, due entirely to the fact that the master employers connected with the suborganizations of the exchange stuck together and refused the men's demands.

"The co-operation could not exist without exchange organizations. While you may not consider our labor conditions here oppressing, bear in mind this important fact—they would be decidedly worse were it not for the fact that the local exchange does control the labor situation. Is it not wise to support the exchange, realizing full well one ounce of prevention is better than a pound of cure?

"As regards the exchange membership, while our organization is not the largest in the country, I believe there is not one doing a more conservative, consistent work. Our membership has increased 19 the past year, this alone increasing our revenue $730, as shown by the finance report. We are in fair financial condition, having over $2000 in the treasury, with no bills of any type or kind unpaid.

"As regards the future of the exchange, that lies with you, its members; it is your organization. The questions is, How are you going to use and direct its power?"

Retiring President C. B. Jameson was presented by the members of the exchange with a handsome leather chair and table as a token of appreciation for the faithful, honest labor he had expended in behalf of the association the past year.

After the business session the members adjourned to the Ellicott Club, where a banquet had been prepared.

### Duluth, Minn.

The members of the Duluth Builders' Exchange held their second annual dinner at the Commercial Club rooms on Saturday evening, January 28, when covers were laid for nearly 170, the guests including a number of local architects, civil engineers, contractors and building supply men, as well as some of the officers of the State Association and of the local associations of the Twin Cities and Winnipeg. The *menu* consisted of eight courses, during the consideration of which patriotic and popular airs were rendered by an orchestra stationed in the annex dining room. About the head of the table were draped the American and Canadian flags, the latter in honor of the guests across the line. After the good things provided for them had been duly considered President J. F. Schleunes of the Duluth Exchange extended a cordial welcome to the guests of the evening and introduced as toastmaster W. E. Magner.

The first speaker was Mayor M. B. Cullum, who in behalf of the city extended a welcome to the visitors from the Twin Cities, Winnipeg and Superior. He was followed by President J. W. L. Corning of the State Association of Builders' Exchanges, who referred with pleasure to his visit a year ago and claimed that some good work had been accomplished by the State organization during the past year, although it had been obliged to contend with many obstacles. President J. F. McGuire of the St. Paul Exchange toasted his local organization in a way which demonstrated that the St. Paul members have reason to be and are proud of their exchange. He characterized the St. Paul Exchange as the father of the Minneapolis and the Duluth exchanges, an organization of 176 firms and corporations and about 320 individual members. He claimed that the secret of all the success of the exchange was the loyalty of its members and paid a high tribute to the efforts of A. V. Williams, the energetic secretary, in building it up. President G. W. Higgins responded in behalf of the Minneapolis Exchange, and stated that he brought the greetings of that organization and invited all to the State convention to be held in Minnneapolis February 28. President G. W. Murray of the Builders' Exchange at Winnipeg, Canada, gave a pleasing talk interspersed with humorous stories, and then in a more serious vein referred to the wonderful growth and prosperity of the Canadian metropolis in the past few years. Howard Thomas, city engineer of Superior, responded for the "Interests Across the Bay," after which T. W. Hugo responded to the toast "The Mechanical Engineer in Modern Building." The speaker dwelt upon the necessity during the present age of large buildings of consultation with the mechanical engineer in order to obtain the most economical returns from the power plants. W. A. Elliott of Minneapolis was assigned the toast "As You Please," after which Secretary A. V. Williams spoke of the State Association of Exchanges, its growth and prosperity and what it has accomplished. "At the present time," he said, "the State Association is represented by 436 firms, or more than 700 individuals. Within the last year 18 new local exchanges have been established in the State." F. L. Young responded to the toast "Architects; Their Work and Influence Upon Civilization." He spoke most interestingly on the subject, pointing out that a really successful architect is deserving of the highest honors within the gift of the public. Architecture records a true history of the people and races of the earth to a degree that no other profession approaches. Mr. Young took up successively the old Egyptian people and styles of architecture, the Greek and their curved lines of architecture, telling of a nation of life and given to art; the Roman architecture, expressing vigor, militarism, commercialism and sport, and the Romanesque, telling of the revolt against paganism and reaching its climax in the pure Gothic style. James R. Quigley, the veteran contractor, had for a toast "Specified Alternates," and in his remarks he deplored the tendency of the owner and architect to shift the responsibility of the specified alternates onto the contractor and urged that the architects should do the figuring. He made a plea for fair prices the coming season and urged the builders to remember that they have their share to do in building up the reputation of the city. Z. D. Scott briefly responded to the toast "Shavings," during which he dwelt on the economical tendency of the times in the saving of by-products of the mills. Architect W. A. Hunt responded to the toast "A Court House While You Wait," telling some good stories bearing on his points. Hugh M. Todd was the last on the list of speakers and toasted the local exchange.

During the intervals between the speeches a number of delightful selections were rendered by the Orpheus Quartette. The banquet was arranged by a committee consisting of H. R. Armstrong, M. A. Thomson and L. D. Campbell, while the Reception Committee was made up of H. A. Hall, J. A. Clarey, H. M. Todd, W. F. Quayle, William Penn, Robert Freeman, H. D. Bullard, Frank Carlson, E. J. Zauft, C. E. Evens, D. R. Black, Charles Baxter, G. V. Burgess and L. R. Helbing.

### East St. Louis, Ill.

The East St. Louis Builders' Exchange at its annual meeting elected the following officers to serve during 1905: President, C. H. Way; first vice-president, Charles Guenther; second vice-president, Frank Keating; secretary, Charles Broderick; treasurer, A. Anderson, and sergeant-at-arms, A. Hunter. A special committee, composed of C. L. Gray, E. C. Hamler and A. Anderson, was appointed.

### London, Ont.

The annual meeting of the Builders' Exchange was held on Monday afternoon, January 16, when steps were taken toward establishing a central or provincial association. The treasurer's report showed the finances of the exchange to be in a healthy condition, with a comfortable cash balance in the treasury. It was decided to hold a banquet in the near future. The meeting was well attended and from the opinions expressed a very active season is expected as soon as the weather will permit of operations.

The retiring officers were re-elected for 1905, as follows: President, Henry Stratfold; first vice-president, George C. Young; second vice-president, James S. Luney, and secretary-treasurer, George S. Gould.

### Minneapolis, Minn.

The new year starts out with flattering prospects and with indications that more buildings of heavy construction will be erected in 1905 than was the case during the 12 months of either 1903 or 1904. During the past year there were 2058 permits issued for new buildings, estimated to cost $5,416,495, as against 1799 permits for new buildings in 1903, costing $4,822,235. According to the figures of James G. Houghton, Inspector of Buildings, there were 2408 permits issued for alterations and repairs calling for an outlay of $1,285,470, while in 1903 there were 2350 permits for additions and repairs costing $1,388,512. Including the permits granted the past year for house moving, plumbing, electric work, &c., the number reaches a total of 10,892, calling for an estimated outlay of $7,820,040, while the grand total in 1903 was 7986, calling for an outlay of $7,732,799.

### Montreal, Canada.

According to the City Building Inspector the year just closed was one of unusual activity in the building line, especially in the way of dwellings. As compared with 1903 the value of the buildings showed a decrease, but this was owing to the big work in connection with the new Angus shops. Then, again, there were no less than seven new office buildings put up that year, while in 1904 there were only three. Mr. Chausse, City Building Inspector, predicts that the present year will witness even more building than has been the case in the past. During the year just closed the value of building operations in the city was $3,643,181 and the number of permits issued was 1328, while in 1903 the value of the improvements was $3,948,733. With the exception of the latter year and that for 1887, the amount of building done in 1904 was the greatest in the city's history.

### Newark, N. J.

The Master Carpenters' Association of Newark held its annual meeting Friday evening, February 3, one of the most interesting features being the presentation to Henry J. Schaedel, the retiring treasurer, of a large mahogany clock as a token of the appreciation in which his services for the last eight years were held. President George Varley in his presentation remarks spoke of the good work that the treasurer had done and that the members felt that they should give him some token of their friendship. James Shaw also made a few remarks in the same strain. Mr. Schaedel surrenders the office of treasurer because it is his intention to retire altogether from business activity. The members, however, decided to elect him an honorary member of the association.

The election of officers for the ensuing year resulted in the selection of George Varley, president; Frederick Kilgus, first vice-president; Charles T. Day, second vice-president; A. J. Crowder, corresponding secretary; E. P. Harrison, financial secretary, and E. H. Harrison, treasurer.

The annual election of the Builders' and Traders' Exchange of Newark was held at the Exchange Building on Clinton street January 17, resulting in the re-election of the following officers: President, Albert C. Courter; vice-president, Hugh Kinnard; secretary, J. Howard Parker, and treasurer, John J. McGrath. The old Board of Directors was re-elected, the vacancy caused by the death of George Clark being filled by the election of William J. Hughes.

During the business session Secretary Parker presented his report, showing that the organization was in a most flourishing condition and had added 15 new members to the rolls during the year and lost two through death.

Prior to the election a dinner was served at which covers were laid for about 150. An orchestra rendered some choice numbers while the *menu* was being considered, and songs were sung and stories told, so that the affair was thoroughly enjoyable in every way.

### New York City.

The year is opening with very flattering prospects, notwithstanding the friction which exists between certain interests identified with the building business. The plans which have been filed with the Building Departments of Manhattan and the Bronx since the first of the year, taken in connection with statements of contractors in these boroughs, indicate that 1905 is likely to witness a record breaking volume of operations. Present indications seem to point to the erection of a large number of flats and tenements, of which during the past two years there has been a decided dearth, this accounting in large measure for the higher rentals which have occurred in that period. In the Borough of the Bronx especially the unprecedented activity of the last year seems likely to continue, Superintendent P. J. Reville of the Bureau of Building expressing the opinion that notwithstanding the fact that building operations aggregated fully 150 per cent. more in 1904 than were ever before recorded in a similar period in that borough the current year will probably witness a great increase over those figures. In the Borough of Brooklyn the outlook for a peaceful spring season in the building trade is promising, and while a tremendous amount of work was done last year, it is felt that the number and value of operations will be even greater in 1905. Builders will be called upon to sign annual agreements with several unions on May 1, but no trouble is expected in making the necessary renewals.

At the annual election of officers of the Mason Builders' Association in Manhattan Thomas M. Weeks, one of its oldest members, was made president, he succeeding Otto M. Eidlitz, who had been president for the past four years. Isaac A. Hopper, Superintendent of the Building Department, was made first vice-president; Andrew J. Robinson second vice-president, Charles A. Cowen treasurer and William H. Foster, secretary.

Some of the general building contractors in Manhattan who are opposed to the methods of the Building Trades Employers' Association recently held a meeting in the Cambridge Court, 142 West Forty-ninth street, and organized what is known as the Master Builders' Association of New York. The officers are John Sheehan, president; Nicholas W. Ryan, vice-president, and Samuel B. Walker, secretary. It was decided at this meeting to apply at once for a charter.

### Philadelphia, Pa.

A considerable amount of work is in progress in and about the city, notwithstanding the severe weather which has recently been experienced. The report of the Bureau of Building Inspection for the month of January shows that 326 permits were issued, covering 440 operations, estimated to cost $1,004,805, which is an increase of nearly $200,000 over the same month of last year. Of the total amount stated $213,000 was for new warehouses, $139,000 for two-story dwellings, $130,000 for a power house and $199,930 for alterations and additions. In the distribution of the work the Fifth Ward leads with $258,840 expended, followed by the Ninth Ward, with $156,680, and the Thirty-third Ward next in order, with $93,680.

At a meeting of the Master Builders' Exchange held on January 24 the following directors were elected for the ensuing year: P. S. Smith, Jos. E. Brown, John J. Byrne, J. S. B. Nagle, John D. Carlile, F. F. Black, William J. Collins, C. I. Leiper. At the annual meeting of the Board of Directors of the exchange, held February 14, the following officers were elected: President, Thomas F. Armstrong; vice-presidents, John D. Carlile, Albert A. Reeves and Cyrus Borgner; secretary, William Harkness, and treasurer, Henry Reeves.

### Rochester, N. Y.

The report of John A. P. Walter, Fire Marshal of the city, shows that the total number of new buildings to be erected during the past year was 812 and the total number remodeled was 238. The estimated cost of the new buildings is placed at $3,924,303 and the estimated cost of the remodeled buildings at $301,624, making a total estimated outlay of $4,225,927. In 1903 the outlay for building improvements was $1,853,571, as against $2,913,142 in 1902, while in 1901 the figures were $2,205,344. From the above it will be seen that last year was far more active in the building line than any of its immediate predecessors.

In the distribution of the work last year the largest number of buildings was erected in the Eighteenth Ward —133 new structures—the Seventeenth Ward coming second with 126 buildings. The largest amount expended, however, was in the Fifth Ward, where 25 new structures were put up at a cost of $681,708. In the First Ward ten new buildings were erected at a cost of $556,715.

### Sherman, Texas.

The Sherman Builders' Exchange was organized on February 1, with the following officers: W. T. Wylie, president; P. B. Stone, vice-president; Will Gill, secretary-treasurer. A Committee on By-Laws and Constitution, composed of Ed. Belden, Tol Chrisholm and J. B. Barrow, was appointed with instructions to report at the next meeting, when the organization will be completed.

### Toledo, Ohio.

For some little time past the members of the Builders' Exchange have been considering the question of larger and more commodious quarters, and while the proposition to erect a building of their own came up, it was finally decided best to lease space to meet the requirements of the organization. To this end the exchange has leased for a period of ten years the entire floor of the Smith & Baker Building, at the corner of Adams and Superior streets, a most central location, being one block from the City Hall, Post Office and County Court House and situated on one of the most busy corners in the town. It is expected that the new quarters will be occupied by March 1, and they will be fitted up in a way to render them among the finest for the purpose in that section of the country. The space to be occupied by the exchange is 100 x 120 feet in area, and will be devided into offices and business rooms designed especially for the organization. There will be a number of spaces for the exhibition of all kinds of materials entering into construction as well as of interest to those engaged in the different branches of the trade. It is the intention of the members to open their new quarters with considerable *éclat* and discharge of pyrotechnics, so to speak. The membership of the exchange is rapidly increasing and before the end of the summer is is the confident expectation that the present numbers will be doubled.

**Notes.**

The Master Carpenters' and Joiners' Association of the Oranges and Vicinity held its annual meeting about the middle of January and elected the following officers for the ensuing year: President, George P. Roberts; vice-president, Herman Woodruff; secretary, Alexander E. Pearson; financial secretary, James S. Anderson, and treasurer, Hennel Carhart. The trustees elected were Charles H. Taylor, Daniel Preiss and John Edwards.

## Meeting of the Wood Preservers' Association.

A meeting of men interested in timber preservation resulted in the formation in October last of what is known as the Wood Preservers' Association, and at New Orleans, La., on January 17 to 19 of the present year it held its first annual convention. A constitution was adopted, reports were presented and a number of papers were read and discussed. One of these, on testing creosote, by H. W. Jayne of the Barrett Mfg. Company, Philadelphia, Pa., summarized recent studies of creosote tests in the laboratories of that concern. Another paper, by J. C. Haugh, entitled "Twenty-five Years' Experience with Creosoted Timber and Results," dealt more particularly with creosoted pile trestles, and the opinion held was that timber cut in the winter months and timber cut from logs that have lain in the water for some months will give the best results in seasoning and durability. Other papers were read by E. S. Christian on "Heating Coils, Doors, Flanges and Valves," and by F. D. Beal of West Oakland, Cal., on "Seasoning and the Use of Saturated Steam." The following extracts may not be without interest at this time:

On the Pacific Coast we have a sap pine, which we term "Shasta Sap Pine," running 75 to 90 per cent. sap wood. On this class of material I think it would be policy to thoroughly air season before treatment, as this class of material when green contains a large percentage of sap water and wood liquids; also a large percentage of resinous, pitchy matter. By air seasoning a large amount of this liquid would be eliminated, which would shorten the process of treatment to a large extent.

But I think the process of seasoning should be carried further after the material has been placed in the cylinder, if for no other purpose than expelling the air in open cells, which would act as a resisting force against the injection of the preserving fluid. This of course can be accomplished by applying saturated steam, heating the timber thoroughly throughout, forcing all air out and any liquid remaining in the wood which would act as food for any destructive fungi; also killing all diseases peculiar to tree life.

On the Pacific Coast we have occasion to treat with the burnettizing process a large amount of Oregon red fir ties, which you all know to be a firm, close grained wood. In allowing these ties to air season the resinous matter becomes congealed and so hard that we find difficulty in dissolving this matter in order to allow our solution to penetrate readily. To do this the steaming has to be carried to such an extreme that as a result the material is practically burned up and worthless. We found that we obtained much better results by treating these ties green; steaming them for three to four hours, and not allowing the temperature to exceed 280 degrees F., thus eliminating the resinous matter (which is to a certain extent in liquid form while the wood is green) much easier than if it had been allowed to harden by air seasoning.

**The Steaming Process.**

Good results are being obtained by using the steaming process, especially on the more open grained, spongy woods; but in treating the denser woods, such as Oregon pine, red fir, &c, the steaming proposition has proved to be a complete failure when it is applied to large dimension timber and piling in the creosoting process. On account of having to be carried to such an extreme in order to thoroughly sterilize and remove the sap moisture and other destructive matter in the wood the strength of the material was so reduced that it was practically worthless.

There are a great many concerns using the steaming and vacuum process on these denser woods by using a limited amount of steam and then injecting the preservative. When applied in this manner good, lasting results will never be obtained, for the moisture and destructive agents contained in the wood have not been removed, and the consequence is that the center of the material decays, leaving an outer shell of treated wood. the thickness of the depth to which creosote oil or other preservative liquid has penetrated.

It has been found by long experience in treating these denser woods that most perfect results are obtained by carrying on seasoning similar to Boulton's method of boiling the timber or piling in creosote oil, and improvement being made in the process by cutting out the operation of a vacuum pump and simply allowing the vapor to come off of its own accord, discharging into a surface condenser through which cold water is circulated, thus creating its own vacuum by the elimination of sap and moisture contained in the timber. In this manner by carrying a lower temperature, say, 212 to 220 degrees F., all the moisture can be extracted, the wood thoroughly sterilized throughout, and one of the most important features of all—the exact dryness of the material—can be ascertained by the amount of condensation collected in the hot well of the condenser, as all condensation collected represents moisture from the wood alone and is not mixed with condensed steam, which would be the case when saturated steam was used in seasoning. The length of time required is no greater than when treating with a steaming process, and on some classes of material the time of treatment runs considerably less.

There is one important feature in connection with seasoning timber in the above manner in instances where close grained, firm, hard woods are what we term "water seasoned," and that is, the natural sap and moisture have been displaced by water absorbed on account of piling lying in the water in rafts for a long period. Ordinarily it takes a long time to extract this water, especially when piles run in large diameters. I have treated some of this class of material when the time of extracting the water alone was 75 hours on a single charge. After remaining in this condition for so long a time one would naturally suppose that the life would be taken completely out of the wood, but quite the contrary is the case. The piles come out in perfect condition, with hardly a sign of checking or cracking in any manner, and with nearly as much life and elasticity in the wood as before treatment.

The constitution which was adopted by the association provides for two grades of members—corporate and associate—the former including only executive or technical officers of timber preserving plants. The secretary of the association is C. W. Berry of Laramie, Wyo. The next meeting of the association is to be held at Chicago, beginning January 19 of next year.

## New Publications.

**Plank Frame Barn Construction.**—By John L. Shawver. 34 pages. Size, 5½ x 8 inches. Numerous illustrations. Bound in board covers. Published by David Williams Company, 232-238 William street, New York City. Price, 50 cents, postpaid.

This little work, as its title indicates, relates to the construction of barns and other buildings according to what is known as the plank frame system, with which the author has been more or less prominently identified for many years past. The matter was originally presented in the columns of *Carpentry and Building* in response to continued requests for information concerning the plank frame system of construction, which has been growing in popularity in various sections of the country, more particularly, perhaps, throughout the Central West. In the course of his articles the author points out the advantages of the form of construction referred to and describes wherein there is a saving of time, labor and material—an important consideration, especially in sections of the country where timber for building purposes is not in plentiful supply. In concluding his series of articles Mr. Shawver invited the friendly criticism of practical builders, to the end that suggestions might be offered which would lead to further improvements in the form of construction described. In response to this invitation questions were raised touching the bracing of a basement barn built in accordance with the system named, the application of the system to a skating rink,

&c., all of which were discussed at some length by the author. These matters are contained in the work under review and constitute an interesting contribution to the literature of the subject.

**Hand Book of Sanitation.** By George M. Price, M.D., Medical Sanitary Inspector, Department of Health, New York City; 300 pages, 5 x 7½ inches; 28 illustrations. Published by John Wiley & Sons. Price, $1.50.

This book is written to meet the needs of inspectors in sanitary, tenement house and plumbing lines, but it will also be useful to the plumbing student of sanitary problems. Much of the information compiled is the result of the author's practical experience in tenement house work in New York City, with full knowledge of construction and other details gained while serving on the Board of Model Tenement House Commission of the New York Tenement House Company as manager. The book is divided into four general sections. The first deals with sanitary science and takes up the fundamental problems, such as soils, building sites, air, ventilation, necessity of warming, water supply, &c., considered from a medical standpoint. Sewers, the disposal of sewage, with the general principles of plumbing and house drainage, considered from a sanitary standpoint, are treated in the second part. The third section deals with sanitary apparatus and is written more particularly for the benefit of sanitary inspectors. Some chapters of this section, however, would be of benefit to the heating engineer, especially the matter regarding the ventilation of factories and tenement house construction under the new building law of New York City. The fourth part deals with the subject from a medical standpoint, taking up infection and disinfectants, chemical solutions and practical disinfection. The latter portion of the book contains questions from civil service examinations in New York City relating to the positions of food inspector, inspector of tenements and inspector of plumbing, light and ventilation. A practical chapter at the end of the book is devoted to calculations of areas, with tables of weights of different substances, discharge of water and other useful information.

## Building in Cuba.

They have a hard time of it in erecting buildings in Santiago, owing to the fact that many workmen are serviceable on an average four, sometimes only three, days of the week. The following is, almost word for word, the statement made by an architect of Santiago, who is at present erecting a number of important buildings, and consequently employs large squads of men: "The great drawback in building is lack of reliable hands and the frequent stagnation of work. The laborers themselves live like beasts, and have few needs outside of their drink. When payday comes around my paymasters are beset by the men's wives, who put in a timely appearance, and try to get their husband's pay so that the family will not starve. As I am usually obliged to pay the husband, who does the work, the result is likely to be that he spends Sunday in drink; Monday (known as San Lunes or Holy Monday) likewise; Tuesday is needed for partial recuperation; on Wednesday the men either work in a half hearted fashion or return home to fetch some forgotten tools and stay there. If it rains I can't count on them even for indoor work, and the only days on which solid work is done are, therefore, the remaining three. Their belongings, and frequently those of others, are usually in the pawnshops. My work is further hampered by a scarcity of skilled workmen. But the greatest nuisance is the large number of holidays." The *Mercurio* of Santiago says that from January 1 to May 22 (the date of the article) the work on the harbor was suspended 89½ days, or about three months out of four months and 20 days.

WE have received from the secretary of the National Sculpture Society a brochure entitled "Art as an Educational Force and a Source of Wealth." The printing is on fine paper and the engravings are direct reproductions from photographs of buildings and art work in Paris, Vienna, Berlin and Florence. The text tends to show the influence of art upon cities and nations, pointing out that while the function of a building should be manifest in the lines of its architecture, yet on sculpture and painting must it depend for the interpretation of its meaning and purpose to the people, and that in the accessories of our public buildings, quite as much as in monuments in our streets and public places, the great events of our history should be expressed in enduring form. A strong plea is made for artistic embellishment of public buildings and the society recommends that Federal and State legislatures and city councils enact laws and ordinances which will require that of the total cost of every public building a certain portion thereof be expended in historic art—sculpture and painting—including stained glass and mural decorations of all classes, and also that of the total cost of municipal government a definite, even though small, appropriation be devoted to beautifying the city by suitable landscape and monumental treatment of its parks and streets.

ECONOMY of space has of necessity been a matter of close study in buildings erected in New York City, owing to the comparatively limited area available on Manhattan Island. In this connection a plan recently approved by the Tenement House Department of the city is of interest. This plan provides for two flats on each floor of a five-story building, on a lot 16 feet 8 inches by 88 feet 11 inches. All the rooms in these flats have outside light, a well 63 feet 7 inches long by 6 feet wide being left on the side. This makes the rooms in the rear only 8 feet 8 inches wide. The bathrooms are 5 feet 8 inches by 4 feet, and contain an enameled bathtub, corner basin and closet complete.

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FRAME CARRIAGE HOUSE AND STABLE AT GREAT BARRINGTON, MASS.

W. J. STEVES, ARCHITECT.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.


DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
232-238 WILLIAM STREET, NEW YORK.

APRIL, 1905.

## Bringing the School to the Man.

It is estimated that more than 90 per cent. of the people in the United States have received or are receiving education reaching no higher than the primary or grammar schools. Out of every 1,000 men, women and children now attending school 948 are in primary and grammar grades, 39 in high and preparatory schools and only 13 in colleges, normal and technical schools. The struggle for existence is so keen that the great majority of men are forced to enter their callings without any special preparation, and once in, school days are over. The expense in time and money of attending a technical school is so great that only a favored or unusually determined few are ever enrolled in such institutions. Meanwhile the marvelous development and increasing intricacy of industrial life call for men of trained minds as well as skilled hands, and the few men thus equipped in each establishment forge ahead to positions of responsibility, while the rank and file are apt to remain as mere mechanics. The small enrollment in technical schools shows how hard it is to bring the man to the school. But a new force is at work in which the school is brought to the man. Nearly 1,000,000 men and women have been or are now enrolled as students in the technical correspondence schools of the country, and to each one is given the sort of instruction he requires for his advancement in his daily labor without interruption to his work. Such men study during their evening hours with a definite purpose in view. They learn more about the theory and practice of their work that they may earn more. In doing this they become possessed of the secret of success—namely, that their futures lie, not with unions or a socialistic government, but with themselves. The habit of self-development, the new impulse of looking within for strength and help in time of perplexity and need, and the consciousness of the ability to bring a trained mind to the aid of trained hands, are developing a new race of engineers and mechanics whose influence for good is almost incalculable. Up to the present time these home study courses in practical work are carried on only by private institutions or in connection with two or three great colleges; but the benefits are so great to both employer and employed that employers' associations in each trade or industry should give earnest consideration to some plan of offering to every employee home instruction supplemented by shop practice. Better still would be the results if the trade unions could be brought to see that the greatest good they could do to their members would be their education along practical lines—practical courses in instruction leading up to diplomas which would advance their holders to higher and higher grades on the union rosters and to better pay in the shop. A union card backed by such a system would be a *sesame* to the shop of most wide awake employers, and the competitive demand for men of the higher grades would insure higher wages for good men than the unions will ever be able to force on employers by present methods.

## Reading of Technical Papers.

The demand for technical papers in the reading rooms of public libraries has increased very much during the past few years, many librarians having evidently realized the fact and encouraged it by the addition of more standard publications, including domestic and foreign, which are read much more than would be expected at first thought. In a few instances, in the larger cities, separate reading rooms have been established for this class of periodicals. A study of those who use the technical journals reveals interesting conditions as to the class of people who accept the opportunity offered them. Some are engineers by profession who wish to keep up with the times by the systematic reading of the latest ideas in their lines. But the majority of the readers have not had the advantages of the higher education and are mostly young men from the shop. They read deeply and apparently with understanding. It is with them no cursory glancing through the pages. Many articles are beyond them, because of the ultra-technical vernacular or mathematical discussion which may require, as a basis of understanding, a liberal education. But, excepting such articles, the intelligent and interested young mechanic or draftsman gets pretty nearly the meaning of discussions and descriptions and profits much by them. In some instances librarians appear to have overlooked this important class of literature, and a reading room completely stocked with magazines has only a small quota of technical journals. They are missed by a great many people, and many more would miss them had they ever had the advantage of a properly balanced reading room. The educational result of such reading to young men, whether in the building business or some other line, cannot be overestimated. It is in a sense a technical education itself, and, which is very important, is a constant source of stimulation and even inspiration. If a man reads the literature of his profession or trade he does not get into a rut from which, later on, it will be difficult for him to escape. It is, like travel, broadening as well as educating. Some large employers of labor have realized this and have provided reading rooms where their employees have access to the technical and trade papers, knowing that good results must follow.

## Politics in Trade.

The history of the world in all ages records that the business tradesman and his customers have been forced to pay tribute where none is earned. In many instances this is due to the fact that in devoting their entire attention to their own interests the people and the tradesmen have overlooked the necessity of being eternally vigilant in order to keep free from the levies of the politicians. No small expenditure of energy is necessary and all of the means available must be utilized to frustrate the insidious designs of those who would live without work. That occasionally the populace will arise is true not only of ancient Rome, but also of the busy city of New York. A substantial protest has recently been brought to the attention of the building department of the city by the plumbing trade, both wholesale and retail. At various times office holders have favored the productions of some of their friends in their rulings, but apparently at the present time too many different specialties are being favored; hence the protest. When any department makes a ruling in favor of some special device the whole trade is of necessity forced to use this device in work, regardless of its suitability for the purpose, its efficiency as a device, its quality or its cost. In one instance a prominent politician is pointed out as using his influence to bring the inspection of the plumbing in every building in the city under the control of a single company, capitalized for a large amount, and doing away with methods of tests by apparatus which have been in use since the modern plumbing system has been recognized as a necessity. These are not the only offenses. Another company manufactures a device which is marketed at a price far above that at which equally good articles for the same purpose can be secured. This device, however, is not so universally necessary as another device which has been carefully guarded from publicity, but which has been gradually insisted upon by the officers of the people. It is claimed that the chief of the department is not so active in the enforcement of the use of these special devices as some of the men to whom the carrying out of some of the departmental details is intrusted. The practice at the present time is at variance with that which was followed under former department heads and is sufficiently objectionable to have had the American Institute of Architects and the Association of Master Plumbers unite in the effort to have standard articles brought to the attention of the departments and passed upon, so that they may be used rather than to maintain a monopoly for the benefit of politicians.

### Burning Garbage.

A garbage crematory on a small scale is to be erected in New York City in the near future, which promises to be of interest not only to municipal sanitary and heating engineers throughout the country, but to the general public as well. The proposed schème in New York is to take garbage from the streets and houses, burn it and utilize the heat energy to light the streets and public buildings. A similar plan has been satisfactorily used in England for some time. This is no more than utilizing a waste product, as do many manufacturing establishments. Formerly the by-products of many manufacturing establishments were thrown away or, if that was impossible, disposed of at a considerable expense. Now, due to inventive minds and scientific research, almost every manufacturing establishment sells a portion of its by-products for a goodly sum. The city scheme is analogous to the manufacturers' present procedure and from the economic standpoint is founded on a sound business basis. From a sanitary standpoint it is vastly more desirable to dispose by fire of organic matter that would decay and putrefy than by filling in vacant lots or spreading it over the harbor to disseminate germs of disease or become a nuisance from offensive smell. Another view which undoubtedly will appeal to a few is the æsthetic side. It is very distasteful to have "my lady's" victoria stand in front of the apartment house by the side of a garbage wagon loaded with all sorts of ill smelling things, tin cans, old mattresses and other unsightly material. While the last two reasons will not appeal to the business man, still they are founded on fact and if generally known the new project would have many supporters from these reasons alone. All this is very good, but the question arises, Why not go to the root of the evil and destroy the house garbage at the first available opportunity, in the basement of the hotel or apartment house? There are a number of garbage crematories now on the market designed to destroy the garbage and at the same time heat the water for domestic uses with a much smaller expenditure for coal than would be otherwise required. Hot water is a necessity at all seasons of the year in the up to date New York habitation, be it private dwelling, hotel or apartment house, and the daily accumulation of garbage will supply a large portion of the fuel necessary for this service by using proper facilities.

## New Trinity Office Building.

(*With Supplemental Plate.*)

An excellent example of the steel skeleton frame construction which has become so popular at the present day in connection with lofty and massive buildings is the new structure nearing completion in lower Broadway, New York City, adjoining Trinity Church yard, and illustrated on the supplemental plate which accompanies this number of the paper. The building is unique in many respects, but what will probably first strike the attention of the practical builder is its hight and depth as contrasted with its width. It has a frontage on Broadway, which is the thoroughfare immediately in the foreground, of a trifle over 41 feet, while its depth is 264 feet and its frontage on the street in its rear is 47.3 feet. When completed it will be 20 stories in hight, not counting the six-story towers which will surmount it at each end. The building was designed by Francis H. Kimball, who also drew the plans for the Empire Building, which borders Trinity Church yard on the south side and a little lower down on Broadway. According to his estimate the cost will be in the neighborhood of $1,250,000. An examination of the half-tone picture, which was made directly from a photograph taken specially for our purpose, will show that the masonry work is being carried up simultaneously from two levels, a practice quite common at the present day whenever it becomes necessary to hasten the work in order that it be completed within the stipulated time. The picture also shows numerous derricks in position for hoisting the materials to the various stories and the manner in which the apparatus is supported.

A study of the lower stories indicates the style of architecture which will prevail, the idea being to make it somewhat in harmony with that of Trinity Church, which for years has been a landmark of the metropolis and an object of deep interest to visitors from all parts of the country. It may not be without interest to mention that the new Trinity Building stands upon the site occupied by the old Trinity Building for a period of 50 years, it having been put up in 1853 from plans prepared by Richard Upjohn, who also designed Trinity Church.

## Concrete Chapel for Naval Academy.

The extensive improvements which are in progress at the Naval Academy at Annapolis, Md., include a chapel in the construction of which concrete is largely employed, and to cost in the neighborhood of $400,000. In outline the chapel somewhat resembles a Greek cross, with the main floor in a circle and wings extending on each side, giving an interior width of 116 feet 8 inches on a line with the transepts, while the outside width of the structure is 130 feet. The dome which surmounts the building is 69 feet in diameter and rises to a hight of 210 feet above the level of the sea. One cupola of the dome forms the ceiling of the chapel, which is 110 feet above the main floor and a second cupola, which is 33 feet 7 inches above the first, supports a lantern 48 2-3 feet high.

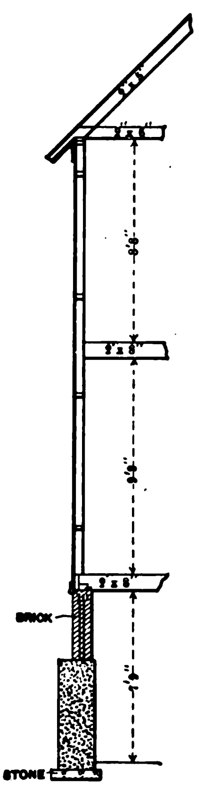
The exterior wall of the building is double, the outer portion being 18 inches thick and the inner 12 inches thick, with an intervening space of 12 inches. The outside walls are of granite and white glazed brick with Caen stone for the inside walls, while the main floor is ferro-concrete, covered with Indiana limestone. Eight concrete columns support the dome, while the arches of the transepts are supported by the same number of smaller columns. The ferroconcrete arches and cupola are from 5 to 8 inches thick, the necessary rigidity being secured through the steel reinforcement.

# COMPETITION IN $3500 HOUSES.

## FIRST-PRIZE DESIGN.

THE Thirty-eighth Competition, which has just been decided by the committee having charge of the drawings submitted therein, bears striking testimony to the widespread interest manifested in contests involving houses of moderate cost. The responses to the invitation, as outlined in our issue for December last, were of a most generous nature and represented a territory extending from the Atlantic on the east to the Pacific on the west and from and including Canada on the north to Georgia on the south. It is gratifying to note in connection with the studies presented in recent competitions a steady tendency toward a higher order of merit, thus clearly demonstrating the educational nature of which the contests partake. As a general thing most of those competing observed a strict compliance with the conditions as have brought the cost above $3500, while in two instances the authors submitted figures which were in excess of that sum, but stated by way of explanation that they thought the house could be built for less.

After the drawings had been examined by the committee with a view to eliminating such as did not in all respects comply with the conditions of the contest, the remaining studies were very carefully considered in every detail, both from the standpoint of architectural merit and that of cost of construction, with the following results: The first prize of $150 is awarded the set of drawings bearing the designation "231" inclosed in a double circle, and submitted by John P. Kingston, 518 Main street, Worcester, Mass.; the second prize of $100 is given to the study entitled "A Stranger," and submitted by




Section.

Front Elevation.—Scale, ⅛ Inch to the Foot..

*Competition in $3500 Houses.—First-Prize Design.—John P. Kingston, Architect, Worcester, Mass.*

described in detail in the December issue, but a few destroyed any possibility of their securing a prize through failure to meet all the requirements. In some instances the name and address of the competitor appeared upon the drawings and specifications, in direct violation of the stipulated conditions, while in other cases an estimate of cost in detail was lacking, although figures in the aggregate were given under the headings specified. In the case of one set of drawings the sealed envelope with the name and address of the author was lacking, which, of course, destroyed his chances of obtaining a prize, even though his study had been adjudged among the best of those submitted.

What was wanted in this contest were, as stated, houses of attractive exterior and convenient arrangement, which should be thoroughly up to date in all their appointments and not cost in excess of $3500 in that part of the country from which the drawings were sent. In their efforts, however, to make as fine a showing as possible, some submitted designs which obviously could not be fairly executed at a figure within the limitations of the competition. Studies were found where important items had been omitted and which, if included, would

Delbert P. Slitor, 133 South avenue, Penn Yan, N. Y., while the third prize of $50 goes to the study designated by a single gilt star, the author of which is C. A. Wagner, 89 Jersey avenue, Port Jervis, N. Y.

The contest for third prize in this, as in some of the other competitions, was interesting in that there were several candidates which made strong claims for the honor. The final decision was reached by carefully considering the good and bad points of each and weighing one against the other. The "gilt star" proved victorious, although the author of the drawings submitted under the designation "D-I-C-E-" was close behind and would doubtless have secured the prize had his bathroom been located over the kitchen rather than directly over the dining room. While not entitled to a prize the drawings are worthy of "Special Mention," and in this list we would name "Exemplum," "Swiss," "Flemish," "Northwest" and "A-D." Some of these are of such a nature that we hope to be able to present them to the attention of our readers in the not very distant future.

We take pleasure in presenting herewith the drawings awarded the first prize under the conditions of the contest, and at the same time we are gratified to be able to give an excellent likeness of the author, thus enabling the many readers interested in his work to make his acquaintance. In this connection it may not be out of place to state that Mr. Kingston was born in St. John, New Brunswick, nearly 52 years ago. In his boyhood he attended the common schools, which were taught by private teachers, there being no public schools in the provinces at that time, thus rendering it much more difficult to obtain an education than is now the case. When about 14 years of age he started out to earn his livelihood, his first venture of any account being in the saw mills, where logs were cut into all kinds of dimension lumber, boards, lath, shingle, &c. In this work, varied with a little shipbuilding, he continued until he was 19 years old, when

JOHN P. KINGSTON,

Winner of First Prize in $3500 House Competition.

he came to the United States. He at once started in to learn the carpenter's trade and from the outset his great ambition was to be a first-class mechanic in every particular. He learned to do all kinds of framing and finishing, taking advantage of all opportunities offering for his advancement, and by persistent study and effort he, after a period of 19 years, decided to engage in business as an architect, in which profession he has been continually engaged for nearly 14 years. If he has had any measure of success over others he is of the opinion that a great deal of the credit "is due to having a good practical knowledge of Carpentry and Building, in all its branches." Mr. Kingston is very domestic in his tastes and when not engaged at his business is to be found with his family.

In its report the committee makes the following comments regarding the first prize design: "The exterior is well designed, the details are good, and the house contains all the room that could be required in a house costing $3500. There is no waste room worth mentioning, and the specifications cover the entire work. The only possible objection which we can point out in the entire plan is the fact that in order to wait on the front door the servant must pass through the dining room or up the three steps from the kitchen to the front hall and then down three, as indicated on the first floor plan. This could be overcome by cutting a door between the hall and the kitchen, but we all know that direct communication between the kitchen and any other part of the house is a very bad feature, as it is well in all cases to have two doors between the kitchen and all other rooms or halls."

## Specifications.

We present herewith the specifications furnished by the author, together with detailed estimate of cost:

### Cellar Work.

**Excavation.**—Dig out the earth to form the cellar as per plans, and make trenches for bed stones, piers and other places to conform to the drawings. The bottom of all foundation work to start at least 6 inches below cellar bottom, as shown.

The earth, &c., removed from cellar to be graded up about the building, with the top dressing evenly spread over the top.

**Foundation.**—To be built of local flat field stone with footings well bedded 6 inches below cellar bottom. To be laid up dry, with faces even and well bonded and all joints on the inside trowel pointed. The wall to be 18 inches thick, with footing 2 feet wide. Footing for iron column supports to be at least 2 feet across and for chimney at least 12 inches larger all around than outside.

### Brick and Plaster Masons' Work.

**Chimneys.**—The brick work to be done as shown, with merchantable hard red brick all laid up in lime and cement mortar, with exposed parts colored dark red. The chimney to have rough opening and hearth for fire place, with connection for laundry, furnace and for range in kitchen. To be well laid and have caps on top. Chimneys to be well plastered inside and outside except where exposed above the roof.

The fire place to have iron linings, damper and tile for facings and hearth.

**Underpinning.**—The brick wall to be 10 inches thick, with air space, except two full courses at top and where shown at sides of frames and intermediate points.

**Lathing.**—Cover all the parts to be plastered with good spruce lath laid the proper distance apart. All to be well nailed to each and every bearing. To be carried down to subfloors at exterior walls.

The lathing for gable to be done with metal lath.

**Plastering.**—The walls and ceilings where finished to be plastered with one coat of best lime mortar and one coat of green skim. To be well worked into the lath and smoothed up in best manner. Fill plastering down to subfloors on exterior walls and well up to all openings and all done true and straight. Back plaster back of sheathing on exterior walls.

The gables to be plastered with two coats of cement plaster, with surface left rough cast.

The bathroom and lavatory to have hard plaster wainscoting up 4 feet high, marked off with a tool to show like tile.

All parts of brick and stone wall in cellar to have a coat of whitewash.

**Cellar Concreting.**—Level off the cellar and give the whole a coat of tar concrete 2 inches deep, all done in best manner, even and true.

The mason is to clean up and assist the others employed whenever his help is necessary and is to do all

*Perspective View of First-Prize Design.*

cutting and jobbing required without extra charge and leave all perfect.

### Carpenter Work.

**Timber.**—The framing work to be done in balloon style. The timber to be No. 1 hemlock of full size. The sills to be made of 2 and 3 inch plank; joist supports in cellar, 8 x 8; first-floor joist, 2 x 8; second-floor joist, 2 x 8; third-floor joist, 2 x 6; exterior wall studs, 2 x 4, with double plates; partition studs to be 2 x 4 and 2 x 3, all put in 16 inches on centers. Rafters to be 2 x 5, 24 inches on centers; hips and valleys, 2 x 8.

Put beads on all corners and "grounds" at all openings and bottom of all partitions to plaster against.

**Bridging.**—Floors to be bridged with 1 x 2 inch strips cut to fit at both ends.

**Subfloors.**—Cover all floors, including attic, with ⅞-inch planed and jointed hemlock boards, well closed up together and nailed.

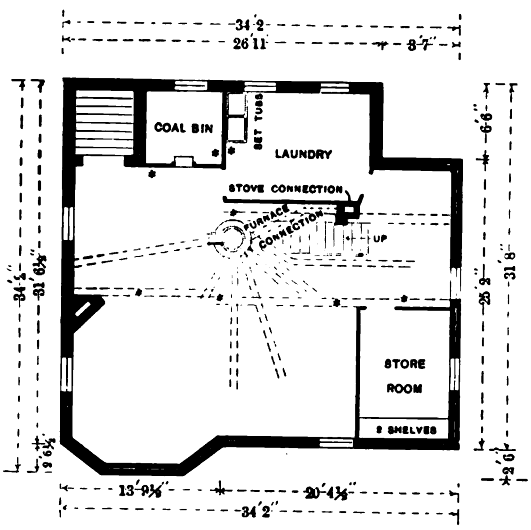
**Outside Boarding.**—Cover all exterior walls with planed ⅞-inch jointed hemlock boards laid close together and nailed with two nails to each bearing.

**Roofs.**—Cover all roofs with ⅞-inch planed hemlock boards. To be laid open not more than 2½ inches and nailed to each bearing with at least two nails. Those for valleys to be laid close.

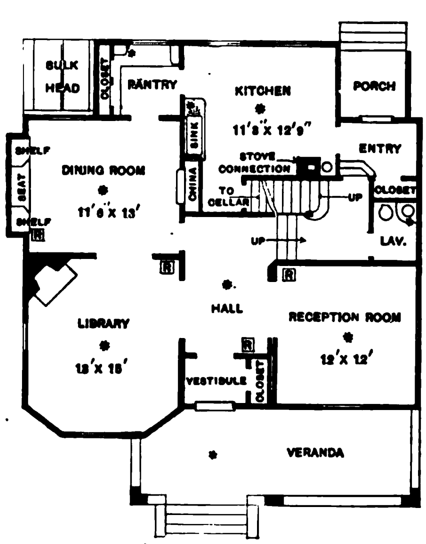
**Roof Shingles.**—Cover all roofs with best quality cedar shingles, put on to show not more than 4½ inches to the weather, with at least two nails to each shingle. Valleys to be laid open with 14-inch painted tin. Ridge to be covered with 6-inch saddle boards and a 2-inch three-quarter round on top.

**Wall Shingles.**—Cover all parts shown, including veranda, with clear butt cedar shingles, laid not more than 5 inches to the weather, well nailed, with butts even at bottom.

**Sheathing Paper.**—Cover all exterior surface with a




Foundation.




First Floor.

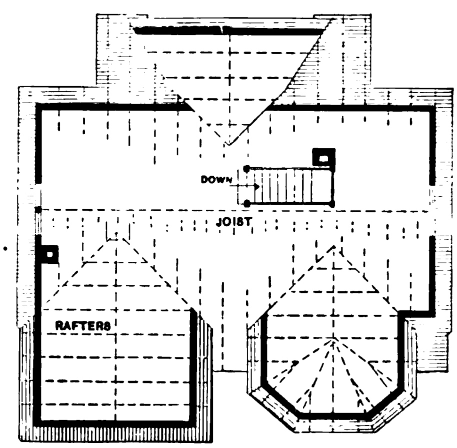
x 5 inch spruce laid open ⅛ inch. Ceilings to be done with cypress sheathing; finished veranda work as per detail; steps to have ⅞-inch risers, 1⅛-inch treads and 2-inch stringers. Do all flashing about frames, finish, &c., to make the job complete.

**Window Frames.**—The cellar windows to have plank frames and 1¼-inch pine sash. The sash to swing in at bottom and have proper fastener. Frames above cellar to have 2-inch stools, ⅞-inch jambs and casings with molding on outside. To have pockets, finished sash pulleys and grooved for 1⅜-inch sash.

**Sash.**—The frames to be fitted with 1⅜-inch pine double sliding lip sash glazed with No. 1 American sheet glass well fastened and puttied in place and to be fitted in frames and hung and evenly balanced with weights and cord. All one and two light sash to have double thick glass. All sash cord to be connected to sash with the Six Second sash cord fastener.

**Blinds.**—All sliding windows to be fitted with best 1⅛-inch pine blinds hung on proper hangers that will not let blinds blow off, and fasten with the Waltham blind fasteners.

**Exterior Doors and Frames.**—Frames to be made of




Attic with Outline of Roof.


Second Floor.

*Competition in* **$3500** *Houses.—First-Prize Design.—Floor Plans.—Scale,* **1-16** *Inch to the Foot.*

good quality of sheathing paper, well lapped before any finish or shingling is put on.

**Cellar and Veranda Supports.**—The girders in cellar to be supported on 3½-inch iron pipe posts and veranda to be supported on 2½-inch iron pipe, with caps for each.

**Bulkhead.**—To be done with frame finished on top and sides. To have sheathing covers hung with three heavy hinges and proper fasteners. Steps and stringers to be of 2-inch and risers ⅞-inch spruce. To be a frame in wall with cleat doors hung and fastened in proper manner.

**Cellar Partition Work.**—To be done with 2 x 3 studding and matched boards and have doors of pine barn boards.

### Exterior Finish Work.

Work out and fit in place all materials to complete the outside finish work as per details in first-class manner.

To be made from well seasoned pine or cypress lumber except otherwise specified. Veranda floors to be 1⅛ 2-inch pine, with hard wood thresholds, casings and moldings.

Front door to be of oak 1¾ inches thick, molded, with No. 1 double thick glass in top part.

Porch door to be 1¾ inches thick, of cypress, with glass.

### Interior Finish Work.

Work out and fit in place all materials to complete the inside finish work as per details in first-class manner.

All to be worked out from good, clear, sound, kiln-dried stock, to be sandpapered before putting in place and put on after all plastering is done.

**Finish Wood.**—To be all of best even colored North Carolina hard pine to finish natural or stain, except parlor, which will be painted.

**Door Jambs.**—To be 1⅝ inches thick. Cased openings and sliding door to be 1 inch thick, all set plumb, level and true.

**Doors.**—Slide door to be 1¾ inches thick, made to slide at top with trolley rollers and track.

Other doors to be 1⅜ inches thick, six cross panels. Vestibule door to have glass, same as front door. All doors to have blind tenons wedged and glued in best manner.

**Trimmings.**—The hall, vestibule, reception room, library and dining room to have 4¾-inch casings, 1 x 5 inch header, with molding around. Remaining parts to have 4½-inch side casings and 1-inch plain header. Stools to be ⅞ inch thick, rebated to rest on outside stool, with ⅞ x 4 inch molded aprons. Window stops to be ½ inch thick, with molded edge; sides put in with screws, tops nailed in.

**Base and Molding.**—Each room not sheathed to have a 9-inch base. The vestibule, front hall, reception room, library and dining-room to have molding on top of base.

**Sheathing Wainscot.**—The kitchen and entry to be wainscoted 3 feet 4 inches high with narrow beaded sheathing. To have cap at top and base at bottom, as shown.

**Plate Rail.**—The dining-room to have a plate rail three drawers under. The remaining part to be closed in with beaded sheathing and cleat doors. Over to be four shelves 12 inches wide. The closet to be closed in with sheathing and have two cleat doors.

**China Cabinet.**—To have a case of drawers and shelves over, as per detail.

**Mantel and Shelves.**—The library to have mantel with mirror, as selected.

The kitchen and bathroom to have a small shelf on brackets.

**Tank.**—To be a 30-gallon tank, made and placed in attic and supported in proper manner, and to be lined by plumber.

**Stairs.**—The stairs to be built, as shown, on plank stringers, accurately cut to the required dimensions for risers and treads and firmly secured in place. To have 1⅛-inch treads grooved together and base into risers.

Front stairs to have paneled newel post, 6½ x 6½ inches; angle posts, 4¼ x 4¼ inches; balusters, 1½ inches square, three to a tread, and have 2½ x 3¾ inch hand rail.

Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

*Competition in $3500 Houses.—First-Prize Design.*

about 6 feet from floor to top. The outside member to return onto casings.

**Dado.**—The bathroom and lavatory to have cap 3 inches wide at top of plaster wainscoting.

**Seat and Shelves.**—The seat and shelves in dining-room to be made by plastering the fronts so base can continue around room. The tops to be made of ⅞-inch boards, with nosings and surbase molding under edge. Around on top to be a ½ x 3½ inch molded base.

**Closets.**—To have narrow base and casings, with two rows of beaded wardrobe strips, with coat hooks and one shelf.

**Finished Floors.**—The finished or top floors in vestibule, front hall and dining-room to be done with flash grain even colored matched hard pine. The kitchen, pantry, entry, second story hall, lavatory and bathroom to be done with ⅞-inch smoothly worked, matched maple flooring. Top floors in other parts to be square edge, smoothly worked pine. All top floors to have paper under and put down between base. There is to be no finished floor in attic.

**Linen Closet.**—To have a case of drawers and four shelves at one end, and wardrobe strips on wall space.

**Sink.**—To be sheathed up under with two small cleat doors and case of drawers. Back to be 14 inches high, with a 6-inch shelf on top. To have drip shelf at one end.

**Wash Trays.**—To be fitted on proper frame and have covers.

**Pantry.**—To have broad 24-inch shelf, with case of

Attic to have a closed flight, with 4 x 4 posts, 2 x 3 hand rail and 1-inch round balusters around well hole.

The cellar stairs to be built of spruce, with guard rail and post at bottom, as shown.

**Bell.**—To be a small electric bell in kitchen to ring from front door.

**Hardware Trimmings.**—All doors, windows, drawers, closets, shelves, &c., to have proper butts, locks, knobs, catches, fasteners, hooks, stops, &c., as selected. There will be $50 allowed in estimate for this.

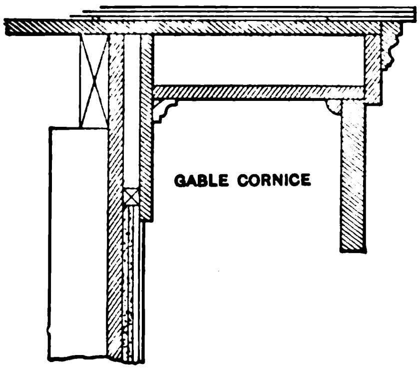
**Heating Apparatus.**—Furnish and set up in cellar one approved warm air furnace, with proper size galvanized iron cold air box and heavy tin pipes to conduct the hot air to each room marked. The pipes going through floors or partitions to be properly protected with asbestos paper and tin. Each outlet to have a black japanned register with border. There will be $150 allowed in estimate for this work.

**Wall Papering.**—All rooms and hall not finished by painter to be decorated with wall paper and have picture molding at hight to conform to style of paper. There will be $50 allowed in estimate for this work.

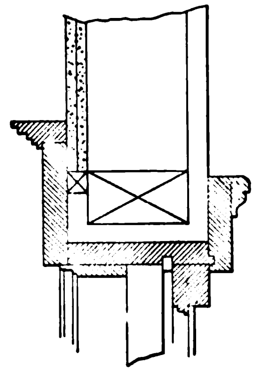
**Gas Lighting Fixtures.**—The outlets shown to be supplied with lighting fixtures, as selected, and there will be $45 allowed in estimate for same.

**Painter's Work.**

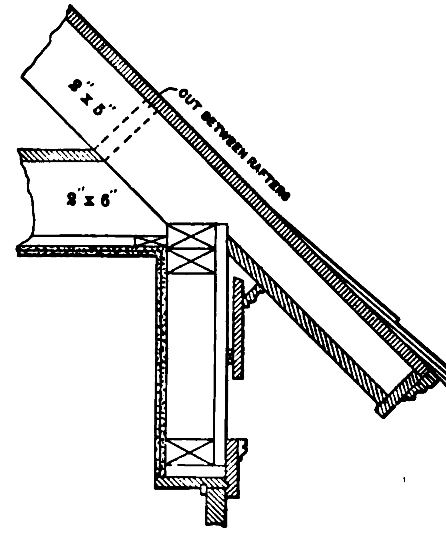
Paint all the exterior work except otherwise specified with two coats of pure lead and linseed oil and turpentine, all colors to please owner.



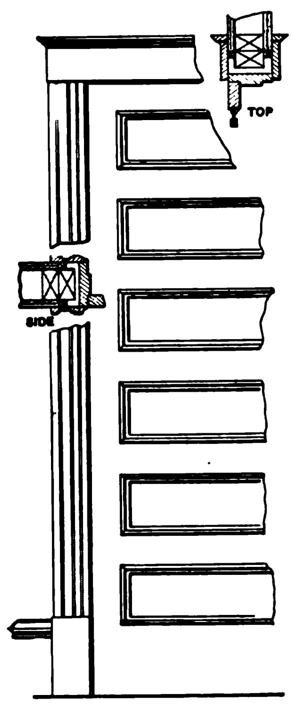

Detail of Gable Cornice.—Scale, 1 Inch to the Foot.



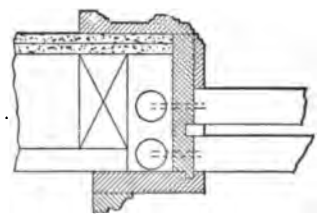
Section through Head Casing.—Scale, 1½ Inches to the Foot.



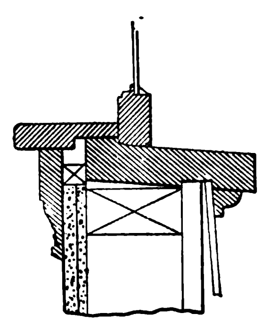

Detail of Main Cornice.—Scale, ¾ Inch to the Foot.



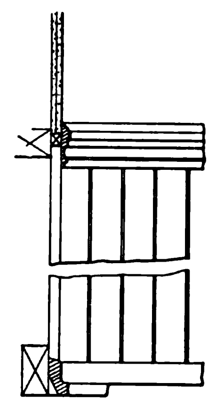

Details of Doors.—Scale, ½ Inch to the Foot.



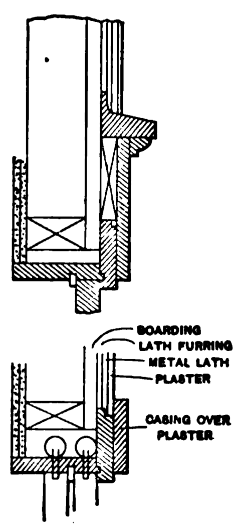
Horizontal Section through Window Frame.—Scale, 1½ Inches to the Foot.



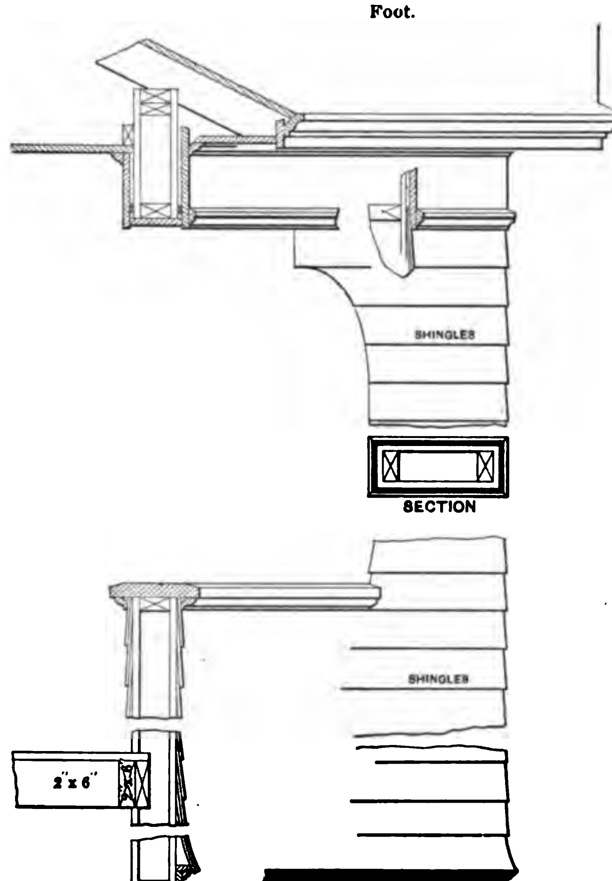
Detail of Window Stool and Apron.—Scale, 1½ Inches to the Foot.

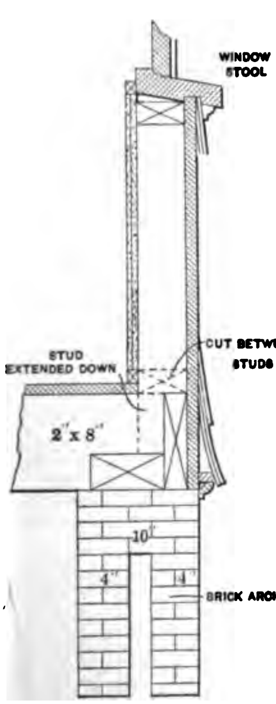


Detail of Wainscoting.—Scale, ¾ Inch to the Foot.

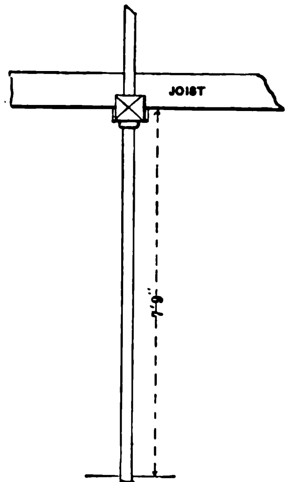



Details of Gable Windows.—Scale, 1 Inch to the Foot.




Details of Water Table.—Scale, ¾ Inch to the Foot.




Detail of Post in Cellar.—Scale, ¼ Inch to the Foot.

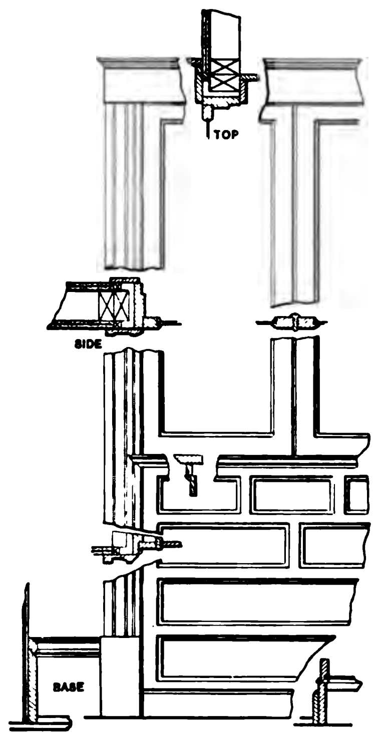
Details of Front Veranda.—Scale, ½ Inch to the Foot.

*Competition in $3500 Houses.—First-Prize Design.—Miscellaneous Constructive Details.*

The front door to be filled and have three coats of varnish, the last coat rubbed.

The shingles on side walls, &c., to have one coat of pure linseed oil stain and one coat of linseed oil.

All the interior work must be well cleaned before any finish is put on. All nail holes and other imperfections well puttied, matching wood or stain as near as possible.




**Details of China Cabinet.—Scale, ½ Inch to the Foot.**

**Standing Finish.**—The reception room to be finished with three coats of ivory white, left with a gloss.

The vestibule, hall and library to be stained mahogany, the dining room a golden oak, and all to have a coat of shellac and two coats of varnish and a coat of flat varnish, all left smooth and even.

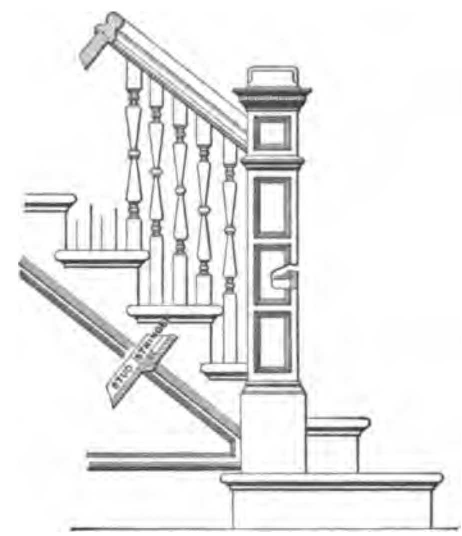
The work in kitchen, pantry, entry, &c., to have a coat of primer and filler and two coats of varnish.

Hall and rooms on second floor to have two coats of varnish. The closets to have two coats of paint. The bathroom and lavatory to be painted three coats of enamel white. This will include plaster wainscoting.

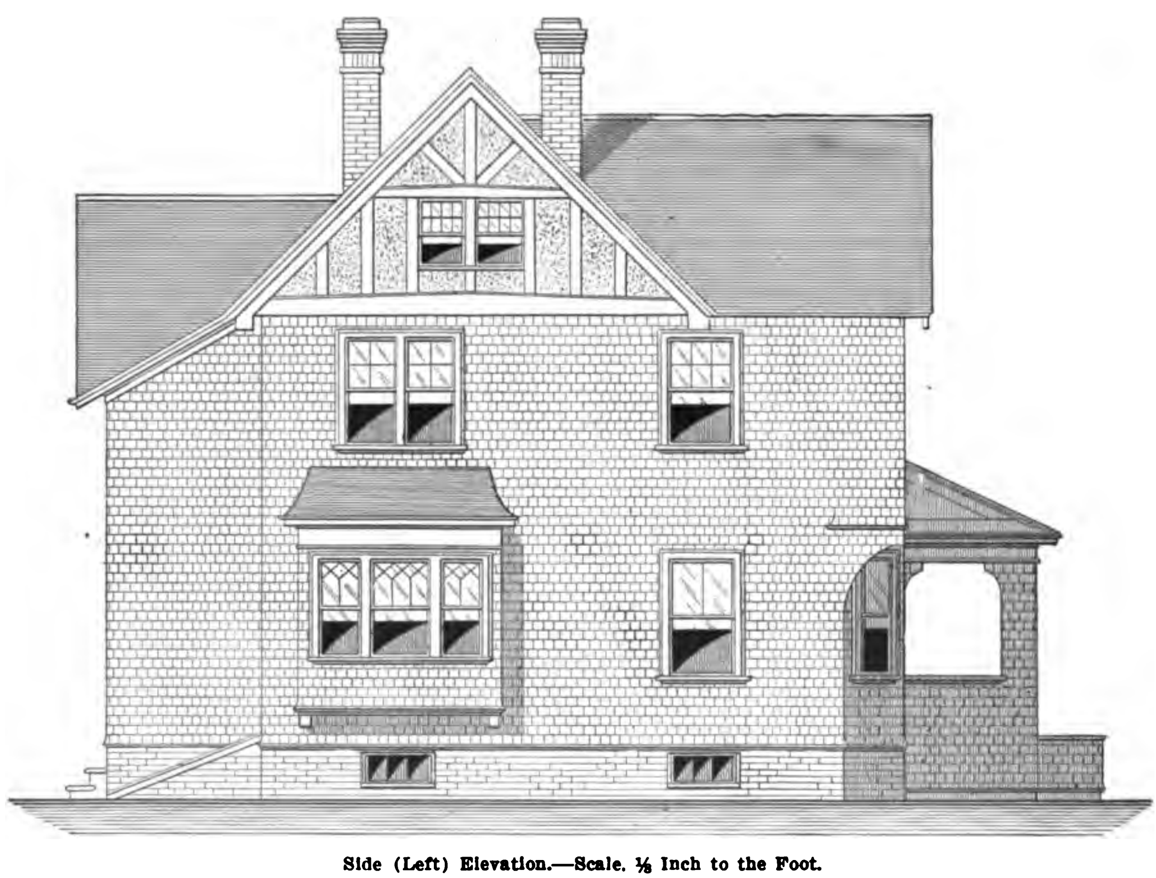
**Walls.**—The walls of bathroom, lavatory, kitchen, panty and entry to have a coat of sizing and two coats of paint.

### Gas Piping.

Pipe the house for gas in usual manner, according to



**Details of Main Stairs.—Scale, ½ Inch to the Foot.**



**Side (Left) Elevation.—Scale. ⅛ Inch to the Foot.**

***Competition in $3500 Houses.—First-Prize Design.***

**Floors.**—The hard wood floors in vestibule, front hall and dining room to have a coat of pure shellac, sandpapered, and two coats of floor finishing wax well rubbed on and polished. The floors in bathroom, lavatory, pantry, kitchen, entry and second-story hall to have a coat of oil and turpentine and two coats of Berry Brothers' liquid granite. The closet floors to have one good coat of paint.

city, town or company rules, and to be inspected and tested before any lathing is done. All pipe to be well secured in place with iron clips and screws and all outlets to have caps.

### Sanitary Plumbing.

**Sewer Connection.**—Furnish, connect and run a 6-inch tile sewer pipe from street sewer to outside of house, from there run a 4-inch cast iron soil pipe with a running trap inside of wall, with fresh air inlet and hand hold. To be continued along to and under fixtures up through at least 2 feet and flashed tight at roof with 3-pound sheet lead. To have all necessary Y branches, bends, offsets, &c., to which to connect the several fixtures. All joints to be made and calked with oakum and molten lead, well driven in and properly calked.

**Water Connection.**—Furnish, connect and run from street service to inside of cellar regular size water pipe with shutoff inside of wall.

**Water Closet.**—Furnish and fit up in bathroom and lavatory a Standard Plate P-827 porcelain enameled siphonic closet with 2-inch brass flush connection and improved roll top flushing rim, 1¼-inch plain oval seat and cover, round corner copper lined tank with tank board, solid top and pull connection, N. P. brass supply pipe, flush connection, floor connection, rubber gasket, screws, bolts and washer complete.

**Wash Bowls.**—Furnish and fit up in bathroom a Standard Plate P-535 porcelain enameled lavatory bowl, with slab, bowl, overflow, apron and back all in one piece. To be connected to wall with concealed wall hangers. To have N. P. waste, plug, coupling and rubber stopper, Fuller pattern faucets with china handles. To have brass supply pipes, waste and trap complete.

Furnish and fit up in lavatory, first floor, a Standard Plate P-537 porcelain enameled corner lavatory, with slab, bowl, overflow, apron and back all in one piece, with concealed hangers, N. P. waste, plug and stopper, Fuller pattern faucets with china handles, supply pipes, wastes and trap complete.

**Bathtub.**—Furnish and fit up in bathroom a Standard Plate P-141 porcelain enameled bath 4 feet 6 inches long, with N. P. No. 4½ Fuller double bath cock, ½-inch iron pipe size brass supply pipe and connected waste, overflow and rubber stopper. To have 1½-inch lead waste and trap.

**Sink.**—Furnish and fit up in kitchen a 20 x 40 x 5 inch beaded iron sink with brass outlet. To have two arm compression bib cocks, ½-inch iron size brass supplies and 1½-inch waste and trap.

**Trays.**—Furnish and fit up in laundry a set of two-part Munson slate wash trays of regular size and pattern, with soap dishes and brass outlets. To have two-arm brass compression bib cocks, ½-inch iron size brass pipe and 1½-inch waste and trap.

**Boiler.**—Furnish and fit up in closet near chimney a 30-gallon copper hot water boiler with proper stand. To have all necessary couplings, pipes and cocks complete. To be supplied with water through ½-inch brass pipe, with stop over boiler.

**Tank.**—Furnish and fit in attic and line with copper a 30-gallon tank to be supplied with water through ½-inch iron size brass pipe, ball cock and float complete, with shutoff in cellar. To have proper overflow into nearest practicable place with ¾-inch lead pipe.

**Supply Pipes.**—Furnish and run ½-inch iron size brass supply pipes, with stop in cellar, to each set of fixtures, and same size and kind of pipe from boiler to each set of fixtures. All pipe to have proper connections to conform to their positions, and exposed ones fastened with brass clips or hangers, and remainder with iron clips.

### Detailed Estimate of Cost.

The estimate of cost as submitted in detail by the author is as follows:

#### Cellar Work.

| | |
|---|---|
| 151 yards excavating, at 25 cents | $37.75 |
| 71 perch foundation stone, laid, at $1.30 | 92.30 |
| Grading up around building | 15.00 |
| Total | $145.05 |

#### Brick and Plaster Masons' Work.

| | |
|---|---|
| 10 M. brick for underpinning and chimney, laid, at $14 | $140.00 |
| Finish work for fire place | 20.00 |
| Caps, linings, thimbles and doors for chimneys | 27.00 |
| 712 yards lath and plastering, at 27 cents | 192.24 |
| Lath and plaster for gables outside | 20.00 |
| Extra tile plaster for wainscot | 3.60 |
| 99 yards cellar concreting, at 60 cents | 59.40 |
| Pointing and whitewashing cellar | 16.00 |
| Total | $478.24 |

#### Carpenter Work.

FRAMING, BOARDING, SHINGLING, ETC.

| | |
|---|---|
| 11 M. feet hemlock framing timber, at $17 | $187.00 |
| 8 M. feet hemlock boards for subfloors, side walls and roof, at $17 | 136.00 |
| Plaster beads and grounds | 4.50 |
| 16 M. cedar shingles for roof, at $3.75 | 60.00 |
| 18 M. cedar shingles for side walls, at $3.25 | 58.50 |
| Flashings for valleys and frames | 16.00 |
| 4,800 feet sheathing paper for walls and floors, at 1½ cents | 7.20 |
| 5 iron columns for cellar, at $1 | 5.00 |
| 4 iron columns for verandas, at 50 cents | 2.00 |
| 500 feet matched boards, cellar partitions, at $20 | 10.00 |
| 100 feet studding, at $17 | 1.70 |
| Total | $487.90 |

EXTERIOR FINISH WORK.

| | |
|---|---|
| Lumber and moldings for cornices, &c., including front veranda and rear porch | $176.00 |
| 1 front door and 1 frame | 9.50 |
| 1 back door and frame | 5.25 |
| 8 cellar windows and frames, at $1.20 | 9.60 |
| 33 window frames, sash and blinds, at $4.50 | 148.50 |
| 2 sets outside steps | 14.00 |
| Cellar entrance work | 11.00 |
| Total | $373.85 |

INTERIOR FINISH WORK.

| | |
|---|---|
| 14 jambs for doors and openings, first floor, at 65 cents | $9.10 |
| 12 jambs for doors, second floor, at 65 cents | 7.80 |
| 26 sides best door and window trimmings, first floor, at 90 cents | 23.40 |
| 17 sides door and window trimmings at rear first floor, at 70 cents | 11.90 |
| 32 sides door and window trimmings, second floor, at 70 cents | 22.40 |
| 7 sides closet door trimmings, at 20 cents | 1.40 |
| 1 vestibule door with glass | 4.50 |
| 1 slide door and hangers | 12.00 |
| 22 doors for first and second story, at $2.60 | 57.20 |
| 425 feet base, at 4½ cents | 19.13 |
| 160 feet base molding, at 1½ cents | 2.40 |
| 82 feet closet base, at 3 cents | 2.46 |
| 288 feet sheathing wainscot, 3½ cents | 10.08 |
| 107 feet sheathing cap and dado, at 2½ cents | 2.68 |
| 66 feet base for sheathing, at 2½ cents | 1.65 |
| 29 feet plate rail, at 4 cents | 1.16 |
| 350 feet flash grain hard pine flooring, at 3 cents | 10.50 |
| 470 feet maple flooring, at 4 cents | 18.80 |
| 1,250 feet pine flooring, at 2½ cents | 31.25 |
| 120 feet wardrobe strips, at 2 cents | 2.40 |
| 40 feet shelving, at 3 cents | 1.20 |
| 1 case drawers for linen closet | 4.00 |
| Bay window seat and shelves | 5.00 |
| China cabinet | 12.00 |
| Pantry shelves, drawers, &c | 18.00 |
| Fitting up sink and wash trays | 7.00 |
| Library mantel | 25.00 |
| Shelves for kitchen and bathroom | 2.00 |
| Attic tank | 4.00 |
| Front, attic and cellar stairs | 67.00 |
| Work in connection with plumbing, &c | 10.00 |
| Front door bell | 7.00 |
| Nails, screws and trucking | 75.00 |
| Carpenter labor | 625.00 |
| Total | $1,109.41 |

RECAPITULATION.

| | |
|---|---|
| Cellar work | $145.05 |
| Brick and plaster masons' work | 478.24 |
| Framing, boarding, &c | 487.90 |
| Exterior finish work | 373.85 |
| Interior finish work | 1,109.41 |
| Hardware | 50.00 |
| Heating apparatus | 150.00 |
| Wall papering | 59.00 |
| Gas lighting fixtures | 45.00 |
| Painting work | 175.00 |
| Gas piping | 21.00 |
| Plumbing work | 340.00 |
| Incidentals | 65.55 |
| Total | $3,500.00 |

The builder's certificate was signed by Frittriop C. Johnson, contractor and builder, 1 Endfield street, Worcester, Mass.

## Class in Reading Architects' Drawings.

The ability to read architects' drawings with facility is the desire of every ambitious young builder who expects to make progress in his business, for it is obvious that the man who possesses this accomplishment is in a position to rise much more rapidly than the one who is unable to readily interpret drawings. It is with a view to affording opportunity for ambitious members among the younger element in the building trades of New York City that a new class in plan reading has been formed at the Young Men's Christian Association in Fifty-seventh street. A class which was formed last September with something like 50 pupils has been of great value to the students, who for the most part were drawn from the building trades, owing to the fact that plans and specifications of actual buildings are used, and the pupils are instructed in the correct reading of these and are shown how to take off quantities and interpret the drawings the same way that would be required in actual work. The class is under the direction of Louis E. Jallade of the firm of Duboy & Jallade, architects, and in connection with the work lectures are given on the construction of buildings, their indication on drawings, &c.

A MAGNIFICENT marble front building occupying a plot 70 x 159 feet is now in course of erection on E street below Fourteenth street, Washington, D. C., for the Washington *Times*, and will cost about $500,000. The plans were drawn by McKim, Mead & White of New York City, and the contract for the work has been awarded to the George A. Fuller Company.

# CONCRETE SIDEWALKS AND BASEMENT FLOORS.*

By Frederick W. Taylor and Sanford E. Thompson.

THE introduction of reliable American Portland cements has rendered concrete available for sidewalks and other similar purposes at a price not more than two-thirds of that previous to 1890, when German and English cements were used. Portland cement being thus commercially within reach of builders, masons have become familiar with its use, and concrete sidewalks, because of their economy and durability, are supplanting those of other materials.

Street pavements are also being made of concrete, and with apparent success,† by methods similar to those which obtain in sidewalk construction.

The essentials for a good concrete sidewalk are an artificial foundation of firm but porous material, through which the rain water may percolate, a base of good strong concrete and a wearing surface of rich mortar, troweled to a smooth, dense surface. The walk must be divided into blocks, with the joints between them forming lines of weakness, so that if any cracks occur through shrinkage, settlement, or frost, they will occur at the joints and thus not be noticeable.

Vault light construction in concrete requires even greater skill than ordinary walks, and should never be attempted by inexperienced constructors.

The construction of basement floors is similar to sidewalk work except that in dry ground an artificial foundation is not always necessary, and, there being less danger of settlement and frost, the blocks of such a floor may be of larger size, having occasional joints to provide for contraction from changes in temperature.

Floors above the ground level in buildings may be surfaced with mortar in a manner similar to the wearing surface of walks, or the concrete may be floated without thè extra coating of mortar.

The selection of a first-class Portland cement is an absolute necessity. Natural cements will not stand the wear, and Puzzolan cements are liable to surface deterioration from the action of the weather. Walks have been built with a natural cement concrete base, and a wearing surface of Portland cement mortar, but the results have been unsatisfactory, for even if the surface coat is laid before the natural cement concrete base has set, the Portland cement does not adhere strongly and is likely to scale off.

Harry T. Buttolph suggests that the breaking up of the surface appears to be due to the difference in expansion of natural and Portland cement. He has noticed that the surface of such slabs sometimes curls up like a sheet of paper.

For the foundation, by which is meant the prepared surface underneath the concrete, any porous material such as broken stone, gravel (preferably with sand screened out) or cinders may be employed.

For the base, which consists of a layer of concrete from 3 to 5 inches thick, ordinary materials, such as broken stone and sand, screened gravel and sand, or gravel as it comes from the bank without screening, may be used for the aggregate. Unscreened gravel is not generally advisable, however, because a more uniform mixture can be obtained by screening the gravel and remixing the sand with it in definite proportions. The proportions frequently used in our large cities for the concrete base are one part Portland cement to two parts sand to five parts stone. Proportions 1 : 3 : 6, if the relative volumes are based on a unit of 3.8 cubic feet to the barrel, should be satisfactory for ordinary conditions, with 1 : 2½ : 5 for more important construction, or for pavements to be subjected to severe usage, such as teaming. If the proportions are based upon the volume of cement measured loose the required parts of sand and stone must be decreased by about 10 per cent.; thus, 1 : 3 : 6 would become about 1 : 2¾ : 5½.

The wearing surface, whose thickness varies in different specifications from ½ to 1 inch, should be laid with the same first-class Portland cement as is the base. Customary proportions are equal parts of cement and aggregate. Either sand or fine crushed rock, or a mixture of the two, may be used to form the mortar. If crushed rock is used—and good crushed rock is usually preferable to sand—it should be of a texture such as granite or trap, which will break into cubical rather than flat or laminated fragments. The size of crushed stone specified by the majority of engineers is that which will pass a ¼-inch sieve, although a few cities require finer material, Chicago, for example, specifying torpedo sand ranging from ⅛ inch down. Such sand is too fine to give a strong mortar. On the other hand, some cities, including Omaha, Neb., require crushed stone which will pass a ½-inch mesh sieve.

The requirements in various cities throughout the United States in 1900 are shown in the following table:

*Requirements in Various Cities.*

| City. | Foundation. Thickness. Inches. | Foundation. Material. | Base. Thickness. Inches. | Base. Proportions. | Wearing surface. Thickness. Inches. | Wearing surface. Proportions. Cement sand. | Dry coating. Proportions. Cement sand. | Size of blocks. | Guarantee. Years. |
|---|---|---|---|---|---|---|---|---|---|
| Boston | 12 | Broken stone, gravel or cinders | 3 | 1 : 2 : 5 | 1 | 1 : 1 | ... | 3½ to 6 feet square | 10 |
| Rochester | 6 | Sand, gravel, broken stone or cinders | † | 1 : 5 | 1 | 2 : 3 | ... | ................ | 8 |
| Philadelphia | 3 | Sand, gravel, broken brick, stone or cinders | 3 | ...... | 2 | 1 : 2 | 1 : 1 | ................ | .. |
| Washington | 0 | ........ | 4 | 1 : 2 : 5 | 1 | 2 : 3 | 1 : 1 | ................ | 5 |
| Chicago | 12* | Cinders | 4¼ | 1 : 2 : 5 | ¾ | 1 : 1 | ... | 5 feet x 6 feet | 10 |
| Milwaukee | 4 | Cinders or broken stone | 2½ | 1 : 3 : 5 | 1 | 1 : 1 | ... | 24 to 36 square feet | .. |
| St. Louis | 8 | Cinders | 3½ | 1 : 3 | ½ | 1 : 1 | ... | ................ | 1 |
| Omaha | 4 | Gravel, slag or stone | 3 | 1 : 2 : 4 | 1 | 1 : 2 | 3 : 1 | ................ | 5 |

* No foundation required where the soil is clean sand.
† Specified for each contract.

### Quantity of Materials Required.

The volumes of materials required to cover a certain area of surface are determined by the thickness of the walk or floor, the proportions in which the materials are mixed, and the character of the materials.

The following table gives the approximate quantity of materials necessary for 100 square feet of surface for walks of various thicknesses of base and wearing surface. It is assumed in compiling the table that the coarse aggregate of the base contains about 45 per cent. voids, and that the stone and sand are measured loose by shoveling into boxes or barrels, on the basis of the volume of a cement barrel of 3.8 cubic feet. For example, proportions 1 : 3 : 6 are equivalent to 1 barrel Portland cement, 11.4 cubic feet of sand and 22.8 cubic feet of broken stone or gravel, while proportions 1 : 2 are equivalent to 1 barrel of Portland cement to 7.6 cubic feet, or 1 bag of Portland cement to 1.9 cubic feet of sand or crushed stone. The variation in volume of mortar produced with sand and crushed stone of different fineness may affect the quantities for wearing surface by at least 10 per cent.

Since the volumes are given separately for the base and wearing surface, the quantities required for walks of

* This article is adapted by the authors for *Carpentry and Building* from a chapter in their book, "Concrete—Plain and Reinforced," which has just been issued. Copyright, 1905, by Frederick W. Taylor. All rights reserved.

† *Engineering News*, January 28, 1904, page 84.

*Materials for 100 Square Feet of Concrete Sidewalks.*
Proportions based on a barrel unit of 3.8 cubic feet.

| Base. | | | | | | | Wearing surface. | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Proportions—1 : 2½ : 5. | | | Proportions—1 : 3 : 6. | | | | Proportions—1 : 1. | | Proportions—1 : 1½. | | Proportions—1 : 2. | |
| Thickness. Inches. | Cement. Barrels. | Sand. Cubic yards. | Stone. Cubic yards. | Cement. Barrels. | Sand. Cubic yards. | Stone. Cubic yards. | Thickness. Inches. | Cement. Barrels. | Sand. Cubic yards. | Cement. Barrels. | Sand. Cubic yards. | Cement. Barrels. | Sand. Cubic yards. |
| 2½ | 1.10 | 0.39 | 0.78 | 0.94 | 0.40 | 0.80 | ½ | 0.85 | 0.12 | 0.68 | 0.14 | 0.56 | 0.16 |
| 3 | 1.33 | 0.47 | 0.94 | 1.13 | 0.48 | 0.96 | ¾ | 1.28 | 0.18 | 1.02 | 0.21 | 0.85 | 0.24 |
| 3½ | 1.55 | 0.55 | 1.10 | 1.32 | 0.56 | 1.12 | 1 | 1.70 | 0.24 | 1.36 | 0.29 | 1.13 | 0.32 |
| 4 | 1.77 | 0.63 | 1.25 | 1.51 | 0.64 | 1.28 | 1¼ | 2.13 | 0.30 | 1.70 | 0.36 | 1.41 | 0.40 |
| 4½ | 1.99 | 0.70 | 1.41 | 1.70 | 0.72 | 1.44 | 1½ | 2.56 | 0.36 | 2.04 | 0.43 | 1.69 | 0.47 |
| 5 | 2.21 | 0.78 | 1.56 | 1.89 | 0.80 | 1.60 | 2 | 3.41 | 0.48 | 2.72 | 0.57 | 2.26 | 0.63 |

NOTE.—Select and add together the quantities of each material corresponding to the required thickness and proportions of base and wearing surface.

other thicknesses may be readily estimated, as illustrated in the following example:

*Example.*—What materials will be required for a walk 8 feet in width and 150 feet long, the base to be 3 inches thick, of concrete in proportions 1 : 3 : 6, and the wearing surface 1 inch thick, in proportions 1 part cement to 1 part sand?

*Solution.*—Referring to the table we find directly that for 100 square feet of base 3 inches thick, 1.13 barrels Portland cement, 0.48 cubic yard sand and 0.96 cubic yard broken stone or gravel are required. Similarly, for 100 square feet of the wearing surface 1 inch thick we should require 1.70 barrels cement and 0.24 cubic yard sand. For each 100 square feet of completed walk there would therefore be needed 2.83 barrels cement, 0.72 cubic yard sand and 0.96 cubic yard broken stone or gravel; and since there are 1200 square feet in an area of 8 x 150 feet, for both base and wearing surface we should require 34 barrels Portland cement, 9 cubic yards sand and 12 cubic yards broken stone or gravel.

(*To be continued.*)

## New Chapel for Columbia University.

The new St. Paul's Chapel, under construction at Columbia University, is of cruciform plan, which is particularly well suited to the location, and in its size and proportions as well as its architectural treatment it is to be in harmony with the adjacent buildings. It will have a seating capacity for 820 persons in the naves and transepts and for 120 in the choir, the greatest length being 122 feet and the width across the transepts 77 feet. The basement beneath the choir will contain a well lighted choir room and apartment for a resident chaplain. The main approach will be from the west, the chapel facing the library. At either end of the vestibule stairways will ascend to galleries on each side of the nave, but the effect upon entering the church will be one of loftiness, as the roof of the nave will be vaulted and at the intersection of the nave and transepts a dome on a tier of arches will rise to a hight of 91 feet. Architects Howells & Stokes have taken advantage of the irregular form of the building and made use of the opportunity which it offers for a greater variety and freedom of treatment than it was possible to employ in the educational buildings. While harmonizing with the other structures of the university the new chapel differs from them in design as it does in purpose, with a diversion which marks it unmistakably as a place of religious worship.

## London's Building Restrictions.

The new building regulations for which the London County Council has asked the sanction of Parliament limit the hight of buildings to 80 feet, unless consent of the Council is secured, and this is only given on satisfactory evidence of fire protection. Buildings of the warehouse class are limited to 250,000 cubic feet, unless divided by approved party walls. Special regulations are to be made by the Council for steel construction buildings. Where buildings are used for both trade and dwellings the dwelling part must be separated by walls, partitions and floors of fire resisting materials.

The shaft of an elevator, if within the well hole of a stairway, may be inclosed with open metal grilles, but otherwise with solid fire resisting materials not less than 3 inches thick, with fire resisting doors. Windows exposing another wall opening within 30 feet must have fire resisting glazing. Stoves and fire places must be set solid in brick work and concrete, and all flues, except in dwellings, must be surrounded with brick work at least 8½ inches thick. Floors under stoves and ovens must be incombustible and not less than 6 inches thick.

## The Wisconsin State Capitol Building.

A movement has been started in the Legislature of Wisconsin to remove the capital of the State from Madison to Milwaukee. The agitation is the result of plans that are being made to erect a new capitol building to take the place of the present structure, which was badly damaged by fire a year ago. At that time Governor La Follette appointed a commission to make recommendations and present plans for reconstructing the old building or erecting an entirely new one. The commission, of which Edwin Reynolds, consulting engineer of the Allis-Chalmers Company, is a member, called for plans from leading architects, and made its report a few weeks ago, in which it advised the erection of a new building and recommended that the plans of Cass Gilbert, a New York architect, be accepted. These plans contemplate the erection of a building to cost more than $5,000,000. Other plans presented by Milwaukee architects provided for a building to cost in the neighborhood of $2,000,000. The discussion of the subject gave rise to suggestions that the capital be removed to some part of the State more easily accessible and with ampler hotel accommodations. Oshkosh has also introduced a bill asking that the capital be removed to that city. The impression seems to prevail that no change will be made in the location of the capital, although there is quite general dissatisfaction with the present location.

THE new 13-story fire proof Central Building, which is to be erected at the corner of Baltimore and Charles streets, Baltimore, Md., for the offices of the Baltimore & Ohio Railroad Company, will cost in the neighborhood of $2,000,000, and will be erected in accordance with drawings prepared by Herbert D. Hale, 92 William street, New York City, associated with Parker & Thomas of 612 North Calvert street, Baltimore. The three lower stories will be constructed of Maryland granite, and the upper ones of light gray brick and terra cotta. The main entrance will be on Charles street, and over it will be a light court, extending from the first story to the top of the building and running back to within 20 feet of the went end of the structure.

THE Chemical National Bank, at 270 Broadway, New York City, is about to put up a new building, which will give it the commodious quarters that have long been needed. The new structure will occupy the site of the old building together with adjoining property recently acquired, giving a frontage on Broadway of 25 feet and a depth of a little over 91 feet, and on Chambers street a frontage of 101 feet with a depth of 75 feet. The plans have been prepared by Trowbridge & Livingston, 424 Fifth avenue, and work will be commenced as soon as the spring season will permit.

AMONG the important building improvements projected in the city of Chicago is an 18-story $2,000,000 office building, which will be erected at the corner of Clark and Adams streets by the Commercial National Bank.

# HAND RAILS FOR ELLIPTICAL STAIRS.

BY MORRIS WILLIAMS.

IN the August issue of the paper for last year there was presented a diagram illustrating the plan center of rail and the plan tangents of a rail to be constructed in three sections. There were also diagrams illustrating the method of developing the face mold for each section, &c. In the February issue for this year a correspondent signing himself "D. P." of Cairo, Ill., asks me to give a description of my method of getting out hand rails after the lines have been established, and also to tell how to curve the stair stringers and the frieze. In order to serve as a help to the reader in understanding the constructive lines exemplified in the diagrams presented in the August number for last year, I have prepared Fig. 1, which exhibits the entire construction wherein each face mold development is shown placed in its proper position relative to its plan lines.

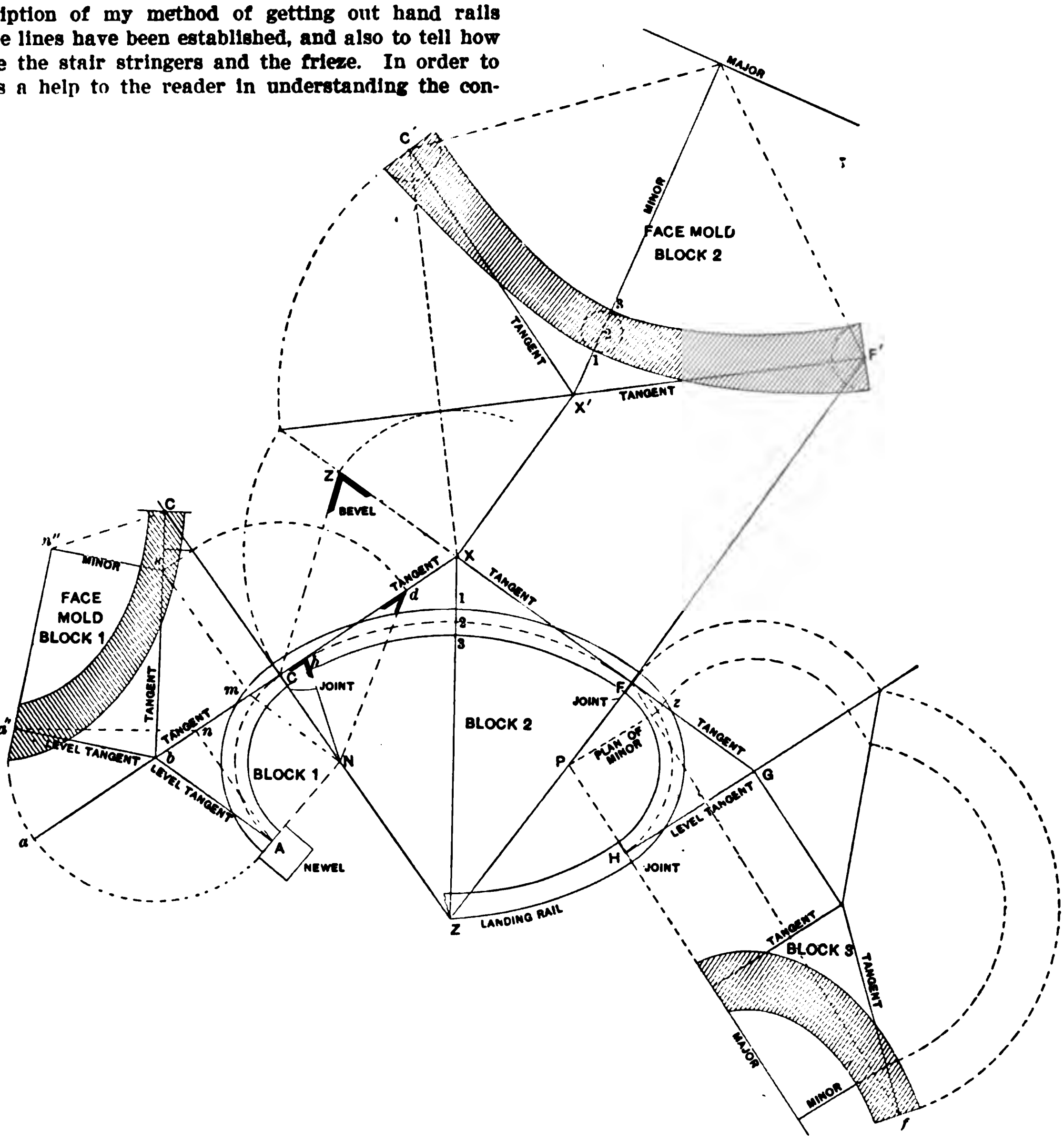



Fig. 1.—Plan Reproduced from Fig. 8 in August, 1904, Issue of *Carpentry and Building*, with Development of Face Molds Reproduced from Figs. 10, 11 and 12 of Same Issue.

*Hand Rails for Elliptical Stairs.*

The first position of the wreath which extends from the newel post to C is shown developed over and above its plan lines, A C. The second portion which extends from C to F, and which is described from the center Z, having for its plan tangents the lines C X and X F, respectively, is also shown developed over and above its plan lines, as C'' X' F'. So also is the third portion shown developed over and above the plan line F H of the rail, and the plan lines F G and G H, respectively, of the tangents.

The constructive lines in the development have been fully explained in Figs. 10, 11 and 12, which appeared in the August issue of *Carpentry and Building* for last year. By comparing these three separate diagrams with the three contained in Fig. 1, presented herewith, the relation of each constructive line in the development with those of their respective plan lines will be easily comprehended.

In Fig. 2 is exhibited the development of the falling line of the center of rail, and the whole length of the stringer extending from the newel post to the landing where it connects with the landing facia. Along the center of rail in plan we have marked dots to represent the location of the 23 risers which the stairway contains.

To develop the falling line stretch out the center of the rail on the ground line, as shown from A to J; on J erect the perpendicular line J Z equal in length to the total hight of the 23 risers—namely, from floor to floor. From Z erect the line Z K equal to the hight of the landing rail above the floor. Erect the line 23 2, and continue the floor line from Z to 2. From 2 draw the line 2 N, which will represent the nosing line of the steps and at a distance equal to the width of the stringer draw a parallel line, as shown from B to G.

The soffit of the stringer at G will have to be ramped, as shown, to intersect gracefully with the facia of the landing. This completes the development of the stringer which as here exhibited assumes the form of a straight board similar to the stringer for a common flight. The falling line of the center of rail is shown to be a straight line above and parallel to the line of the stringer, both lines being straight, owing to the risers having been equally spaced around the elliptical plan. The least variation from the uniformity thus shown in the spacing of the risers would inevitably cause both stringer and falling line to deviate from a straight course, and the consequences arising from such an arrangement would of necessity cause a great deal of extra labor in the construction of the stringer, as well as in the manipulation of the wreaths.

At M and X, respectively, on the nosing line are shown the joints of the stringer. The first portion from A to M, as shown, will be a straight board long enough to contain seven steps; the second portion also will be a straight board and of sufficient length to contain ten steps; the third portion will contain six steps, as shown from X to Q.

We are now fully prepared to go about bending each portion to a curvature that will follow the perpendicular side of a solid, having a base coincident with the elliptical plan of the stringer. To bend the first portion from A to M, it will be necessary to construct a drum, as shown in Fig. 3. The radius N A, or N C, is taken from the plan, Fig. 2, and for the shaded portion shown from C to M the radius will be equal to C M' of the plan, Fig. 2. The diagram shows the joint to be at M, which will be found to be a point contained in the curve of the second portion of the stringer, which facilitates greatly the operation of connecting the two portions after the bending process is completed and the stringer put together in one continuous piece from the newel to the landing. The method of bending shown in Fig. 3 is what is known as the laminated method, and is considered superior to all other methods especially in strength. It consists of having prepared for bending a number of thin boards the width of the stringer; the total thickness of the whole to equal the thickness determined for the stringer. For example, we will say that the stringer is to be 1½ inches thick; by experimenting we will find that a piece of board ¼ inch thick will bend around the drum; consequently we find that it will require six pieces ¼ inch thick to compose the required thickness of 1½ inches for the stringer. On one of these is marked the steps as for a common flight. This one is placed nearest the drum, adding the remaining ones, and then with hand screws the whole is clamped together to the drum, having been previously brushed over with the best quality of glue. When the glue is set the hand screws are taken off, when

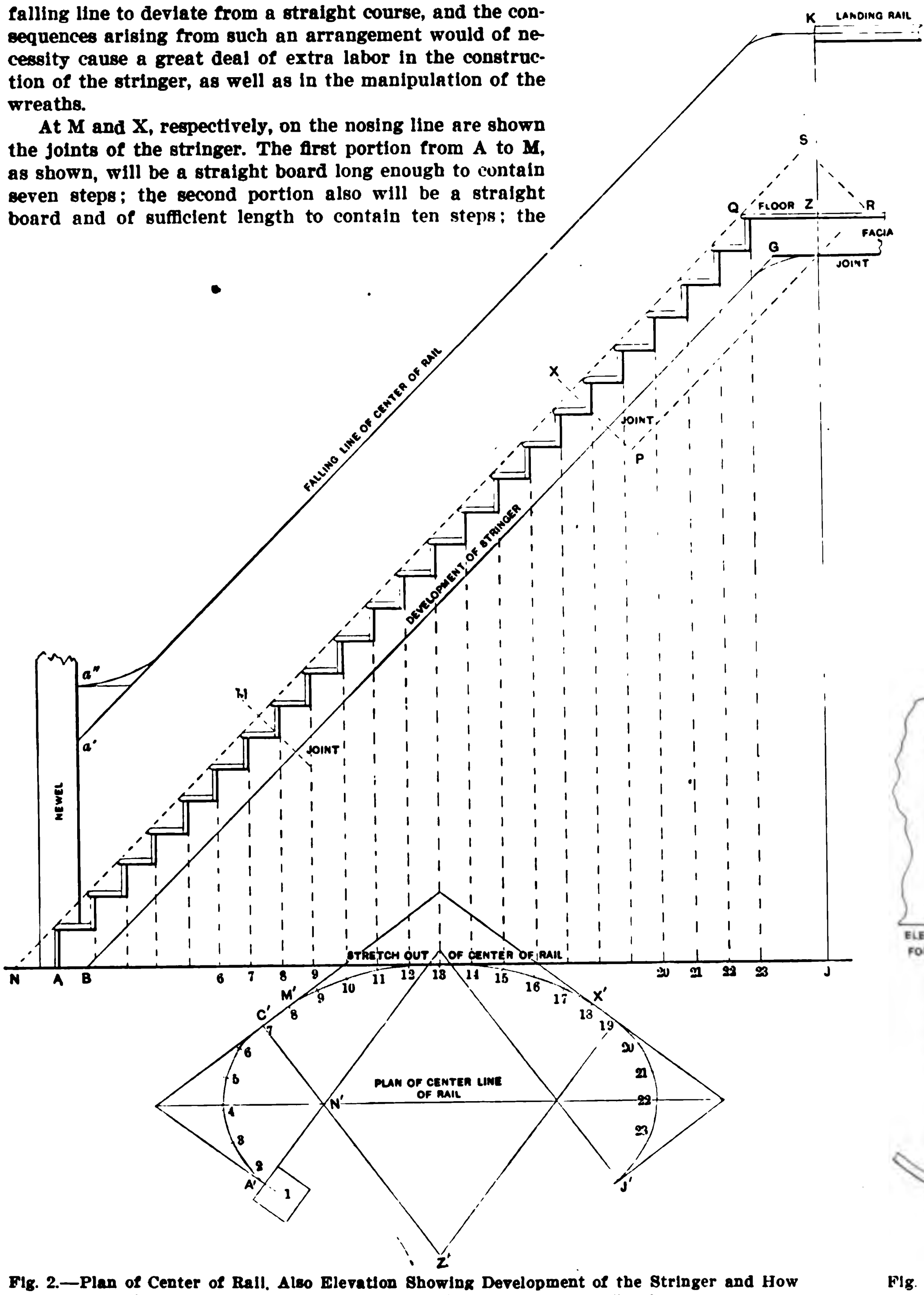



Fig. 2.—Plan of Center of Rail. Also Elevation Showing Development of the Stringer and How Soffit is Ramped to Intersect Level Line of the Landing Fascia.

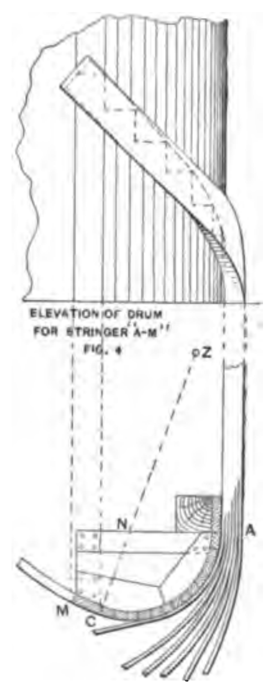



Fig. 3.—Plan of Drum for Block 1 as Shown in Fig. 1.

*Hand Rails for Elliptical Stairs.*

it will be found that the glued pieces will adhere and stay in their bent position.

Fig. 4 illustrates the elevation of the drum showing the stringer as it will appear attached to it. The steps are shown marked on the piece next to the side of the drum, and the riser line is shown parallel to its edge. In Fig. 5 is shown the drum for the middle portion of the stringer, which is shown in Fig. 2 to extend from M to X. The radius for the curve of this drum will be the length of C′ Z′ of the plan, as shown in Fig. 2. The bending process is similar to the process explained for the first portion.

Procure six pieces of ¼-inch stuff, the width of the stringer and of the length shown in the development of the stringer from M to X in Fig. 2, mark the steps on the one next to the drum, glue the six together and fasten with hand screws to the drum. It will be noticed that the third portion of the stringer which extends from X to the landing, and is to intersect with the landing facia, as shown in the development in Fig. 2, will need to be much wider than the exact width of the finished stringer.

Let X P S R represent the width required, proceed as before by having six pieces ¼ inch thick, mark the inside piece for the steps and the soffit curve, glue together and fasten with hand screws to the drum. The same drum will suffice to bend this piece as the one shown in

In the development of the face mold for the wreath shown in Fig. 8 it intersects the two tangents in the point of contact X′, therefore right in the center of the face mold. The two tangents in this development are equally inclined and of the same length. The position of the minor axis should be marked on the face mold and transferred to the material intended for the wreath. Note its position in Fig. 8, and its relation both to the center line of rail and center of plank. The circle there inscribed indicates the exact thickness of the finished rail. The center of the circle is shown to be the center of the plank, and in squaring the wreath an equal portion is chopped off the upper and under sides of the plank, so as to have the center of the wreath in the center of the plank, as shown at 2 *b* and 2 *a*, respectively.

In Fig. 9 is presented an isometric view of the plank, and the application of the face mold to cut out the wreath material. It will be observed that the material is cut out square from the face of the plank, and that the joints are cut square to the tangents. The tangents are marked on the upper face. After cutting out the material, as thus shown, the next step in squaring the wreath will be to work the joints true. All butt joints in hand rails are made square to the face of plank and also square to the tangents. Every care should be taken to have them accurately true, so that no alterations will be necessary after

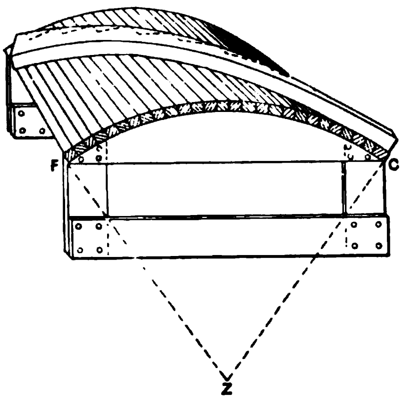



Fig. 5.—Drum for Stringer " M X " of Fig. 2.

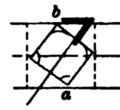



Fig. 6.—Method of Determining Thickness of Plank.

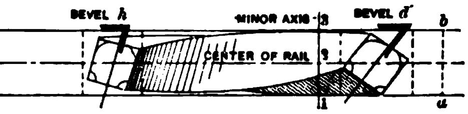



Fig. 7.—Showing Application of Bevels and Position of Minor Axis for Wreath Over First Portion of Rail as Shown in Block 1 in Fig. 1.

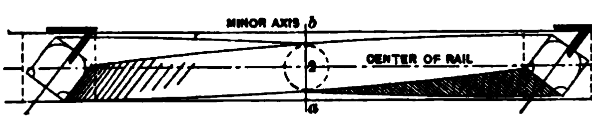



Fig. 8.—Wreath Piece for Block 2, Showing Application of Bevels, Position of Minor Axis and the Center of Rail in Its Relation to the Center of Plank.

*Hand Rails for Elliptical Stairs.*

Fig. 3. After the pieces are bent proceed to cut out the tread and riser lines, and the easing of the soffit for the upper portion to intersect with the facia, as shown at G in Fig. 2.

In Fig. 6 is shown the method usually adopted to determine the exact thickness of the plank required to cut out the wreath pieces. Referring to Fig. 1 where two bevels, *h* and *d*, are shown, having been found for the face mold of block 1. To determine the thickness required for this piece of wreath we will take bevel *d* and apply it, as shown in Fig. 6, then draw a square section of the rail, the diagonal of the section will measure, as from *a* to *b* the thickness of plank required. The rule being, where two bevels are required to square a wreath the greater of the two will have to be used to determine the thickness of plank.

In Fig. 7 is shown the wreath piece for the same block after the application of the two bevels *b* and *d*, and the wreath squared ready for molding. In Fig. 8 is shown the wreath for the second section, block 2, Fig. 1, after the application of the bevel Z shown in Fig. 1, and the squaring is accomplished. Note that in both wreaths the center of rail coincides with the center of the plank. In both illustrations is shown the location of the minor axis. In Fig. 8 it will be found right in the center of the wreath, as at *a b*, while in Fig. 7 it is shown considerably closer to one end than to the other, as at *1 - 3*. A glance at the development of the face molds for the two wreaths, as shown in Fig. 1, will suffice to explain the variation. In the development of the face mold, as shown in Fig. 1 for the wreath shown in Fig. 7, the tangents vary in length and inclination which causes the minor axis to intersect the inclined tangent *b c* in S.

the wreath is molded, when it will be too late to venture upon any tinkering.

When the joints are accurately prepared it will then be necessary to find the center of each joint. Set a gauge at half the thickness of the plank and gauge the line *a d b*, as shown, and from *h* where the tangent intersects the joint draw *h d c* square from the face. The intersection at *d* will indicate the center of the joint. Now place the stock of the bevel against the face of the plank, and parallel with the joints, so that the blade will intersect the center point *d*. The blade will cut the upper face on one end at 1, and on the other end at 3, while it will cut the under side at 2 and 4, respectively. These figures represent points on both faces of the wreath material, whereon the tangents in their changed position will be placed as is required to mark the material for working the vertical sides of the wreath.

Referring to Fig. 10, which is a geometrical figure illustrating the application of the face mold for the purpose above mentioned, it will be noticed that the tangents of the face mold in its changed position for the top of the plank coincide with the points 1 and 3, respectively, and that by tracing along the outside and inside curves of the face mold as here applied to the top of the plank the lines on the material are found for squaring the sides of the wreath vertically. The same process will be necessary for the under side, where the tangents will have to coincide with the points 2 and 4, respectively. One set of dotted lines in this figure represents the face mold as applied in Fig. 9, and the sections on both ends will be found to correspond with the joints, as shown in Fig. 9. The top and bottom faces may be worked out, as shown in Figs. 7 and 8, where it is shown that the center of each joint and the center of the minor axis represent points in the center of the plank. By considering these points as representing also the center of the finished rail, it is evident that the surplus wood to be chopped off to square the rail on both top and bottom faces must be limited to an equal distance on both faces from these center points.

## San Francisco's New Office Building.

An important addition to the architecture of the city of San Francisco will be the new Monadnock Building to be erected on the site of the old Bishop Block on Market street, and which will cover an area of 22,800 square feet. It will have a frontage of 142½ feet on Market street, the same on Stevenson street and 160 feet on Annie street. It will be ten stories high, thoroughly fire proof throughout, and contain about 600 offices above the ground floor. There will be a central light court, 45 x 65 feet, lined with white enameled brick. The building is estimated to cost something over $500,000. In the basement will be a large grille room in the Elizabethan style and a *café* finished in mahogany and marble. The vestibule and the entrance hall will be finished in royal red Numidian marble and bronze, while the corridors of the upper part of the building will be tiled and wainscoted with marble. All of the wood work will be mahogany.

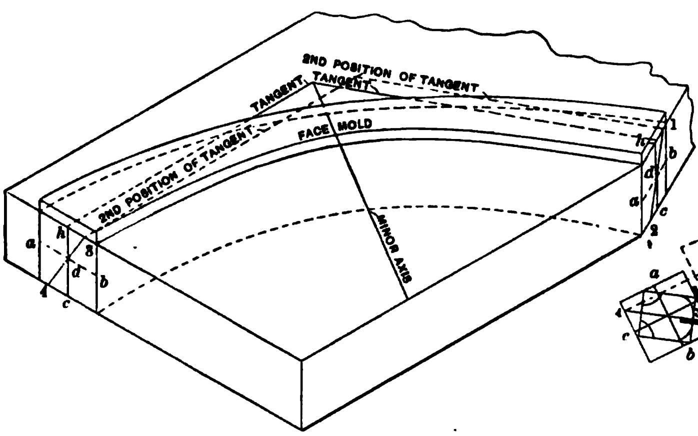



Fig. 9.—Isometric View, Showing Method of Applying Face Mold to Plank for Purpose of Cutting the Material for the Wreath.

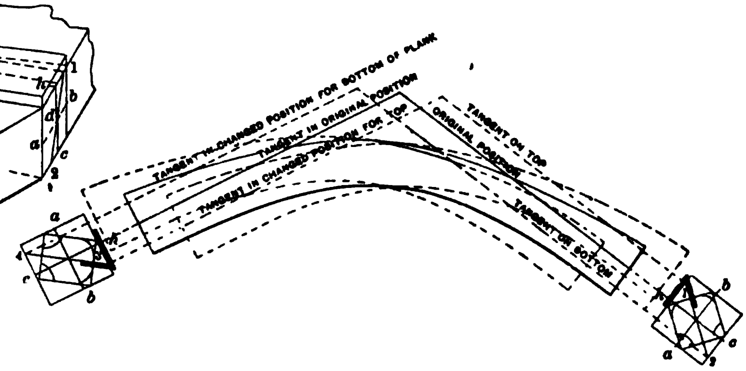



Fig. 10.—Diagram Illustrating Method of Applying Face Mold to Trace the Outlines of the Wreath Preparatory to Squaring Its Vertical Sides.

*Hand Rails for Elliptical Stairs.*

## New Way to File Plans with the Building Department.

Not long since the Bureau of Building of Greater New York made a ruling to the effect that excavating on the site of a new building could not begin until the plans had been filed and approved, and while this caused no little comment by architects yet it was in reality but the enforcement of the established law in the matter and was not by any means a new interpretation on the part of the Department. The legal requirement is that "before the erection, construction or alteration of any building or part of any building, structure or part of any structure, or wall, or any platform, staging, or flooring to be used for standing or seating purposes," and before the construction or alteration of the plumbing or drainage is commenced, somebody shall submit a detailed statement of the specifications, a full and complete copy of the plans and such detail drawings of the proposed work as the Commissioner of Buildings shall require, and the work shall not be commenced until these plans have been approved. In commenting upon this "recent ruling," the *Record and Guide*, in a late issue, printed the following: It need not be said that in practice it has been found inconvenient at times to live up to the letter of the law, and, on the other hand, that certain evils have arisen from violating it. But a way out of the difficulty is contained in the law itself, which in another paragraph says that nothing shall prevent a commissioner of buildings from granting his approval for the erection of any part of a building when plans and statements have been presented for the same before entire plans and detailed statements have been submitted.

In the past few weeks architects and builders have in a number of instances resorted to the alternative contained in this latter provision, and have filed plans for "a part" of their intended building, obtained official approval therefor and a certificate of filing addressed to the Superintendent of Highways, to whom they must next apply for permission to cross the sidewalk. By first filing plans for the foundations and basement they have been able to get their work started sooner than they otherwise would. This is the explanation of some of the plans for "one story brick and stone shops" and "one story stone and brick loft buildings," permits for about 20 of which have been granted in the course of a few weeks, 8 of them last week. This is true of the plans for the "one story brick and stone work shop" to be erected on the southeast corner of Riverside Drive and Ninety-third street, which is an extremely choice location for a "work shop" to cost only $1500. In reality, the site will be occupied by a high class nine-story apartment house, and there will be two six-story ones adjoining. Plans were filed this week for "a one story and cellar stone shop," at 337 and 339 East Thirty-fourth street, that will evolve in due time into a tenement. It would be an exaggeration to say that filings of this nature form "an epidemic," but the movement has been considerable enough to attract attention. The reason given by the architects is that to wait until complete plans for an apartment house have been prepared and passed through the formalities of both the Tenement House and Building Departments means a great loss of time, which can be saved by submitting plans for "part" of the building first and getting permission to start the excavating.

Without permission to cross the sidewalk sites cannot be cleared of old buildings, and without a certificate from the Building Board the Superintendent of Highways will not consent. It is therefore exceedingly convenient for the builders to turn in these preliminary plans and be permitted to start work in a very few days thereafter, rather than wait several weeks for complete plans. However, there may arise objections to this procedure, especially if some confusion should result in the records from having two or more sets of plans filed for the same building, even though the first set be withdrawn when the second is produced.

## Exhibition of Society of American Artists.

A letter from Henry Prellwitz, secretary of the Society of American Artists, 215 West Fifty-seventh street, New York City, announces that at the conclusion of its task of selecting works for the twenty-seventh annual exhibition the society desires to make a public statement of its regret at its inability to show properly, or at all, many worthy works submitted to it. Out of more than 1500 works submitted nearly one-half received on the first ballot a number of votes sufficient for admission, but the restricted space at the disposal of the society necessitated a considerable reduction of this list on revision. The works submitted were of a higher average of merit than ever before and came from all parts of the country, emphasizing the importance of New York as an art center. It is pointed out that a building suitable for a united exhibition of the art societies of New York City is greatly to be desired, as the present galleries are inadequate to the needs of a single society and that larger quarters are rapidly becoming indispensable.

## Meeting of Minnesota State Association of Builders' Exchanges.

The third annual convention of the Minnesota State Association of Builders' Exchanges, which was held in the rooms of the Builders' Exchange in Minneapolis, on Tuesday, February 28, was largely attended and great interest was manifested in the proceedings. In addition to members of builders' exchanges throughout the State there were also present a number of contractors from towns having no local exchange. St. Paul, Duluth and Faribault were well represented and the interest developed is likely to lead to the organization of local bodies in many places where there are a sufficient number of active contractors and builders to insure a successful organization.

The meeting afforded opportunity for an interchange of ideas regarding many phases of the building business as at present conducted, and many interesting points were brought up and ventilated in a way to result in ultimate good to the fraternity. Among other matters was a suggestion for forming a bonding association to furnish bonds for the members, but from the discussion which ensued it was not regarded with general favor. The policy of the State Board of Control in keeping secret the bids made on public work and even the figure of the successful bidder brought out an animated discussion and no little opposition.

The officers elected for the ensuing year were as follows:

President, J. W. L. Corning, St. Paul.
First Vice-President, George W. Higgins, Minneapolis.
Second Vice-President, J. F. Schleunes, Duluth.
Third Vice-President, A. H. Hatch, Faribault.
Secretary and Treasurer, A. V. Williams, St. Paul.

The Executive Committee consists of George J. Grant, chairman, St. Paul; N. W. Nelson, Minneapolis; C. E. Evans, Duluth; Robert Seibert, Stillwater, and James E. O'Neil, Faribault.

In the evening the delegates attended a reception at the West Hotel, tendered by the members of the Minneapolis Builders' and Traders' Exchange, in connection with the annual banquet of that organization. Covers were laid for over 300 guests, there being ten rows of tables arranged across the large dining room and decorated with ferns and carnations. An excellent *menu* was provided, and after the many good things for which it called had been duly considered, President George W. Higgins of the Minneapolis Exchange introduced in graceful phrases the toastmaster of the evening, William A. Elliott. The first speaker called upon was Mayor D. P. Jones, who welcomed the visitors to the city. He touched upon many things in which builders are interested and expressed the belief that the construction work now being executed by the representatives of the building industry is being better done than ever before. He referred to the handsome new State Capitol building and also to the new auditorium which has just been completed in Minneapolis as marking an epoch in the development of the city. J. W. L. Corning, president of the State association, spoke in behalf of that organization, expressing the belief that it was becoming more and more useful and likely to become a great factor in the development of the building trades of the State. He was followed by J. F. McGuire, president of the St. Paul Builders' Exchange, who amused his hearers for a time and then coming down to serious matters referred to the growth of the Twin Cities and suggested that builders and supplymen should insist upon securing a reasonable profit for their work. He declared against cheap work and intimated that the aim should be to see how well it could be done. S. E. Matter spoke on behalf of the Duluth Exchange, paying a glowing tribute to the good work that the exchanges are doing in promoting fair dealing and eliminating the jealousies which for years existed between builders and materialmen. L. A. Lamoreaux of Minneapolis, speaking from the standpoint of the architects, thought that the State had passed through a remarkable epoch of building in the last few years, but felt that the coming year would lead all records. He thought that the members of the building trades should be free from the commercial spirit in order to produce their best work, as architects can accomplish the most when not hampered and limited by that spirit, and he felt sure that it was the same with the building contractors. He favored the further practice of the system which is growing in use in the city—that of letting work on a percentage basis. His opinion was that it gave the owner an opportunity to build what he wanted and eliminated the causes of many misunderstandings. The contractor knows that he is to be paid for what he does and he thought there should be a liberal compensation, not less than 10 per cent.

## Another Hotel for Women.

A scheme which is designed to provide home comforts and attractive surroundings for working girls of small incomes is the erection of a six-story hotel at the corner of Hudson and West Twelfth streets, New York City, in accordance with plans drawn by Ralph S. Townsend of 29 East Nineteenth street. The building will be known as "Trowmart Inn," and will occupy a plot 50 x 147 feet, will contain 258 sleeping rooms, restaurant, kitchen, laundries, roof garden, six bathrooms to a floor, and will cost in the neighborhood of $150,000. The building will be of Colonial design, with façades of granite and brick and trimmings of terra cotta. The unique feature will be the absence of corners or angles both outside and in the interior, as all angles will be either concave or convex. Single rooms will be 8 x 13 feet in size, and double rooms 11½ x 14 feet. Each room will have a fire proof closet of polished cement, so ventilated that damp clothing will be easily dried. Each floor will have a dressmaking room for the girls and a laundry with a steam dryer and electric irons. The hotel is being put up by W. R. H. Martin, the owner of the Hotel Martinique, and while the scheme is not in any sense a charity, the rates will be such as to make it more or less of a philanthropic enterprise. It is expected to have the hotel ready for occupancy by October 1.

## A Women's Club House.

A building, which will be known as the "Colony Club," and which is expected to be ready for occupancy by May 1, 1906, has been designed by McKim, Mead & White for erection on Madison avenue, New York City, between Thirtieth and Thirty-first streets. It will be four stories and basement in hight, and will occupy a plot 75 x 98 feet in size. It will be built of brick and white marble in the Colonial style, its model being an old Boston tavern. The structure will be fire proof and provided with a hygienic system of heating and ventilating, electric lighting and an air cooling system. The interior decorations, we understand, will be under the personal supervision of Miss Elsie de Wolfe, the actress. There will be an assembly room, 25 x 72 feet; a gymnasium, 33 x 60 feet; a swimming pool, 20 x 55 feet; Turkish, Russian and electric baths, lounging rooms, dressing rooms, a squash court, a general restaurant, kitchen, &c. Across the entire front of the building will be a roof garden, 20 x 75 feet in size.

A POPLAR board was recently received by a Detroit concern, which it is said would make even a Pacific Coast redwood man envious. The size was 51 inches in width and 16 feet in length.

# CABINET WORK FOR THE CARPENTER.

## SITTING ROOM FURNITURE.

BY PAUL D. OTTER.

MANY of the readers doubtless observed in the "Prospectus" which accompanied the December number of the paper the announcement relative to some articles intended to serve as suggestions for the carpenter or cabinet maker who is clever in handling the tools of his craft. As indicated in that issue of the paper, the rooms in which we move and have our being will be disclosed for general inspection in the articles which are here commenced, the apartments in question being the sitting room, dining room and parlor. The sitting room first appeals to us, for it is here we go to be at ease, to read or chat in the relax hours of the day or evening. Some of later day like to see it on their building plans or speak of it as the reception room, but this puts it in the chilly class, and causes "the man" to feel less likely to be admitted—with his cigar and dressed in his easy clothes.

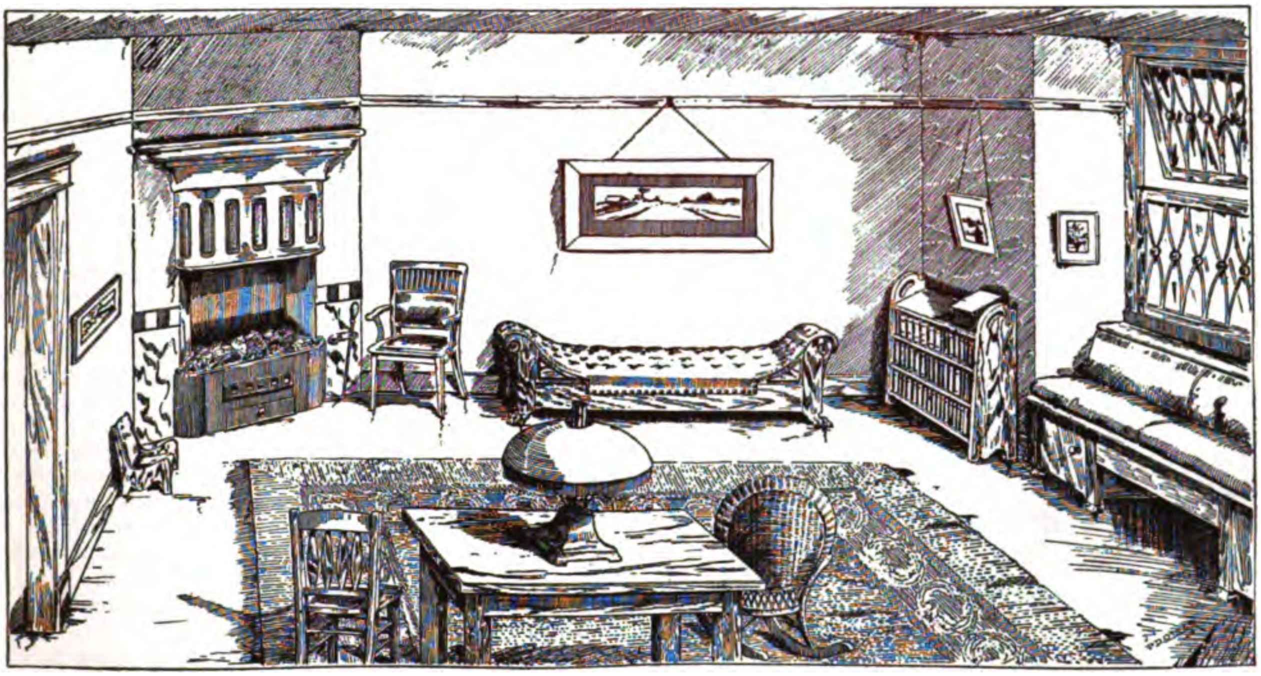
In order to deal intelligently with the subject it will perhaps be more interesting to offer a suggestion of each room, and to this end the general interior view shown herewith has been prepared. This, taken in connection with the details which follow, cannot fail to interest those mechanics who are disposed to improve their opportunities.

The sitting room, or living room, should be all that the name implies—a room in which to truly live and rest, to draw cheer and fresh air from without through broad window openings; to provide ample artificial light by night, for how often does the good wife who represents the "purchasing department" invest in the lamp beautiful, possibly one of those "banquet" affairs—something like a lone umbrella in a little topply stand, stiff and formal, with its pretty red silk skirts, absorbing the light? This gives a reason for "Pa liking the kitchen to go over the newspapers."

As the carpenter is generally accustomed to doing work "on the square" it is fortunate and befitting that no great departure from the path of rectitude be suggested, for as indicated in these columns two years ago the Mission style, then touched upon, has been favorably received. This "style" and its more pleasing modified forms in the later "Arts and Crafts" and "Modern Arts" are within the range of every joiner other than cabinet maker. Despite the present pronounced favor in which this clean lined furniture is held there is little reason for the present day craftsman, with modern equipment, repeatedly executing all kinds of furniture in that severely rigid manner. The form and generous proportions may well be adhered to, or, we will say, take the pure type of modern Mission, so-called, and soften it down on edges and corners, and we would have a much less dangerous piece of furniture to stumble against in the dark. There is too much evidence of 3 x 4 inch and scantling effect, which is hardly consistent with our rounded out way of living.

As the window seat shown in the illustration is simply a suggestion, its construction must be determined by individual requirements. The hight, however, can be definitely set at 16 inches, and this with soft, well filled leather bags to bring the seat hight to 18 inches.

The under part should not be lost space, but should do duty for lockers or drawers. In building such a piece of furniture the aim should be, whether it is portable or fixed, to maintain its harmonious relations with the architectural treatment of the house. A pleasing change may be given in the doors of the lockers or cupboards, when the general wood trim is of a plain character, by having a three-ply laid-up door, with a good marked figure or quarter panel without molding trim. In making the veneer the two outer panels should be placed transversely in grain, with a thin veneer intervening, the three pieces being glued under heavy pressure in this order.



Interior View of Sitting Room, Showing Principal Articles of Furniture.

*Cabinet Work for the Carpenter.—Sitting Room Furniture.*

The book shelf shown in the picture needs little explanation, as it is a matter of easy construction. A slant top freed from everything but the big dictionary will be found very convenient. Where there is a large and growing family the medicine chest and the dictionary should be in a free position to which to refer quickly to repair our physical and mental condition. Undoubtedly the modern system of "elastic" book shelves is the best solution in caring for books, as they are in units and dust proof, to be added one to another as books and the means increase.

In Fig. 1 of the smaller illustrations a fireside seat is offered as a novel form of rest furniture not seen in the show windows, its chief feature being its substantial character and the low and slanting position of the seat to the floor. It measures to the top of the frame 9¼ inches at the back and 11 inches in the front. The entire structure is from 1 inch stock, or, when surfaced, ⅞ inch thick. Careful selection of wood as to figure, markings and jointing is very important in patterns with broad, plain surfaces. If maple, birch or mahogany is used the smoothness of the work in the making is amply compensated for in the effect of the good after-finish, whether in dull or usual polish treatment. The side view that is shown is all that is necessary to detail in full a drawing, as the front view is 22 inches outside from floor to top. It is thought that from the necessary high and low points noted in the cuts sufficient guide is afforded to prepare the drawing of the side. Do this in a free-hand way, not hesitating to rub out and draw over until one feels satisfied that the curves are good. When the drawing has been completed cut to the outline for a marking out pattern. A side will make up from three 8-inch boards jointed in length and shape to more than cover the pattern. Be careful that good glue is used, fitting the joints previously with two or more dowels as a precaution. It is, of course understood that the boards are rough or full thickness so as to dress ⅞ inch in thickness and perfectly smooth. After the sides are sawn and perforated to shape of pattern it would be well to glue and screw the 2-inch cleat upon which the seat frame rests, as shown in the illustration. The position of all detail will be before you on your drawing.

The seat frame is 18 x 20 x ⅞ dressed size, consisting of the rails and stiles of 3-inch widths, and as to filling,

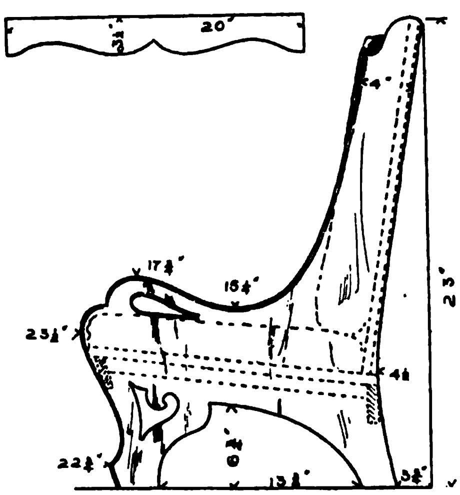



Fig. 1.—Fire Side Seat.

*Cabinet Work for the Carpenter.—Sitting Room Furniture.*

five 2-inch slats equally parted. It is a matter of opinion as to how the frame is made up, whether by dowels, lap joint or grooving. The two rails shown according to the cut are now made ready, one for the front rail, or apron, and the other in inverse position for the top back rail. Cut these to a 20-inch length and provide each end with three 7-16-inch dowels; likewise prepare a straight back rail of the same width and length. The sides, bored with holes corresponding to the dowel holes on the rails, permit the frame to be glued and set up under long clamps after which the seat, exactly fitting, may be set over the fitted rails and along the cleats, which were glued to the sides. This may be glued and further held by glue blocks here and there underneath, fitted to angle of slanting front and back rails. The back filling consists of 4½ x 3 inch slats evenly spaced. Each of these may be provided with two short 7-16-inch dowels to fit the top rail, and the lower ends fitted and driven up to line, where they can be secured by brads. The edges should now be rounded off from top rail to floor, or they may be treated to a ⅛-inch bevel and smoothly sanded. The front edge of the seat should have a full rounding; also hand holds at top to be well filed smooth. The sanding stick illustrated in the January issue of the paper comes into good use on such outlines.

The cushions are very much like a leather covered pillow, and their construction will be taken up in another article dealing with the cushion, likewise the desirable finish for various pieces under discussion in this series.

It may not be out of place to state that the smaller illustrations represent articles of furniture slightly differing in design from those indicated in the large interior view, this being done for the purpose of giving a drawing with specific details and the same proportions, which will enable the worker to draw up in full outline the articles shown in the interior view if he so desires, and at the same time incline him to lean more and more on his own judgment and creative ability. There are many who are not only able to originate, but to draw up their ideas if they have proper standards to serve as a guide, and it is with this thought in mind that much time and attention has been given to the proper measurements and details of the work in hand.

*(To be continued.)*

## Ventilating by Open Fire Place.

Judging from the various schemes for ventilating buildings which have come under my notice, says W. Harman, in a paper recently read before the Architectural Association, I am surprised to find what little attention is given to even the most elementary calculations as to the probable results which will be attained, notwithstanding that certain data have been arrived at which experience proves to be fairly reliable and so simple that there is no excuse for neglecting to employ them. Failure, where it takes place, results generally from underestimating the supply of air necessary for securing efficient ventilation, and from the employment of restricted areas of inlet or outlet channels, openings or ducts. An ordinary room is provided with one fire place flue, and, as previously stated, when a fire is lighted, that flue is practically the only outlet of air from the room. Consequently, by ascertaining the velocity of air passing up the flue and the sectional area of the flue, it is easy to find how much air will pass through the room in a given time.

Several influences will be at work at varying times which will affect the velocity of air passing up the flue, such as more or less fire in the grate, more or less force of wind outside, &c.; but under medium conditions a flow of about 5 cubic feet per second may be taken as the volume passing up an ordinary 14 x 10 inch flue. Kindly note that I give the volume at about 5 cubic feet. I do this for the purpose of simplicity, and because it is near enough for practical purposes and can easily be remembered. If 5 feet be multiplied by 60 times 60, the result—namely, 18,000 feet—will be the volume of air passing through the room in an hour, and if change of air be demanded at the rate of six times per hour, the cubical capacity of a room with only one fire place flue should not exceed 3000 feet, say 20 feet by 15 feet by 10 feet.

A point to which I have given some consideration is the size of a special inlet relative to that of an ordinary fire place flue. A good rule is to have it of ample dimensions, with easy means for its regulation. It is then the fault of the occupants if care be not taken to adjust it to requirements. The difficulty, however, is that people are generally careless in paying attention to so simple an appliance. On a windy day the opening will be closed to prevent discomfort from drafts, and no one thinks of opening it in calmer weather. I have therefore come to the conclusion that when the inlet is placed as I advise—on the same side as the fire place and as nearly central thereto as possible, about 2 feet below the ceiling—a clear opening of about one-half the area of the outlet flue will suffice, for the following reasons: (1) If the inlet is simply through an external wall there will be less friction than in the long outlet flue, therefore the velocity can be greater. (2) Because, with a properly formed and louvred inlet, the additional velocity in the upper and unoccupied portion of the room will distribute the air throughout better than if entering at low velocity. (3) Because variations in the force of wind outside will not be so much noticed within the room when the area of inlet opening is not excessive.

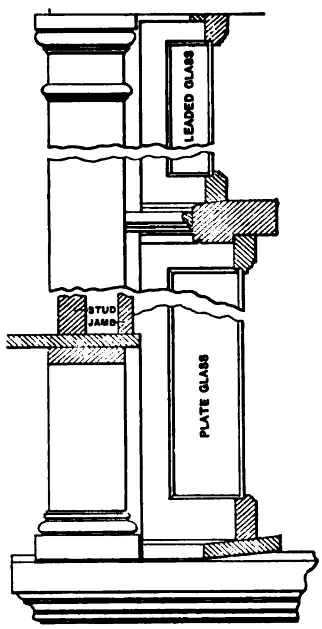
# CORRESPONDENCE.

### Designs Wanted for Double Deck Lumber Sheds.

*From* S. F. L., *Ellinger, Texas.*—Will some of the practical readers of the paper send for publication in the Correspondence Department designs of double deck or two-story lumber sheds? I expect to build one about 28 feet wide by 100 feet long, and closed all around. There will be doors on one of the long sides of the first and second floors. If possible I would prefer to use barn door hangers. I have no doubt that designs of this character will prove interesting to other readers as well as myself.

### Construction of a Transom Bar.

*From* C. A. W., *Port Jervis, N. Y.*—Inclosed find blue print of a transom bar which I hope will answer the requirements of "M. S. M." of Spokane, Wash. He does not say whether he wants the sash to raise or to be stationary. It is difficult to tell from his query just exactly what is wanted. In case, however, he should want to




*Constructing a Transom Bar.*

raise and lower the sash he can cut off the inside of the bar so as to let the bottom run through the head jamb.

### A Reader's Views on "Labor Epigrams."

*From* A. B., *Proctor, Vt.*—While I have never been a contributor to your journal I have read it with much interest. I heartily indorse the major part of the card of "labor epigrams" published in the January issue, and think they are the most practical of anything I have seen outside of the Correspondence Department. This department seems to me to be the extremely practical side of the journal, but I fear that it is read by only a few of those who would receive the most benefit. Both experience and observation have taught me that this latter class, such as described by "Blue Hand Saw" in the August issue, prefer to spend a large part of their spare change and time down on the corner at Mickie Flynn's or the "old spot" rather than in the acquisition of useful knowledge. Now, I would not be understood as being inimical of union principles, but would welcome the day when the interests of so vast a problem shall be managed by as broad minded men as those who are at the heads of the great business houses and adjust the affairs of State.

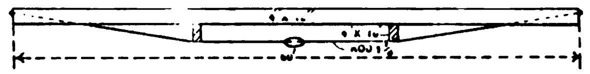
### Framing a Roof with Varying Pitches.

*From* H. F. H., *London.*—Will some one kindly tell me through the Correspondence columns the most simple method for framing a roof with varying pitches?

*Note.*—If our correspondent will refer to the early issues of the volume for 1903 he will find a most interesting series of articles by Morris Williams on "Framing Roofs of Equal and Unequal Pitch," which we think will meet his requirements.

### Formula for Safe Load for Floor Truss.

*From* E. H., *Hailey, Idaho.*—In an early issue of the paper I shall be glad to have Mr. Kidder give the formula



*Formula for Safe Load for Floor Truss.*

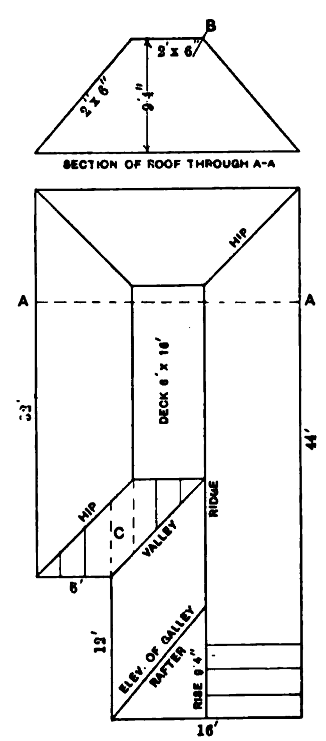
for determining the safe load for the form of floor truss shown in the accompanying sketch. It may be of interest to many others, as well as myself.

### Cutting a Perfect Square from a Board.

*From* W. B. L., *Skowhegan, Maine.*—I am a reader of *Carpentry and Building* and gain much information from its columns, yet how true it is that the more we have the more we want. I have had a bit of discussion with a man under whom I was working last fall as to the use of the square and one thing brought on another until it came to the question, Can we cut out a perfect square from a board, and if not why not? We were agreed as to the fact but not as to the reason. He maintained that a steel square that is perfect will not fit around the fourth corner. I claimed that the trouble is with the instrument or the workman, and that if the steel square is exactly 90 degrees and the workman does his part to the line every time there will be no error. Of course, I understant that a very small error—so small as to pass unnoticed—repeated upon each corner may be quite an error at the fourth, as it would double at the second, and so on. Can the readers tell which of us is right?

### Finding Bevels of Rafters in a Deck Roof.

*From* J. A. K., *Detroit, Mich.*—I would like to ask some of the brother chips who are expert in roof framing to give a plain and simple method for obtaining the




*Finding Bevels of Rafters in a Deck Roof.*

bevels and lengths of rafters in a roof of the kind represented in the sketch presented herewith. What I particularly want to know is how to practically obtain the bevels at B which represents a section through the deck roof on the line A A of the plan, the rafter being 2 x 6 and continuous from plate to plate, as indicated in the section. I would also ask how to obtain the lengths of the jack rafters or cripples between the hip and valley rafters as at C of the plan, the rafters being 2 feet on centers.

### Proper Hight for Hand Rail and Newels.

*From* M. S. M., *Spokane, Wash.*—Will some reader tell me through the Correspondence columns how to find the proper hight of the hand rail in the construction of a stairway, and the method of determining the hight of the newel posts? I have been a reader of the paper for two years and would not be without it.

### Action of Frost on Concrete.

*From* C. H. T., *Norfolk, Va.*—Authorities seem to differ considerably as to the action of frost on concrete. In order to aid me in some very important work I would like to know if possible at what stage of setting frost does the most harm and what injury it does after the initial setting before the concrete is dry. What effect has frost on dry concrete fully set? Can a practical answer be given to the following questions:

1. Is cinder concrete injured if it freezes before setting at all, then thaws out and has a chance to set properly?

2. Is cinder concrete injured if it freezes when partly set and then thaws out and is allowed to set? If so, to what extent?

3. If cinder concrete is partly set and then becomes saturated with water which freezes in the concrete, what will be the result on the concrete?

4. If saturation and freezing and thawing occur in concrete almost or entirely set, what will be the result?

5. If concrete is thawed by heat and allowed to set, to what extent if any would this injure it?

I am at present working on a building in which the concrete floors were laid under very unfavorable conditions. The floor panels for the most part are about 14 x 18 feet, and removing them will greatly delay a job which is in a big hurry, besides incurring great expense to the contractors. On the other hand, the floor panels have in many cases been exposed to freezing and thawing weather which was never expected, and the panels are so large as to have considerable responsibility put upon them.

*Note.*—With a view to affording our correspondent prompt information on the various questions enumerated above we submitted them to Sanford E. Thompson, the author of several contributions to these columns on the subject of concrete, who furnishes the following comments:

In answer to the correspondent in regard to the action of frost on concrete, I would say that if the structure is properly designed and the concrete is carefully laid with first-class Portland cement, freezing should produce only slight surface disintegration.

Freezing retards the setting and the hardening. In fact, while frozen, the concrete attains almost no strength, but upon exposure to a higher temperature the setting takes place and the concrete will attain an ultimate strength very nearly as great as if it had not been frozen.

Natural cements are seriously injured by frost; in several instances I have seen natural cement mortar made in freezing weather which after two or three years' time was of the consistency of earth, but Portland cement concrete with proper care can be laid in extremely cold weather without bad results, although winter work should be avoided if possible. The surface of the concrete is apt to be affected to the depth of about 1-16 inch and there is also difficulty in making joints between concrete laid on two different days.

The worst conditions to which concrete can be subjected are alternate freezing and thawing with constant exposure to moisture, particularly for a concrete so porous that water percolates through it. However, if in any case serious damage is caused by the frost the injury should be evident to the eye. In other words, if a concrete which is known to be of good quality, except for the freezing, looks all right and appears from blows of a chisel or crowbar to be sound and hard, it should attain with age a strength equal or nearly equal to a similar concrete laid in ordinary weather.

Cinder concrete, although weaker and less reliable than concrete made with broken stone or gravel, should stand freezing as well as the latter, provided it is well proportioned and laid so as to be dense and without visible voids; but to attain this it must be mixed wet enough in laying so that the mortar will flow and completely surround the cinders. Conclusions in regard to the resistance to freezing of stone concrete are applicable therefore to cinder concrete.

As to the time at which injury from frost is greatest, I would say that in my experience cements such as Natural cements, which are affected by freezing, appear to be injured even if the frost does not occur for, say, two or three days after it is placed. In general, however, the earlier the freezing occurs after laying the worse it is for the cement.

Turning to the specific questions of the correspondent it may be said that under none of the conditions mentioned should Portland cement concrete, if properly laid, be injuriously affected by freezing except for the surface disintegration mentioned and at the joints between work laid on two different days. If the concrete be poorly proportioned or mixed with insufficient water so as to give a porous concrete in which water stands and alternately freezes and thaws the result would probably be disintegration, as no masonry can stand the direct effect of water freezing in its crevices, but even in such cases the injury should be apparent to the eye.

A further discussion of the effect of frost and the results of experiments upon frozen mortar are given in the book on "Concrete, Plain and Reinforced," which the writer has just written in collaboration with Frederick W. Taylor and which can be obtained from the publishers of *Carpentry and Building.*

### Wired Glass in Skylights.

*From* D., *New York.*—I should be very much obliged if some of the large skylight manufacturing firms would give us the results of their experience with wire mesh glass in skylights. Some architects claim that the contraction and expansion of the wire mesh cracks the glass and that for this reason it is not as satisfactory for skylights, except on fire proof buildings, as the plain skylight without the wire mesh. I know some contractors refuse to guarantee wire mesh glass, and I would like very much to be favored with the opinions of some of those who have had large experience in the use of this material in skylights.

### Sharpening a Scraper.

*From* W. N. H., *Newport, R. I.*—As I was looking over some back numbers in review I came across the question of sharpening scrapers and as I am interested in this particular matter it may not be out of place for me to briefly describe the kind of scraper we use in this section. Here in the city we have mostly hard woods to work and the floors are either quartered oak, maple, red birch or some other hard wood. After traversing and smoothing we scrape and sandpaper the floors, and in connection with the work make use of a cheap, common sense scraper that can be produced at little cost. I will tell my brother chips how it is made: We take a piece of wood 18 inches long, 2½ inches wide and 1¼ inches thick and cut and miter on one end and then shape it for a handle. Take a common scraper and make a hole in the center of it the size of a round headed screw; place a screw in the center of the miter, put the scraper on to that and then put a clamp on the outside to hold it. The cap of a smooth plane can be used or one of Stanley's knuckle jointed strike block caps, and the result is the best scraper there is made—one that can be held so that when you draw it toward you it will not "chatter," but will do good work. In order to sharpen the scraper we use a fine flat file and file the scraper with a short bevel; then we get a good edge by rubbing it on an oil stone, after which we turn the edge lightly with the burnisher. If one has no burnisher the convex side of a gouge will do very well if it is smooth. This scraper is fine after you learn how to sharpen it.

### Finding Cut for Purlins.

*From* Hee H. See, *Brockville, Ont.*—Anticipating that some of the many advocates of the steel square will answer, in the manner requested, the query of "J. C. W.," Berlin, Pa., on page 44 of the February issue, I am sending a sketch of the way that I would do the work, and though I use the steel square in the solution, it is only for the purpose of getting the pitch of the roof and squaring lines across the sides of the purlin. Referring to Fig. 1 of the sketches, take a piece of board about 10 inches wide and 2 feet long and by means of the steel square set out on it the pitch of the roof, as shown. Wherever convenient on this line draw the end elevation

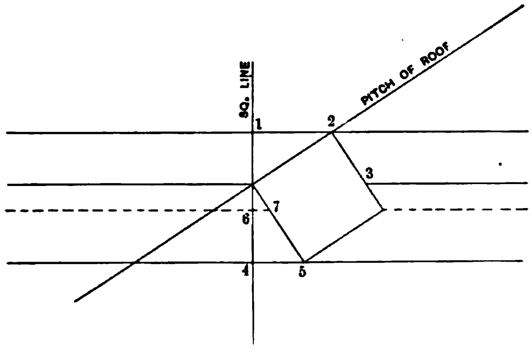



Fig. 1.—Laying Out the Pitch and End Elevation.

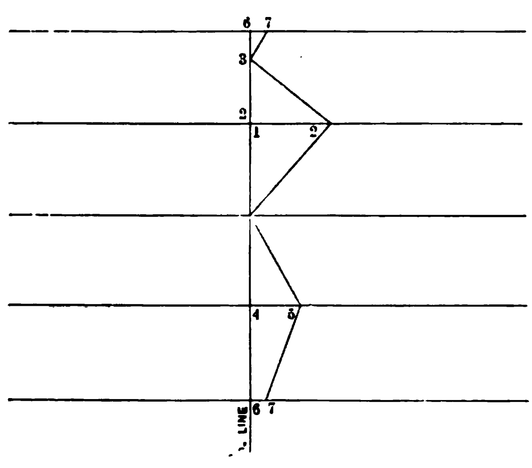



Fig. 2.—Diagram Showing Lines Transferred to the Timber.

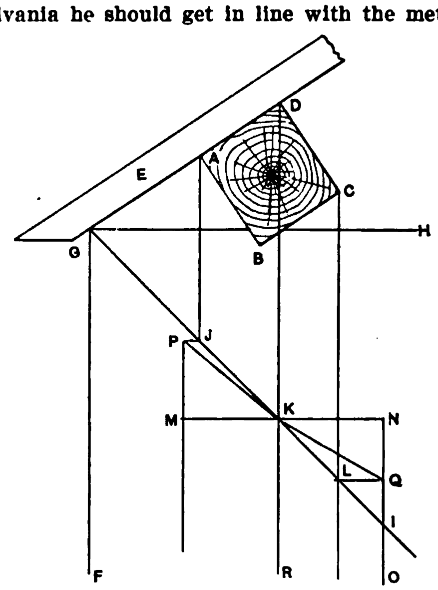



Fig. 3.—Method Suggested by T. W. Sterrett

*Finding Out for Purlins.*

of the purlin full size, then with rule and pencil draw lines parallel with the edge of the board and intersecting with the corners of the purlin. This will be the side elevation of the other purlin, and a line square across this elevation completes the drawing. This can all be laid out in something under a minute, once it is understood.

To mark the timber, first square a line around it about 6 inches from the end, then measure the distance from 1 to 2 in Fig. 1 and transfer it to the timber as shown in Fig. 2, where the four sides of the timber are supposed to be spread out flat. The next step is to take the distance from 2 to 3 of Fig. 1 and transfer to the timber as shown, but this time it is necessary to measure straight down the square line, all as clearly indicated in Fig. 2. This is the spot where the corner of the purlin of which we see the end elevation in Fig. 1 will cut through the inside of the other purlin. The other distances are measured and marked as shown along the corners of the timber from the square line. At first this may seem a little complicated to "J. C. W.," but the whole thing, drawing, marking and cutting, can be accomplished in five minutes once it is understood.

If the roof was square pitch we should not need to measure from 2 to 3, as the cut would be the same on each side and would run through the corner mark 6; that is, provided the timber had equal sides, as in this instance. I would advise "J. C. W." to make a model of this, using a piece of 2 x 2 or 4 x 4, and setting it out full size on a piece of board as shown. If he does this I think he will have no difficulty in understanding how to cut the joint for roofs of different pitch. If he does find it difficult and cares for this method of solving the problem, I shall be very glad to help him through the columns of the Correspondence Department.

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*From* T. Woods Sterrett, *Fairview, Pa.*—As "J. C. W." of Berlin, Pa., seems to be in a great hurry to cut out his purlins, I send the following, which may be of assistance to him. Referring to the sketch, Fig. 3, let A B C D represent the purlin, E the common rafter drawn to the correct pitch as required, F G H the plan of the angle of the building and G I the plan of the hip. From the angles A D C of the purlin draw the lines A J, D K and C L parallel to F G; make K N equal to the depth of the purlin, and K M equal to the thickness of the purlin; draw N O and M P parallel to F G from the points where the lines from A and C cut the plan of the hip; draw J P and L Q square from F G; join Q K and K P. The angle R K Q will be the bevel for the down or side cut and the angle M P K will be the bevel for the cut across the edge. In practice it is best to lay out the purlins full size in order to insure accuracy of the work. "J. C. W." will find that this plan will work every time and for every pitch of roof. However, this is the old time method of setting up purlins, and as I note that "J. C. W." is from Pennsylvania he should get in line with the methods of framing timber as it is now done. I do not know of a purlin being set at right angles with the roof in any building that has been erected in this section for the last 20 years, as we invariably set them perpendicular or square with the beams.

In passing on "J. C. W.'s" sketch I would like to call his attention to the method he has illustrated and no doubt follows in framing his beam into the plates by cutting the beam ½ foot from the bottom side and rendering it liable to split if he loaded it anywhere near its full capacity. He also shows a hook over the plate of 4 x 6 to keep the side of the building from being crowded out, which would be certain to shear off if filled with hay or grain, in case the frame was used for a barn. The method we follow here is to head in the end of the beams ½ to 1 inch and have a tenon and mortise pinned with two hard wood pins.

*Note.*—Just as we go to press we are in receipt of a similar demonstration from "J. O. S.," Terre Haute, Ind.

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### Durability of Washington Fir for Sills.

*From* H. L. W., *Elliott, Iowa.*—I would like to ask through the Correspondence Department of the paper regarding the durability of Washington fir when used for sills, or in places where there is some dampness, as compared with white pine. I have been told it is subject to dry rot.

**Joining New Roof to Old Building.**

*From* N. T. L., *Kingston, Ohio.*—For the benefit of "J. C. W.," Berlin, Pa., whose inquiry appears in the March issue, I inclose a sketch showing how his new roof can be joined to the old one without much trouble. He must, however, remove a portion of the gable cornice and continue the studding upward, forming a plate or rafter seat at A, and then make an eave cornice at this point, which will intersect with the old and new buildings.

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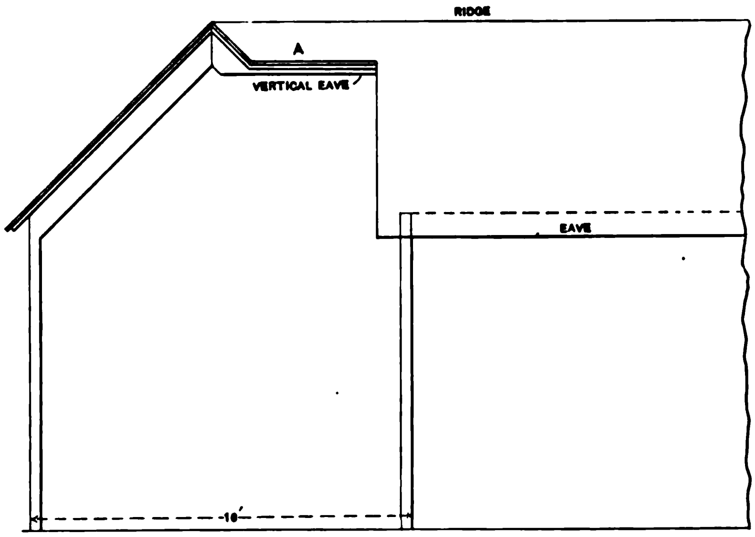
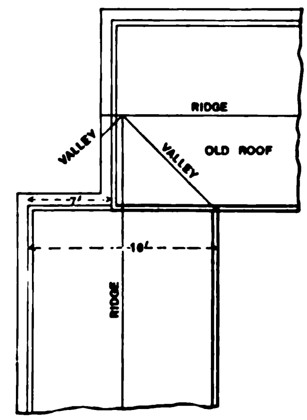
*From* E. H. B., *Riverhead, N. Y.*—In looking over the March issue of *Carpentry and Building*, I noticed the diagram of "J. C. W.," Berlin, Pa., and his request for roof plans suitable for his purpose. I inclose several plans, any one of which can be used successfully.

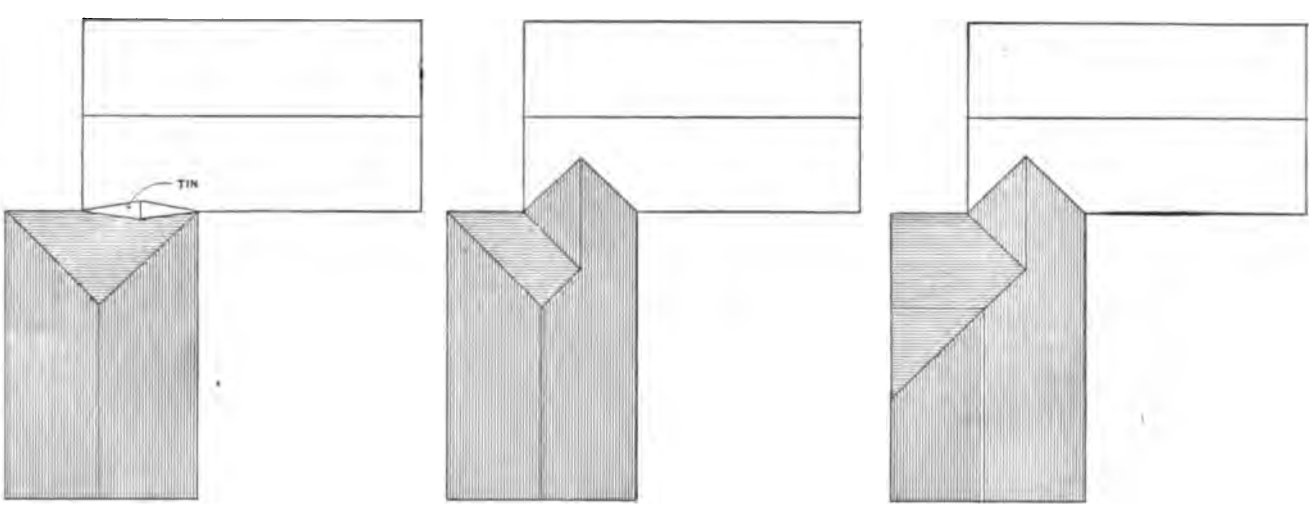
*Note.*—We have solutions of the problem similar to the second shown by "E. H. B." from "J. W. S. E.," Toronto, Can.; "J. M. L.," Hillsboro, Ill., and "J. H. F.," Steubenville, Ohio, all of whom furnish diagrams showing the roof plan.




End View of Old Building, Submitted by "N. T. L." Side of New Building.




Roof Plan, Submitted by "N. T. L."




Various Plans Showing Solution of the Problem Submitted by "E. H. B."

*Joining New Roof to Old Building.*

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**Deadening a Dancing Floor.**

*From* S. M. C., *Jersey City, N. J.*—Referring to the inquiry of "W. A. M.," in the March issue, I would say that probably the better way to deaden his floor for dancing purposes is to fill in between beams with mineral wool, a substance absolutely vermin proof, and if put in with care it will make the floors almost as though they were solid, so far as the conducting of sound is concerned. Another very good scheme and one which will doubtless appeal to many of those practically engaged in the building business is to lay a rough floor on top of the beams, then cover it with two layers or more, according to requirements, of what is known as cork roofing felt, laid with broken joints, and on top of this in turn lay the finishing floor. The material mentioned is thick and water proof, and the cork renders it more sound proof than would otherwise be the case; at the same time it is better adapted to the purpose than even the heavier grades of building paper. In case two thicknesses of the material should not prove sufficient for the purpose the number may be increased according to requirements. If by any possibility the correspondent should not find these several thicknesses to give the desired results it may not be a bad idea to divide the depth of the beam, putting one of the layers of cork felt half way down. If the correspondent desires to render it absolutely impossible for the sound to penetrate to the story below the dancing floor it will be necessary for him to deaden the walls and partitions as well as his floor.

*From* C. G. S., *Olympia, Wash.*—In answer to "W. A. M." I would say that my idea of deadening a dancing floor is to pack the space between the floor and ceiling with sawdust, which will make it absolutely impossible for sound to pass through.

*Note.*—While the above is a method often used for deadening floors and partitions, especially in sections where sawdust is readily available in large quantities, an objection to it, however, is the facility with which it absorbs moisture, and soon becomes so damp as to affect the wood work with which it comes in contact.

**Fastening Tin on Concrete Roof.**

*From* Old Reader, *Evanston, Wyo.*—Will some of the readers explain through the Correspondence columns the method they have used to fasten tin on a roof of concrete?

# WHAT BUILDERS ARE DOING.

ACTIVITY in the building line appears to be on the increase in Chicago, Ill., and judging from the permits which are being filed from day to day and week to week the spring is likely to witness an unusual amount of work. During the month of February permits were issued by the Building Department for 269 buildings, having a frontage of 7835 feet and calling for an estimated outlay of $3,472,700. These figures form a striking contrast to those covering February, 1904, when permits were taken out for 213 buildings, having a frontage of 5362 feet and estimated to cost $1,270,310. With the exception of February, 1902, the past month was far ahead of any corresponding period in the last ten years.

### Erie, Pa.

Architects and builders regard the outlook for the spring season as of a most rosy character, the former being busy with drawings for immediate figures, while several plans which were completed too late last fall to warrant starting the work of construction will soon be presented for estimates. Some idea of the situation may be gained from the statement that during February 21 permits were issued calling for an estimated outlay of $15,025, as against 23 permits for buildings, estimated to cost $5248 in February of last year. Four years ago building operations suffered as a result of a carpenters' strike, but last year a very liberal agreement was signed with the union, and the present feeling is that there will be no trouble the coming spring.

The fourth annual meeting of the Erie Builders' Exchange occurred in the rooms of the organization on the evening of Tuesday, February 7. The annual report showed the exchange to be in a growing and prosperous condition, and that the membership at the beginning of the year numbered 119, with several applications to be acted upon at the next meeting of the directors. The records showed that over 2000 visitors were entertained the past year, and that advance information had been given on 64 jobs in the city and 49 out of the city. Although 1904 was what may be recorded as an "off" year in the building line, it is interesting to note that the total amount of building and repairs in the city exceeded that of 1903. The building inspector issued 677 building permits, having an aggregate value of $999,136. Of this number 290 permits, or 43 per cent., were issued to members of the exchange amounting in value to 65 per cent. of the grand total. From this it will be seen that the bulk of the work was handled by the exchange.

The election resulted in the choice of the following officers for the ensuing year: President, Adolph Schroeck; vice-president, James B. Yard; secretary, U. D. Sweigard; assistant-secretary, R. F. Washburn, and treasurer, John Sapper.

The Board of Directors decided to open a free employment bureau for the convenience of the members and for the benefit of all craftsmen and laborers connected with the building industry, the privileges to be extended to both union and nonunion men alike.

### Los Angeles, Cal.

During the month of February there were issued 618 permits for improvements aggregating $848,765, as against 482 permits for improvements aggregating $839,278 in February, 1904, 464 permits for $780,053 of improvements in February, 1903, and 254 permits, for $363,233 of improvements, in February, 1902. For the first two months of the new year there were issued 1288 permits, with an aggregate cost of $1,980,326, compared with 998 permits and a total cost of $1,715,022 for the first two months of 1904. The record the present year is considered remarkable from the fact that thus far there have been issued permits for no buildings of any great size. The greatest cost of any single building was $53,000, and the next highest was $46,000. Building operations during March promise to keep up the pace set by the first two months of the year, if the record for the first four days of the month is maintained. In these four days the permits issued number 114 for an aggregate cost of $117,665, compared with 50 permits and $55,725 during the first four days of March, 1904, or an increase of 64 permits and $61,940 in cost. Moreover the architects report that there is an abundance of work in their hands. From the outlook the year will be noteworthy as a residence building year and for an absence of large undertakings.

### Milwaukee, Wis.

In common with that of many other sections the outlook for the building season in the city and vicinity is very encouraging, and architects, contractors and builders are making preparations for a large volume of work. One result of this flattering outlook is found in the announcement that the bricklayers and masons of the city demand an advance of 5 cents an hour, making the new rate 55 cents, and plasterers want 35 cents a yard as against 30 cents, the present rate. An idea of the tendency in the building situation may be gathered from the statement that during February 96 permits were issued for building improvements estimated to cost $278,300, as against 57 permits for building improvements in February, 1904, estimated to cost $142,290.

### New York City.

Indications continue to multiply that the season about to open will be one of great activity in the building line, more especially perhaps in the boroughs of the Bronx and Brooklyn, where preparations are being made for the erection of large numbers of buildings, but principally in the way of flats and private houses. An idea of what is likely to ensue may be gathered from the statement that during the week ending March 4 there were filed with the Building Department in Brooklyn plans for 157 new buildings, estimated to cost nearly $1,100,000. P. J. Collins, Superintendent of the Building Department of that borough, is quoted as expressing the belief that the volume of building this year will be far in excess of that for 1904, when operations broke all previous records. There is much ground for the optimism which prevails in all branches of the building trades as the differences which for so long existed between employer and employed in the Borough of Manhattan are gradually being adjusted, and with conditions normal in the labor world there would seem to be no reason why 1905 should not witness a period of profitable and satisfactory operations for all concerned. As Chairman Lewis Harding of the Press Committee of the Building Trades Employers' Association tersely put it a few days ago, "Never in the history of the building trades was there so little friction as at present, and the prospects for industrial peace this year are exceedingly bright."

Announcement has been made of the retirement from office of the men who have been the directing powers in the Building Trades Employers' Association, and at the annual meeting to be held on April 11 new officers will be elected. The present officials who have decided to retire have been in office since the formation of the association two yars ago, and on the evening of March 14 a testimonial dinner was tendered them at the Hotel Astor.

In accordance with their agreement with the Mason Builders' Association the bricklayers in the city had their wages raised on March 1 from 65 cents an hour to 70 cents, these being the highest wages ever paid to bricklayers in this country, and with the exception of the ornamental plasterers, the highest rate paid in the building trades. We understand that the increased rate will continue in force until January 1.

### Philadelphia, Pa.

There seems to be a constantly growing activity among the builders in the city, and judging from the plans which are being filed the spring season is likely to be such as to give plenty of work to members of all branches of the trade. The report of the Bureau of Building Inspection for February shows that 322 permits were issued, covering 558 operations and estimated to cost $1,362,425. This is a notable increase over the same month of last year, when permits were issued for building improvements involving an estimated outlay of $907,885. The activity in two-story dwellings continues, and during February 29 permits for such buildings were issued, covering 250 operations valued at $588,300. Three new school houses were projected to cost $226,000, and alterations and additions accounted for $204,750 of the month's grand total.

### Portland, Ore.

So far this year building in Portland has been about equal to expectations, but there is some talk that building during the spring and summer will be more or less restricted by the fear of labor troubles. This has already made itself manifest in some quarters, and the strike of the workmen engaged in the construction of buildings for the Lewis & Clark Exposition has not had a favorable effect. Contractors on the big exposition buildings expect to be able to complete their contracts without loss, but the general situation is not satisfactory. In the vicinity of the fair grounds, building is very active, but it is running mostly to dwellings, lodging houses, cheap store buildings, restaurants and flimsy structures of various sorts.

### San Francisco, Cal.

Building operations in San Francisco continue unusually heavy, says our correspondent under date of March 7. Building contracts entered into in this city during February, 1905, numbered 198, and called for the expenditure of $1,910,902.50, this amount being a little less than the value of the contracts for January, 1905, but more than double the construction outlay in February, 1904. A great deal of new building is in progress, particularly in the way of heavy construction, and contractors report that this class of work is likely to increase rather than diminish as the season advances. March has started off well, the number of contracts filed during the first week amounting to more than

$370,000. According to present indications San Francisco is to be the only city on the Pacific Coast showing an increase in the number of large fire proof or semifire proof buildings constructed during 1905. All the other important cities show a falling off in this class of work, and a lowering of the average cost per building. If the amount of heavy work undertaken during the first two months of the year can be taken as a criterion, the number of large buildings will be greater this year than ever before, and the average cost per building will be greater. Among the large buildings on which work was begun during February were the four-story and basement brick general office building of the Pacific States Telephone & Telegraph Company, the M. Fisher Company seven-story and basement building on O'Farrell street, to cost $75,000; the new temple of the Congregation Beth Israel, on Geary street, to cost $100,000; a five-story stone front apartment house, containing 80 rooms, to be erected by Miss Annie Dwyer on Ellis street; the Western Addition Masonic Temple on Fillmore street and the Margaret H. Fuller Building at the corner of Beale and Mission streets, to cost $100,000.

### Seattle, Wash.

Building operations in Seattle continue of average volume, the principal activity being in the construction of residences of moderate cost. During February 639 permits were issued for building improvements costing $460,000, as against 590 permits for buildings, estimated to cost $382,622 in February of last year. It is, however, expected that several large buildings will go up during the spring and summer. The Northern Pacific Railroad Company, which is now completing a six-story block on the corner of Madison and Spring streets, has announced its intention of constructing eight more six-story business blocks on its property in the wholesale section of the city. Of these two will be begun as soon as the present building is completed, and it is probable that the construction work on the eight buildings will extend over several years. The total cost of the contemplated buildings will be in the neighborhood of $2,000,000.

### Toledo, Ohio.

The leading contractors of the city regard the prospects for new work exceedingly bright, and all are looking forward to a very busy season in the building line. At the present time no serious labor difficulties are anticipated.

The Builders' Exchange of the city of Toledo held its annual election in the exchange rooms on Monday, March 6, the following being selected to serve for the ensuing year:

President, Joseph Jackson.
First Vice-President, Henry Bender.
Second Vice-President, O. C. Robinson.
Treasurer, John W. Lee.
Secretary, W. J. Albrecht.
Assistant Secretary, Charles T. Lawton.

W. J. Albrecht, Albert Neukom, John C. Romeis, Herman Pfeander, A. R. Kuhlman and W. W. Bright were elected directors to serve for a period of two years.

The membership of the exchange has greatly increased for some time past, and when the exchange is installed in its new quarters, where things will be much more convenient for members of the organization, it is expected the roll will increase much more rapidly. Through the influence of the Builders' Exchange one of its highly respected members, John W. Lee, has been appointed by Mayor Finch Buildirg Inspector of the city of Toledo to succeed Walter Hudson, resigned.

### Notes.

Fifteen well-known dealers in building materials recently held a meeting in the Board of Trade rooms, Jacksonville, Fla., for the purpose of discussing the advisability of organizing the Building Men's Protective Organization. A Committee on Constitution and By-Laws was appointed, as well as a committee to ascertain the names of the various firms dealing in building materials who would be eligible for membership.

Members of the carpenters' union in Scranton, Pa., have been granted an increase of 5 cents an hour, the new rate to continue in force until the first day of March of next year. The contract was entered into March 12, 1904, and according to its terms the minimum rate of wages was fixed at 30 cents an hour for the first year and 35 cents an hour for the second year.

Application was filed a few weeks ago with the Secretary of State for a charter for the Carpenters' Co-operative Building Association of Cleveland, Ohio, the capital being placed at $50,000. This is the company which has attracted much attention on the part of labor men all over the State, and its progress will be watched with great interest.

E. J. Detrick, who for the past two years has acted as secretary of the Pittsburgh Builders' Exchange League, has recently resigned in order to give the necessary attention to his private affairs. Thomas Lane, assistant secretary, will for the present attend to the duties of the secretary's office until a successor is chosen.

## Some Features of the Carnegie Institute Addition.

The construction of the mammoth addition to the Carnegie Institute now in progress in Pittsburgh is developing a number of interesting features. Some idea of the magnitude of the undertaking may be judged from the fact that the building will have 8 acres of floor space, and that in the erection of the steel frame work girders were used, some of which weigh 26 tons each, while the diagonal trusses over the Architectural Hall weigh 66 tons each. Ten derricks, with a capacity of from 5 to 15 tons each and fitted with booms 50 to 70 feet long, are used for hoisting the steel girders and the great stones that are now being laid in the foundation walls. The immensity of the work can scarcely be judged by the 350 men now at work for the contractor, the William Miller & Sons Company, as they are almost lost sight of in the great area where they are engaged on various parts of the work. Only the delay in getting material has prevented the contractor's working a much larger force. When the walls are fairly under way nearly 1000 men will be engaged. It will be recalled that the plans for the addition to the institute were prepared by Alden & Harlow of Pittsburgh.

## Strikes in the United States.

From 1881 to 1900, according to the reports of the United States Department of Labor, there were 22,793 strikes in the United States, involving 117,509 establishments and 6,107,694 employees. The average length of the strikes of the last 20 years was 23 days. The records show a loss to the employees of $257,000,000, and to the employers of $122,000,000. But these figures do not include the recent strikes in the building trades.

Of the strikes in the last 20 years 28 per cent. occurred in New York, and of these almost 20 per cent. occurred among men in the building trades. Labor organizations ordered more than 63 per cent. of the strikes here, and out of this number 52.86 per cent. were successful, while 13.6 per cent. succeeded only partially and 33.54 per cent. failed entirely.

THE lockout in the building trades in Hudson County, N. J., which continued for two weeks in February was brought to an end on the afternoon of Washington's Birthday, when representatives of the Building Trades Employers' Association and of the United Builders' Trade Council signed an agreement by which all difficulties between employers and employees will hereafter be adjusted by an Arbitration Board consisting of two members from each side and an umpire selected by the four. the latter, it is stipulated, cannot be a clergyman, a physician or a politician. On the morning of February 23 the 1500 locked out mechanics returned to work.

IN view of the rapidly increasing popularity of reinforced concrete and concrete blocks in building construction, and the attention which is being given to these forms of materials by architects and builders all over the country, the Engineering News Publishing Company, 220 Broadway, New York City, has decided to offer two prizes for the best papers on the following subject: "The Manufacture of Concrete Blocks and Their Use in Building Construction." The prizes are offered with a view to stimulating the production of literature bearing upon the subject indicated, and at the same time to encourage engineers to make public the results of their investigations relative to concrete block construction.

OF the total number of strikes in New York in the last 20 years 28.7 per cent. were for increased wages, 11.23 per cent. for an increase of wages and shorter number of hours of labor and 11.16 per cent. for a reduction in the number of hours.

# Convention of National Brick Manufacturers' Association.

ACCORDING to programme, brick manufacturers from various sections of the country gathered in Birmingham, Ala., the first of February to attend the nineteenth annual convention of the National Brick Manufacturers' Association held in that city on the first three days of the month named. There was a large attendance, unusual interest being manifested not only in the city selected for the place of meeting but also in the many papers which were read and discussed. The first session was called to order by Vice-President J. M. Blair, as President W. S. Purington of Galesburg, Ill., was detained at home by serious illness in his family. The first order was the enrollment of new members, after which Mayor Drennen welcomed the delegates to the city of Birmingham, the response being made by Second Vice-President W. P. Blair of Terre Haute. In the absence of President Purington, his annual address was read by W. A. Eudaly. Reference was made to the increase year by year in the volume and value of the output of brick making plants and to the value of the statistical information which was being accumulated as the years went by. He briefly called attention to some of the leading papers which were to be read and discussed, and to the practical results of the exhibits at the St. Louis Fair. The report of Treasurer Sibley showed the association to be in a good financial condition, with a comfortable surplus on hand.

### Election of Officers.

The next order of business was the election and installation of officers, the rules being suspended and the secretary instructed to cast the unanimous ballot for each candidate as his name was put in nomination. The result was as follows:

President, John M. Blair of Cincinnati, Ohio.

First Vice-President, J. R. Copeland of Birmingham, Ala.

Second Vice-President, Edward B. Fish of Rochester, N. H.

Third Vice-President, J. F. Lewis of Jackson, Mich.

Secretary, Theodore A. Randall of Indianapolis, Ind.

Treasurer, John W. Sibley of Birmingham, Ala.

It is interesting to note in this connection that Secretary Randall was chosen for the nineteenth time, while Treasurer Sibley was re-elected, having succeeded himself many times.

Prof. H. H. Wheeler, chairman of the Committee on Clay Working Exhibits at the World's Fair, then presented a most interesting report, in which it was stated that the space occupied had a frontage of 100 feet on the main center aisle by a depth of nearly 200 feet, occupying the northeast corner of the Mining and Metallurgy Building. It was referred to as by far the largest, most complete and most imposing of any of the industrial exhibits, and created such a favorable impression upon the United States Museum people at Washington that they endeavored to secure the entire exhibit for the new museum now being erected in the capital city, at a cost of $3,500,000, for displaying the industrial resources of the country. A great majority of the exhibitors in the clay industry display have turned over their exhibits to the United States Museum and they will be permanently installed and maintained at the expense of the Government in Washington.

The session of Thursday, February 2, was taken up with the reading of numerous papers, one of the more important of which was that by Prof. Edward Orton, Jr., of Columbus, relative to "The Testing of Clay." This was an extensive presentation and brought out some interesting discussion. It was followed by a paper on "The Uses of Clay" by Prof. C. W. Parmelee of New Brunswick, N. J. The discussion of this paper concluded the day's programme.

The first session of the last day of the convention witnessed a continuance of the papers and discussions thereon. The first regular number on the programme was a paper by J. E. Budwig of Birmingham on "The Wisdom of Making Haste Slowly in the Clay Business," this being followed by "Fillers for Brick and Block Streets," by H. C. Innes of Chicago. This brought out some extended discussion in which many of the members participated. Not the least interesting feature of the meeting was a paper on "The Good Roads Movement and the Part Paving Brick Should Have in It," by R. W. Richardson of Omaha, this provoking no little discussion of an instructive nature.

The last session of the convention was held on Friday afternoon, February 3, when a paper by G. W. McNeil of St. Louis considered the "Progress in the Brick Industry." This was an interesting contribution to the literature of the subject, covering as it did patented inventions for brick making, as well as methods and appliances employed in connection with the industry.

A point brought out which is of special interest to our readers was that of efflorescence, in regard to which, in the opinion of the author of the paper, an important advance has been made in the overcoming of the trouble. There is one positive way, he said, of meeting the evil of efflorescence—that of mixing a suitable proportion of barium with the clay. The barium uniting with the soluble salts in the clay that creeps to the surface and forms whitewash, converts the soluble into insoluble salts.

### Entertainment.

Another very interesting paper which formed a valuable contribution to the literature of the brick making industry was that by A. D. Klein of Baltimore, entitled "Tried by Fire and Not Found Wanting." This was a vivid description of the Baltimore fire in February of last year, and the manner in which brick stood the test of the fierce conflagration. With brick in the first place, the author named terra cotta as next in order, followed by porous and semiporous tile. This paper was followed by one entitled "Old *versus* New Methods of Handling Brick," by F. Salmen of Slidell, La. Still another interesting paper, more especially in view of the rapidity with which the material is growing in favor in connection with building construction, was that by M. W. Lauer of Chicago on "Hollow Block as a Building Material." This paper is of such obvious interest to our readers that we hope to give copious extracts from it at another time. A discussion of the subject followed the reading of the paper, in which it developed that a hollow clay block building does not cost as much as concrete block by nearly 40 per cent.

The closing hours were devoted to a general discussion of various topics relating to methods of brick manufacture and to the report of the Committee on Resolutions. The latter were of an important nature, covering as they did the question of uniform freight rates, publication of proceedings, appointment of State vice-presidents, World's Fair exhibits, &c.

The annual banquet occurred at the Hillman Hotel on the evening of Thursday, February 2, the hall being beautifully decorated for the purpose. Covers were laid for 400 and at each there was a dainty favor. John W. Sibley acted as toastmaster and in well chosen words introduced the speakers of the evening. These included Governor Cunningham, who spoke to "The State of Alabama"; W. P. G. Harding discussed "Our Business Interests"; Dr. Stagg of Birmingham talked of "The Perfect Brick"; D. E. Reagan gave his "Impressions of a Tenderfoot"; Capt. W. H. Graver spoke of the "Benefits of Organization," and Col. R. W. Richardson responded to the toast "Along Our Highways and Byways."

A valuable feature in connection with the convention was the display of the latest improved mechanical contrivances for clay workers, specimen brick and other clay ware in Exhibition Hall, on the third floor of the City Building, where each exhibitor had one or more tables upon which the products of his plant were shown. There was a side trip to New Orleans, a visit to Birmingham's manufacturing district, a theater party and other diversions.

## National Association of Master Sheet Metal Workers.

An important meeting of master sheet metal workers was held in Philadelphia, Pa., on Tuesday and Wednesday, February 21 and 22, resulting in the formation of what is known as the National Association of Master Sheet Metal Workers of the United States. Members of the trade were present from many sections of the country, while letters and telegrams from those who were unable to attend gave a total representation of something like 20 States, thus showing the keen interest manifested in the formation of the association. Doubtless a larger number would have been present had the call for the meeting been sent out earlier, so as to afford opportunity for local associations in distant cities to hold meetings and appoint delegates.

The meeting organized by unanimously choosing W. H. Barnard of Norfolk, Va., as temporary president, he being the leading spirit in the movement looking to the organization of a national association, and it was he who issued the call for the meeting in question. In the discussions which followed the opening session it was decided that representation and voting power should be given only to delegates from local associations. While the individual tradesman may from this be inclined to think little provision has been made for him, a second thought will doubtless show that a national association composed of local bodies will naturally be stronger than one made up of individuals. Various committees were appointed and later presented their reports.

### Election of Officers.

The Nominating Committee presented the following names for officers for the ensuing year, all of which were duly elected:

President, Edwin L. Seabrook, Camden, N. J.
First Vice-President, Paul L. Biersach, Milwaukee.
Second Vice-President, Wm. Earley, Philadelphia.
Third Vice-President, A. T. Skillman, Hightstown, N. J.
Fourth Vice-President, J. A. Pierpont, Washington, D. C.
Secretary, W. H. Barnard, Norfolk, Va.
Treasurer, E. W. Richards, Philadelphia.
Sergeant-at-Arms, John Bogenberger, Milwaukee.
Trustees: George W. Battley, Norfolk, Va.
W. W. Bosbury, Parkersburg, W. Va.
Otto Goebel, Syracuse, N. Y.
C. W. Smith, Brooklyn, N. Y.
D. H. Sohl, Reading, Pa.
W. A. Fingles, Baltimore, Md.
W. A. Gallaher, Wilmington, Del.

The Committee on Resolutions, composed of W. H. Barnard, E. T. Wilkinson and E. W. Richards, submitted the following report, which was unanimously adopted:

*Whereas,* The business of the legitimate master sheet metal worker throughout the United States has been disregarded, ignored and ruinously treated by various and sundry manufacturers and jobbers; and

*Whereas,* The said manufacturers and jobbers, regardless of the interests of the local dealers (who are sheet metal workers) throughout the land, sell their goods to hardware dealers, builders, contractors, farmers or to whom they please, utterly regardless of its effect on our brethren in the trade where such goods are sold; and

*Whereas,* These conditions have become so intolerant that the master sheet metal workers as a man turn to a parent organization for the relief from such abuse and oppression; therefore, be it

*Resolved,* That this national body views with emphatic disapproval such practices; and, be it further

*Resolved,* That henceforth this association will view with special favor such manufacturers and jobbers who will have a due regard for the local sheet metal worker and as far as they can will assist him in obtaining the business in his line in his town or territory, or at least refrain from giving aid and support to persons not legitimately engaged in the trade; and, be it further

*Resolved,* That in recognition of such courtesy shown by manufacturers and jobbers the said local master sheet metal worker give preference in buying his supplies to such manufacturers or jobbers as have thus helped him; and, be it further

*Resolved,* That in case of the persistent disregard of this principle by manufacturers or jobbers the offended member report the grievance to the president or secretary of this body.

The time and place for holding the next convention was left to the officers.

## Meeting of the American Ceramic Society.

The seventh annual meeting of the American Ceramic Society was held in the parlors of the Hillman House, Birmingham, Ala., January 30 to February 1. President Walker delivered an interesting and instructive address and Treasurer Burt presented a report showing the comfortable position of the organization financially.

The officers elected for the ensuing year are as follows:

President, W. D. Gates of Chicago, Ill.
Vice-President, Ellis Lovejoy of Columbus, Ohio.
Secretary, Prof. Edward Orton, Jr., of Columbus, Ohio.
Treasurer, Stanley G. Burt of Cincinnati, Ohio.
Manager, Walter M. Fickes of Carnegie, Pa.

The time and place for holding the next annual convention were left with the council, it being agreed, however, that it should be the policy of the society to continue the practice of holding joint meetings with the National Brick Manufacturers' Association so long as the latter meets within the territory bounded by Washington and Cincinnati on the south, St. Louis on the west, and Detroit and Chicago on the north.

## Convention of Mantel and Tile Makers.

The second annual meeting of the Interstate Mantel and Tile Manufacturers' Association opened at the Colonial Hotel, Pittsburgh, Pa., February 15, with President Charles P. Brecher of Louisville, Ky., in the chair. The association was formed at Louisville, Ky., a little more than one year ago by the mantel and tile dealers of Kentucky and Tennessee, since which time prominent manufacturers from all parts of the country have become members, the number increasing during the meeting from 110 to over 200. During the morning an open session was held, attended by a number of manufacturers not members of the association and a number of the prominent mantel and tile dealers from various parts of the country.

The second day was devoted to the consideration of various matters of trade interest, including certain changes in the by-laws made necessary by the increased membership, which had grown to over 200 since the opening session. The election of officers for the ensuing year resulted as follows: President, Thomas F. Keating, Chicago; first vice-president, H. A. Crowker, Providence, R. I.; second vice-president, R. E. Logan, Pittsburgh; secretary, B. E. Phillips, Nashville, Tenn.; treasurer, W. R. Northcross, Memphis, Tenn.

In his annual report, read at the closing session, retiring President Brecher expressed the opinion that the coming year ought to prove a good one to all engaged in their line of business.

The next annual meeting will be held in Baltimore, Md., in February, 1906.

The convention closed with a banquet in the evening at the Colonial Hotel, which was attended by about 300, the host being the local organization, of which R. E. Logan is president.

## Master Composition Roofers' Convention.

The fourteenth annual convention of the National Association of Master Composition Roofers of the United States was held in Indianapolis, Ind., February 16 and 17. Interesting papers were read on such subjects as "History of Roofing," "Modern Roofing," "Roofing as We See It," &c. Officers elected were as follows:

President, Emil Machwirth, Buffalo, N. Y.

First Vice-President, P. Le Goullon, Pittsburgh, Pa.

Second Vice-President, Henry C. Smither, Indianpolis, Ind.

Secretary-Treasurer, Wm. K. Thomas, 61 Warren avenue, Chicago, Ill.

Directors: E. S. Bortel, Philadelphia, Pa.; C. A. Monks, Louisville, Ky.; T. S. Harkness, Cincinnati, Ohio.

The next convention will be held in Buffalo, N. Y., the date to be fixed by the Executive Board.

THE Board of Managers of the Cotton Exchange is contemplating an addition to the present structure at

William and Beaver streets and Hanover Square, New York City, which it is estimated will cost in the neighborhood of $1,500,000. The new structure will be 20 stories high, and an interesting feature will be the location of the "pit" on the nineteenth floor.

## Working Rules for Sheet Metal Workers.

For some little time past there has been more or less friction in various branches of the building trades in the city of Pittsburgh, and as a result of numerous conferences looking to an adjustment of the difficulty the following working rules were adopted by the Master Tinners' and Cornice Manufacturers' Association and the American Sheet Metal Workers' International Union No. 12 of Pittsburgh, Allegheny and vicinity. The rules went into force on February 16 of the present year and will continue until January 1, 1907:

RULE I. Section 1. That eight hours' work on the job shall constitute each day's work. Regular working hours shall be from 8 o'clock a.m. until 12 o'clock noon, and from 12.30 to 4.30 o'clock p.m.

Sec. 2. That there shall be no limitation as to the amount of work a man shall perform during his working day.

RULE II. Sec. 1. Eight hours during any portion of 24 hours shall constitute a day's work; any excess time over the above shall be paid at the rate of time and one-half time.

Sec. 2. That no person shall have access to the workmen during working hours without the permission of the employers.

Sec. 3. Workmen shall be paid double time for Sunday and the following legal holidays: Memorial Day, July 4, Labor Day, Thanksgiving and Christmas Day.

RULE III. Sec. 1. The use of apprentices shall not be prohibited or restricted.

Sec. 2. Each shop shall be entitled to one apprentice and one additional to every four journeymen, based on average number of journeymen employed.

Sec. 3. All apprentices shall serve four years, shall be governed by an indenture in conformity with the State laws, and shall be registered with the Master Tinners' and Cornice Manufacturers' Association.

RULE IV. Sec. 1. This agreement shall not deny any workman the right of employment, provided said workman shall become a party to this agreement.

Sec. 2. All workmen shall have the right to work for any employer they may desire, provided said employer shall comply with the provisions of this agreement.

Sec. 3. All employers are at liberty to employ and discharge any parties to this agreement.

RULE V. There shall be no restriction or discrimination against any employer or member of a firm or corporation who may desire to perform skilled or manual labor for his or their firm or for any other member of his association.

RULE VI. Work outside of Allegheny County may be done according to the prevailing conditions and prices in such territory. This applies to local men employed on the job.

RULE VII. Sec. 1. There shall be no restriction of the use of machinery or tools which are furnished by the employer.

RULE VIII. The minimum rate of wages per hour for journeymen shall be 42½ cents.

RULE IX. The foreman shall be the agent of the employer.

RULE X. Sec. 1. Employers will pay all car fare, board and necessary expenses while out of the city, except when special arrangements are made.

Sec. 2. Employers will pay all extra car fares.

RULE XI. Journeymen must provide themselves with a kit of tools, consisting of two hand shears, one hammer, two chisels, two punches, two rivet sets, one scribe awl, one compass, one scraper, one pliers, one small square and one hatchet. Special arrangements may be made with the employer to have complete or incomplete sets supplied at cost price. Soldering coppers, files, mallets and special tools must be furnished by the employers.

RULE XII. Employees must, wherever employed, exercise diligence in doing a fair day's work. On evidence of time willfully lost a reduction in their pay may be made for such time lost, and where material is destroyed by the neglect or incompetency of a workman he shall pay such loss to the employer from his wages.

RULE XIII. There shall be no cessation of work in a shop or on a job on account of any dispute or misunderstanding, but any dispute or misunderstanding shall be referred to a committee of the employers' association and a like committee from the workmen. In case they fail to agree the dispute shall be settled by arbitration, the employers to select one man, the workmen one man, and these two a third man. The decision of these three shall be accepted as final. The decision shall be rendered within six working days. Officers of either association party to the dispute shall not be eligible to serve on either of these committees.

RULE XIV. Should either party to these working rules desire any change at their expiration, or desire to terminate the same, three months' notice prior to the termination of these working rules shall be given the employers or workmen; otherwise this agreement is to remain in full force for another year.

That all men return to work in the respective shops as prior to the commencement of this difficulty, and that this settlement shall be without prejudice to either employees or employer as at present working.

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|---|---|
| Approved. | Approved. |
| Committee for A. S. M. W. I. U. No. 12. | Committee for M. T. and C. Manufacturers' Association. |
| WILLIAM B. ALWARD. | S. KEIGHLY. |
| HARRY ORME. | THOS. M. HUGHES. |
| CHARLES CUSICK. | J. D. RILEY. |
| N. S. GLASS. | J. B. GOODWIN. |
| A. M. HARTZELL. | JACOB GRAFF. |
| J. W. ANSELL, Vice-Pres. | THOS. M. HUGHES, Pres. |
| D. F. QUINLAN, Sec. | J. D. RILEY, Sec. |

Approved: Builders' Exchange League.
SAMUEL FRANCIS, President.

Attest:
E. J. DETRICK, Secretary.

## New Publications.

**Handbook for Superintendents of Construction, Architects, Builders and Building Inspectors.** By H. G. Richey, superintendent of construction United States Public Buildings; 742 pages; size, 4¼ x 7 inches; 357 illustrations; bound in morocco with gilt edges; published by John Wiley & Sons; price, $4, postpaid.

As indicated by the title this is a work which will strongly appeal to those associated in any responsible way with building construction. It has been the aim of the author to make it as complete and up to date as possible, and while he does not claim credit for all the formulæ and information presented there is in his opinion sufficient original matter to render the volume a valuable addition to any mechanical or technical library, while considered as a whole it represents a handbook for any one engaged in any branch of building construction, more especially superintendents of construction and inspectors.

The work is comprised in six parts, the first of which deals with the personality and duties of a superintendent, excavating, foundations, piles and building stones. The second has to do with stone laying, setting and cutting, brick work and brick laying, marble and slate work, paving, &c. In the third part the author discusses concrete construction, a subject which at the present time is attracting a vast amount of attention on the part of architects, builders and engineers, and what the author has to say cannot fail to prove highly interesting and instructive to all connected with the building business. In connection with the matter reference is made to fire proof floor construction, partitions, &c., architectural terra cotta, fire protection of buildings, slow burning or mill construction, suggestions to fire underwriters, fire resisting devices and formulæ for the erection of fire escapes. In part four lathing and plastering is taken up, as well as carpentry, timber work, plumbing, painting, glazing, tin and sheet metal work, iron work, electrical wiring, heating, &c., while in part five extended reference is made to drawing, laying out work, mensuration, geometrical mensuration and various engineering formulæ, all presented in a way to prove of value to the builder. The work concludes with reference to hydraulics and data regarding water, strength, weights, &c., of materials, some general information on wire rope which is an important factor in connection with the erection of buildings, notes on roofs giving the approximate weights of various roof coverings, the angles of roofs as commonly used, miscellaneous receipts and a glossary of names of some new materials used in building. A feature of the early pages of the volume is a list of the works consulted in the preparation of the volume, any of which the author states will prove a valuable addition to an architect's and builder's library. It is gratifying to note the name of *Carpentry and Building* among the list of magazines from which the author has derived some of his information.

**How to Mix Paints.** By C. Godfrey. 64 pages. Size, 5 x 7½ inches. Illustrated. Bound in board covers with side title in white enamel. Published by the Industrial Publication Company. Price, 50 cents, postpaid.

This is a simple treatise on the subject indicated which the carpenter and builder will find especially convenient for reference, as occasions often arise where it is necessary or desirable for them to know how paints should be mixed in order to produce specific results. The great difficulty with those who have not had the benefit of long practice and experience is in the mixing of colors, for while they may be able to produce a good paint by taking a certain amount of white lead, linseed oil and turpentine, they are usually in trouble when it comes to matching a given color. The work in question is designed to offer such assistance that by a little practice the carpenter or builder or, in fact, any one else interested in the subject, may be able to mix the various tints and shades of reds, blues, yellows, browns, greens, grays and colors made from blacks, japans, &c. In addition to giving directions for mixing paints notes are presented about tints and shades, the use and care of brushes, color harmony, &c. Some of the principal colors in ordinary use have been selected, and instructions are given as to how they may be produced. The little book was prepared by the author in conjunction and by arrangement with Arthur S. Jennings, author of the work entitled "Paint and Color Mixing," and who will be recognized by many of our readers as having contributed a series of articles on painting to the columns of *Carpentry and Building* some years ago.

**Modern Cottage Architecture.** By various architects; edited by Maurice B. Adams, F.R.I.B.A.; size, 9¼ x 12¾ inches; 30 pages of text and 50 plates; bound in heavy board covers, with gilt side title. Published by John Lane. Price, $4.50.

This is a work in which the English cottage is exemplified in a way to interest architects and builders generally. Plans and elevations are given of cottage buildings executed in different parts of Great Britain by architects whose work has been associated with the contemporary development of English domestic architecture. In selecting the subjects illustrated the endeavor has been to bring together a representative series of some of the best examples available, irrespective of any particular style of design or type of work. The range is from the three-roomed dwelling of the humble laborer to the more pretentious Entrance Lodge, the illustrations showing with good effect the style of architectural treatment in vogue by the English architectural profession.

In the make-up of the work there is an introductory chapter on "Notes Concerning Cottage Building," which is of unusual interest, owing to the manner in which the essential features of buildings of the character indicated are treated. Reference is made to the economical aspect of artistic buildings, the use of local materials and to other important matters connected with the subject, after which various parts of building work are considered in detail. Some pertinent comments are presented touching the proper site for a cottage, the sanitary arrangements and fittings, the water supply and the arrangement and aspect of buildings, under which head many practical points are treated in a way to interest not only the architect and builder but the general reader as well. What is said with regard to staircases, doors, bedrooms, the hight of rooms, ventilation, baths, &c., is well put and directly to the point. Following these notes is a chapter on the planning and designing of the subjects illustrated. The latter, it is pointed out, exhibit a suitable variety of plan, but the designs are not arranged with any precise intention of showing what may be called "the genesis of cottage arrangement, commencing with the single room shanty, or Scottish 'But-and-Ben' dwelling, with its bed recess, through different degrees up to the more ambitious parlored home, which now forms perhaps the most popular type of house among working people throughout the countryside, as well as in towns and suburbs." The illustrations aim, however, to comprise examples of the several gradations of economic contrivance which represent practically all the main essentials necessary in working out either the single cottage or a group or row of them. It is pointed out that it is unusual to build one single detached cottage for the simple reason that a pair is cheaper, "the isolated cottage being more often erected as an Entrance Lodge or for a gardener or gamekeeper's house, and for this purpose the third ground floor room seems perhaps more desirable, though it is not invariably adopted." Some of the designs illustrate small houses "for professioonal and middle class residents."

Several pages are devoted to a descriptive list of the 50 plates, the information in each instance being confined to a few lines giving the name of the architect and mentioning some of the more important features of construction. The plates are full page in every case, each subject being illustrated by means of a perspective view and floor plans. The work considered as a whole is of such a nature as to prove a desirable addition to an architect's library, its permanent value of course depending upon the character and variety of the designs which are to be found within its covers.

THE last number of "American Art in Bronze and Iron," which is a beautiful specimen of the printers' art, is devoted to "Sculpture in Bronze," this being a continuation of the series, the first of which dealt with "Bronze Memorial Tablets" and the second to "Bank Counter Screens." The work illustrated constitutes some of the more important commissions intrusted to the John Williams Bronze Foundry & Wrought Iron Works by the best men in the profession of architecture and sculpture, so that the collection as a whole is of more than usual interest and value from the standpoint of the architect, the artist and the sculptor. The engravings are direct reproductions from photographs, and show the detail to have been worked out with remarkable fidelity. A great number of examples are shown, each group under a certain heading, the entire scheme being such as to make the volume a valuable reference book and one that should occupy a prominent place in the architect's library.

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THE "TRINITY" BUILDING UNDER CONSTRUCTION ON LOWER BROADWAY, NEW YORK CITY.

FRANCIS H. KIMBALL, ARCHITECT.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

232-233 WILLIAM STREET, NEW YORK.

MAY, 1905.

We beg to announce that after having conducted the business of Mr. David Williams and of the David Williams Company, publishers of *Carpentry and Building*, in Philadelphia since 1875, Mr. Thomas Hobson will on May 1 retire from the active management of the Advertising Department.

The business management of the Philadelphia district has been placed in the hands of Mr. H. H. Roberts, who has been identified with the David Williams Company for eighteen years. He began his career in the Philadelphia office, was for ten years manager of the St. Louis branch and then was for ten years manager of the Chicago office.

We have appointed as business manager of the Chicago office Mr. A. A. Ainsworth, who has been identified with trade journals for many years and has been connected with the David Williams Company for some time past.

## The Building Situation.

A glance over the reports from various cities of the country presented in another part of this issue cannot fail to impress the reader with the fact that the outlook for the building business is of a most promising nature. Indeed it is of a character seldom if ever witnessed thus early in the year, and therefore may be regarded as all the more significant of a season of unusual activity for all branches of the building and allied industries. Figures issued by the building departments of the leading cities covering the month of March and also the first quarter of the current year show almost without exception a notable increase when compared with corresponding periods of 1904, which it may be remarked in passing was considered exceptional in the increase of building operations in the United States. Where there has been a falling off as compared with a year ago it has been slight and due to labor troubles or other well defined causes which, before the present season is greatly advanced, may be sufficiently removed to permit of an average amount of work being carried to completion. The amount of building which the country is likely to witness this year, provided there are no serious interruptions and basing the calculations upon the value of the improvements for which permits have already been issued, is estimated at figures which are stupendous and far beyond all previous records. In a recent issue of its *Journal* Bradstreet's places the figures at over $600,000,000 for the year, and judging from all the information available and assuming that the bulk of the work projected will be carried to completion, the estimate is not unreasonable. Probably a majority of the new work in prospect is made up of dwellings, flats and apartment houses, although there is a large aggregate of buildings for business, factory and other purposes. It is, however, noticeable that the number of individual operations of any considerable magnitude is comparatively small. The towering office buildings that are going up in the large cities are becoming the exception rather than the rule, and capital is apparently finding its best opportunity in the development of suburban property, which is proceeding in many sections upon a gigantic scale. By reason of the progress which has been made in the construction of buildings, and especially those for business purposes, a vast amount of iron and steel is required, and even in the better class of dwellings this material is used in large measure as a substitute for frame and joists. This of course has tended to stimulate this important industry, which at the present time is enjoying an unusual degree of activity and strikingly emphasizes the belief of many that it is a true barometer of the business prosperity of the country. It is worthy of note that, taking the country over, there are probably less labor disturbances than usual at this season of the year, and the indications seem to point to greater peace and harmony in the building trades than has been the case for a long time past. This is attributable in some measure at least to the agreements which have been drawn up and signed by representatives of the workmen and employers, so that a better understanding exists regarding the situation on both sides. All things considered, the country seems likely to witness in 1905 an era of building prosperity which is without a parallel in its history.

## Employers' Certificates.

Not long since we referred in these columns to the labor programme of the Master Builders' Association of the city of Boston and to some of the most striking features in the policy outlined in that document, pointing out that among them was one whereby the members of the association were to file with its secretary the names of such workmen as they might consider worthy of recognition by the association by virtue of "skill, interest manifested in work, good habits and reliability." These were to be known as "registered" workmen and were to be entitled to hearing on questions relating to the common interests of workmen and employers. This was regarded as something of an innovation in connection with labor matters, and was the basis of no little comment in both the daily and the trade press of the country. In connection with this phase of the question it is interesting to note still another which has an important bearing on the relations existing between capital and labor and which, judging from present indications, is likely to continue to grow in favor and popularity. Employers in other lines have tried the experiment of giving to faithful employees certificates which are in effect records of the experience, faithfulness and capabilities of the workmen holding them. The plan has been adopted by the members of the National Metal Trades Association among others, and is said to be working so well that employers' certificates are now held in higher favor by the industrious, well disposed workingman than a union card could ever be by such an individual. The certificate contains a concrete reward and acknowledgment of work well done, and thus stimulates the man to do better and better work, with the knowledge that surer employment and better wages will follow. Thanks to the increasing prevalence of open shops, these certificates are becoming more influential in securing remunerative employment than are union cards. A union card of whatever color is a declaration that its holder has sold his allegiance to a power that is too often antagonistic to the employer's interest, while the employer's certificate states definitely just how faithfully and intelligently its holder has co-operated with his employers. Unions once had the opportunity to make themselves all-powerful and necessary to the industrial fabric by grading their men up instead of down, by establishing so high a standard of skill and efficiency as a prerequisite to membership in their bodies that employers would give preference to union men; but they have lost this opportunity, and now the employers are stepping in and by adopting the certificate system are championing the cause and guaranteeing the employment of industrious, ambitious men. The employer as an individual, beset by competition from his rival, cannot always be trusted to care for the personal interests of his men; but employers banded together in an association that takes a broad, humanitarian view of the whole situation are becoming a great force for good and the ultimate saviors of American workmen from unwise and often corrupt domination.

## Convention of Ohio State Association of Builders' Exchanges.

The fourth annual convention of the Ohio State Association of Builders' Exchanges, held in Cleveland on March 20 and 21, brought together from all sections of the State representative members of the building industry. The meeting was of unusual interest, both by reason of the number present and the business transacted. The discussions were instructive and the addresses were of a character to furnish food for thought on the part of those engaged in the building business. The convention was opened at two o'clock on the afternoon of March 20 in the Library Room of the Chamber of Commerce, President F. H. Weeks of Akron occupying the chair. The delegates were welcomed on behalf of the city by the Rev. Harris R. Cooley and on behalf of the Cleveland Builders' Exchange by President W. B. McAllister.

President Weeks of the State Association in his annual address, among other things, said:

"Let us most strenuously oppose any restrictions of the opportunities for young men to learn a trade which from certain causes are now reduced to an unwarranted degree. Let our purpose be to assist in bringing about such a state of affairs that every young man, rich or poor, shall have an opportunity to prepare himself for any legitimate walk in life he may wish to pursue and that no limit shall be put upon any man's skill or the amount of his production.

"There is one vital thing to do to further the progress of the world and that is to give every man a chance. I believe I express the thought of all here present when I say it is the duty of all men to themselves and their sons to uphold and advance this purpose. No leadership is so false, no doctrine so harmful, as that which denies to a struggling man the opportunity to fit himself for a more useful life or to aspire to the highest, the purest and most honored position in society. Let us keep before us the fact that the manner in which we meet and execute our obligations will in a large degree determine the extent in which public opinon will support us.

"The Ohio State Association of Builders' Exchange should have and I believe does have the moral support of all business interests and the people at large. We are not merely builders of buildings, but we aim to help to build the laws which govern the conditions of our homes, wherein there may be peace, comfort and contentment.

"The manner in which we may assist the people is in lending our influence and best efforts in the framing of just and equitable laws to govern the conditions under which the people may obtain this peace and comfort."

Secretary and Treasurer E. A. Roberts of Cleveland then presented his report, which showed a flourishing condition of the organization, and in which mention was made of the fact that the Ohio State Association was being used as a model by many other State associations of builders. A number of committees were then appointed, including those on nominations, resolutions and audit.

"Building Codes as I Have Known Them" was the subject of an address by Architect John Eisenmann, who presented some very interesting facts regarding the two codes now before the public, and from which it is proposed to compile and bring about a uniform code of building laws for the leading cities of the United States. E. H. Towson, chairman of the Executive Board of the Building Trades Employers' Association of the city, made an address bearing upon "Our Problems as Employers and How to Solve Them." He advocated a closer relationship between employer and employed, and denied the right of a workman to leave a position and still hold it. He deplored the boycott and the enforcement of rules regarding apprentices, which he said kept American boys from learning trades. He pointed out that the employers in the building crafts in Cleveland were better organized than ever before, and advocated the enactment of laws whereby every labor organization should be chartered, with a view to fixing responsibility. F. W. Pierce of Lorain followed Mr. Towson, and told of the conditions in his city, mentioning in the course of his remarks that during the 15 or 20 years he had been in business he had never discharged an employee and had never had a strike. A. C. Bradley, in a short address to the members, advised employers to retain control of their own business, to organize and to be firm, but at the same time to be just in their dealings with employees.

The next subject for discussion was "How Can the Exchanges of the State Be of More Practical Assistance to Each Other?" and among the speakers were John Crisp of Akron and P. L. Pratt of Lorain.

In the evening the visitors were entertained by the members of the Cleveland Builders' Exchange, the principal feature being a theater party at Keith's.

The closing session of the convention, which was more largely attended than that of the day before, was held on Wednesday, March 21, the first business being a consideration of the resolution which set forth the policy of the members on the labor question, and which was practically the same as that adopted at the meeting held last year in Zanesville. In effect it indorsed the open shop policy in the building crafts, opposed the boycott, the sympathetic strike, and any and all forms of personal intimidation.

The election of officers resulted in the unanimous choice of J. R. Squire of Youngstown for president, P. S. Phillips of Newark for first vice-president, F. C. Kasch of Akron for second vice-president, A. R. Kuhlman of Toledo for third vice-president and E. A. Roberts of Cleveland for secretary and treasurer, which position he has held since the organization of the State Association.

John R. Squire, the newly elected president, is a prominent citizen of Youngstown and is identified with the roofing and skylight business and the installation of hot air furnaces. Mr. Squire takes pride in the fact that he operated a saw mill in 1880, cutting the white oak timber from the tract of land now known as Wick Park. He has served as a member of the Board of Education, member of the City Council, was the first secretary of the Youngstown Builders' Exchange, having an assistant to look after the detail work; was first vice-president of the State Association of Builders' Exchanges and has served for two years as a member of the Executive Committee of that body.

A resolution was adopted expressing the thanks of the visitors to the Cleveland Exchange for entertainment furnished, as well as to the Chamber of Commerce for the use of the library for a convention hall. A reception in honor of the visitors was held at noon in the rooms of the Cleveland Builders' Exchange and an address on "The Mechanics' Lien Law of 1904" was made by Hon. F. W. Treadway.

At 2 o'clock the visitors were given a trolley ride about the city, the first objective point being the West Side and the viaducts, after which they were taken east as far as the Windemere car barns. They were also taken up on the Heights, and upon their return to the city inspected some of the big building operations in the downtown district.

THE Woodbridge Building at 100 William street, New York City, is to have a 16-story addition, estimated to cost $400,000. The drawings were prepared by Howells & Stokes of that address, and the general contract has been awarded to Wells Brothers Company of 160 Fifth avenue, New York City.

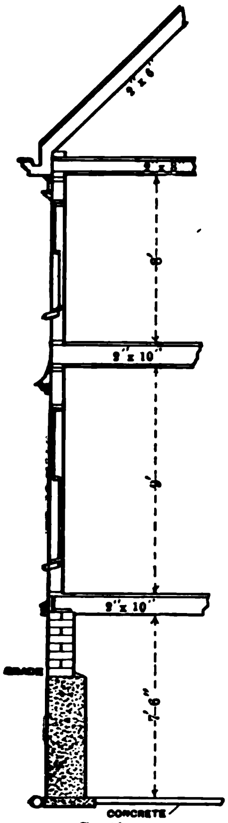
# COMPETITION IN $3500 HOUSES.

## SECOND-PRIZE DESIGN.

WE take pleasure in bringing to the attention of our readers the design awarded the second prize in the recent competition in $3500 houses, the author being Delbert P. Slitor of 133 South avenue, Penn Yan, N. Y. In presenting this study to the consideration of the committee having the matter in charge the author said: "With slight alterations it has been reproduced several times in this section, and the external appearance is such as to give the impression of a house costing considerably more money. The rooms are large, conveniently arranged and well lighted. If direct communication from kitchen to hall is desired there is ample room between the range and the stairs for it. In the accompanying specifications and estimate it has been my desire to make this study complete in all its requirements, to use such materials as would be best for the intending builder, and the workmanship in all cases to be first class."

In commenting upon the design awarded the second prize the committee in its report said: "The arrangement of the rooms is good. While there is no direct communication or quick way of reaching the front door from the kitchen, a door could be placed in the wall between the hall and the kitchen, or, still better, place a door in the side wall leading to the platform to the cellar stairs and then pass through the cellar door to the kitchen, which would give the desired two doors between the kitchen and other parts of the house. An improvement in the arrangement of the attic stairs would be to place them over the main flight, starting where the balustrade extends from the top newel to the wall; then add to the bedroom most of the space now shown on the plans as occupied by the attic stairs, and use the space over the back stairs for a high floor closet opening from the same bedroom. The price for the plumbing, $165, seems rather low, but there is enough allowed in 'Carpenter work not included, etc.,' to balance the plumbing and the small bid on painting. The cold air duct is rather small to allow the proper amount of air to enter, but the plans and specifications show that the designer has considered everything requisite for a complete job."

Doubtless many of our readers will be gratified to have the opportunity of making the acquaintance of Mr. Slitor, and we therefore present herewith an excellent likeness made from a recent photograph. The author of the second-prize design was born in Yates County, N. Y., nearly 51 years ago, and has always lived within a few miles of the county seat. His early education was obtained at the country schools, and when 19 years of age he attended the high school at Penn Yan during two winter and spring terms. Regarding his connection with the building business he says: "As far back as I can remember my greatest desire was to become a mechanic, my father being a first-class mechanic of the old school sort. When 18 years old I began work at the trade with him and continued for six years, when my father, being quite an old man, decided to retire from active service as a carpenter. I then started out alone for myself, having in the meantime taken advantage of every detail, making numerous memoranda as to cost of different work, which in the succeeding 15 years as a contractor and builder constituted the foundation of my success. At the end of the time named I was offered a good position as foreman and draftsman in the fine interior finish, sash, door and blind works at this place, where I am at present engaged, doing the architectural work as a side issue. The only claim I can make for any architectural ability I may possess is natural talent and my experience as a contractor and builder."



Section.

Front Elevation.—Scale, ⅛ Inch to the Foot.

*Competition in $3500 Houses.—Second-Prize Design.—Delbert P. Slitor, Architect, Penn Yan, N. Y.*

### Specifications.

We give below the specifications accompanying the design awarded the second prize; also the detailed estimate of cost:

**Excavations.**—Excavate 1 foot larger all around the building than sizes given on foundation plans, to the depth shown on sectional drawings; excavate for trenches under main wall, graded to 8 inches deep at point where main 5-inch tile leaves cellar.

Excavate for chimney and center partition 1 foot

DELBERT P. SLITOR,

Winner of Second Prize in $3500 House Competition.

deep, for porch footings 3 feet deep. Excavate for all drain pipes so as to give main 5-inch tile proper drainage to sewer and connect with same.

All earth not needed for grading to be removed from premises.

**Mason's Work and Materials.**

**Foundations.**—On outside of main trench lay 3-inch round tile, to connect with main 5-inch tile at point where it leaves cellar. Fill all trenches with concrete to level with cellar bottoms and porch supports to grade. On this build foundation walls of good, sound stone to level with grade; all stone laid in Portland cement mortar and to a line on each side; all to be flush pointed outside and neatly pointed inside. After pointing is dry on outside, earth to be filled in and tamped down even with grade.

**Stone Sills.**—Furnish and set 4 x 8 inch sandstone sills to all cellar window frames, well bedded in cement.

**Brick Work.**—Build foundation wall from grade to sill line with good, hard burned standard size brick; all exposed brick of even color and laid in red mortar with ¼-inch beaded joints, bonded every seventh course.

Build chimney where shown on plans, of same brick as specified for wall, all to be carried up true and plumb, and finished with caps at top, as shown; all above roof to be laid with red mortar, ¼-inch beaded joints; all to be plastered inside smooth their entire length; all above roof to be laid in cement. Provide all necessary thimbles and covers.

**Concrete Floor.**—Level off cellar bottom 3½ inches below finished floor level, and tamp down even and hard at all points, and lay a Rosendale cement concrete bottom 3 inches thick, and finish with 1 inch top dressing composed of Portland cement and sand in equal parts. Form in cellar bottom along foundation wall a channel, all to be graded to outlet before mentioned and connected with same.

Build in bottom of cellar cold air box and cover with flagstone.

**Lath and Plastering.**—Cover all walls and ceilings of first and second stories with No. 1 pine or spruce lath, joints broken every seventh lath on ceilings and ninth on walls; all angles and corners to be furred solid and firmly nailed. Cover same with one coat sand, lime and hair mortar, one of lime to three of sand and one-half of hair; immediately follow with one coat of browning mortar flush with grounds, and left under darby true, even and straight; all angles and corners put on to straight edge. After dry and hard lay on one coat of King's white finish, troweled down smooth and even, no laps to show. Back plaster behind all wainscotings that come to outside walls.

**Carpenter Work.**

All framing materials to be of No. 1 hemlock and as nearly dry as can be found in the market. Sills formed of one piece 2 x 12 laid flat on wall and bedded in cement, one 2 x 8 inch set edgewise and outside even with outer edge of first piece; back this up with one 2 x 8 laid flat on first piece—all well spiked together and at angles. First-floor joists framed into sills thus formed, as shown on section.

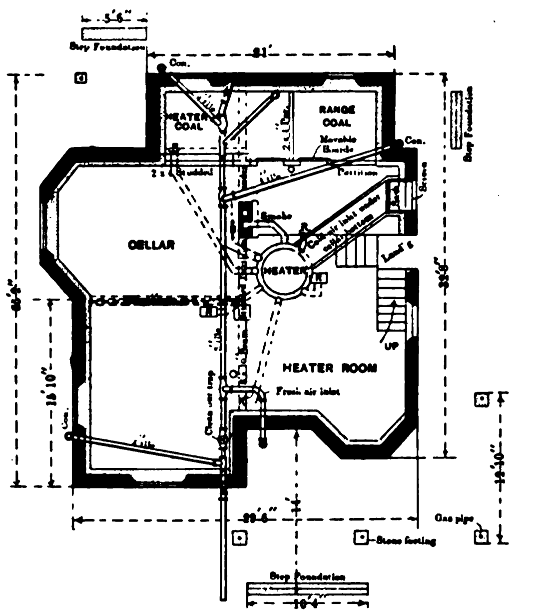
First and second floor joists 2 x 10 inches, third floor

Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

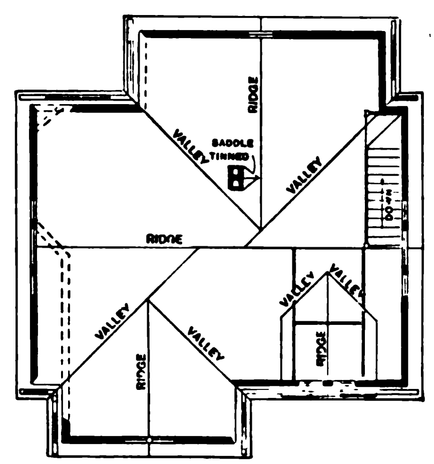
*Competition in $3500 Houses.—Second-Prize Design.*

joists 2 x 8 inches, outside walls and partitions 2 x 4 inches; all set 16 inches on centers. Main rafter 2 x 6 inches, set 18 inches on centers. Valley rafter 4 x 10 inches, with one running to ridge. Ridge, 2 x 8 inches. All joists bridged once in their length, if over 12 feet span twice, with 1¼ x 2 inch sawed bridging; corner posts, 4 x 6 inches; porch joists, 2 x 8 inches, set 16 inches on centers; sills, 4 x 8 inches; soffit beam, 4 x 12 inches. All materials sized.

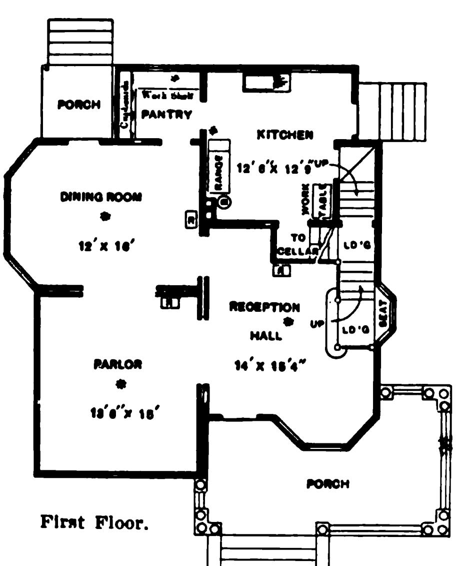
Main partition shown in cellar to have 2 x 6 inch studding, 12 inches on centers; others 2 x 4 inch studding, 16 inches on centers. All to be covered with ⅞-inch




Foundation.




Attic, with Outlines of Roof.




First Floor.


Second Floor.

*Competition in* $3500 *Houses.—Second-Prize Design.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

matched hemlock lumber, not over 4-inch face, all firmly nailed and No. 1 stock.

**Sheathing.**—Cover all exterior surfaces with ⅞ x 8 inch surfaced and jointed dry hemlock boards, strained up tight and surface nailed, with three nails in each bearing.

**Papering.**—Cover all sheathing with best grade of water proof Express sheathing paper, to lap at least 2 inches, well tacked on.

**Subfloors.**—Cover all joists on first floor with ⅞ x 8 inch surfaced and jointed hemlock boards, butt joints cut on center of joists; all laid diagonally across joists, firmly nailed with three 8-penny nails in each bearing and strained up tight.

**Siding.**—Cover all surfaces so indicated on plans with No. 1 5-inch white pine siding, free from sap or knots, to lap at least 1 inch; all firmly nailed to each studding.

**Shingling on Sides and Gables.**—Cover all sides and gables where indicated on plan with No. 1 Washington red cedar dimension shingles, 6 to 2 inches, laid 5 inches to the weather.

**Roof.**—Cover all roof surfaces with surfaced 6-inch hemlock boards, laid 2 inches apart and firmly nailed; all valleys to be laid straight. Cover these with No. 1 Washington red cedar shingles, 5 to 2 inches, laid ½ inch less than one-third their length to the weather, all firmly nailed.

**Metal and Iron Work.**—Lay all valleys in roof of 14-inch tin, all gutters to be formed of 28-inch tin; cover all porch roofs with tin, all well laid and soldered; flashings for chimneys, caps to window and door frames, and all other work necessary to make a water proof job in all cases; all to be done with N. & G. Taylor Company's IX Old Style tin.

Grade all gutters to outlets and connect with 2-inch corrugated galvanized iron conductors, to be carried down and connect with drain, as shown, with all necessary crooks and bends, and all firmly fastened to house.

Place 2-inch gas pipe supports under porches and steps, as shown, with adjustable 5-inch collars.

**Cornices and Belt Courses.**—All cornices and belt courses as per detail, of good grade of white pine lumber, all worked as per drawings, put up straight and true, with all moldings neatly membered. Corner boards, 1⅛ x 4½ inches. Water table as per detail.

**Porches.**—Build porches as shown, with turned columns, molded rails and square baluster. All porch floors to be laid with white lead of 1⅛-inch Washington red cedar match; ceilings of ½-inch North Carolina pine, matched and beaded; steps, 1⅛-inch white pine, as per plans.

**Window and Door Frames.**—Cellar frames of 2-inch white pine, with 1⅜-inch sill fitted to stone sill, with 1⅛ x 2½ inch face casings and 1⅛-inch staff mold. All window frames to be made in the usual manner, with ⅞-inch jambs, 1⅛ x 4½ inch face casings, ⅞-inch subsill and 2-inch sill. All (except the attic, which will be provided with spring bolts) will be fitted with pockets and 2-inch steel axle sash pulleys. All door frames to be made with 1½-inch rabbeted jambs and oak sills.

**Sash and Glazing.**—All windows shown on plans to have 1⅜ C. C. white pine sash, glazed with No. 1 American glass, double strength, all to be oiled, back puttied, and well sprigged and puttied in the best manner; all to be hung on best braided cotton sash cord and balances with cast weights.

Cellar sash hung at top and provided with hook and button.

### Interior Finish.

All interior finish shown in parlor, dining room and reception hall to be of No. 1 kiln dried red oak, kitchen and pantry No. 1 Georgia pine, entire second floor in No. 1 Gulf cypress. All trim as per detail.

**Doors.**—All doors as per sizes marked on plan. First floor, Colonial panel, flush molded; front doors as per plan, raised molded outside, with plate glass. Side entrance doors to be glazed with No. 1 American glass, double strength. All No. 1 Gulf cypress.

All doors on second floor to be five-panel, solid Gulf cypress, blind tenoned, wedged and glued in the best manner. Cellar door 1⅜ inches thick, regular stock pine.

**Wainscotings.**—Kitchen to be wainscoted 3 feet high, behind sink 4 feet high, with ⅝-inch matched and beaded Georgia pine wainscoting, finished with neat cap and ⅝-inch quarter round at floor.

Bathroom to be wainscoted 4 feet high, with matched and beaded Gulf cypress, with base and cap.

**Stairs.**—Build main stairs as shown of No. 1 red oak, molded and paneled newels, 2½ x 3½ molded rail, 1⅛ x 1⅛ turned balusters set 1½ inches apart on inclosed molded string.

Build rear stairs from kitchen to landing of No. 1 Georgia pine.

Build attic stairs of No. 1 white pine, all to be housed, wedged and glued in the best manner, with 1⅛-inch treads, with nosing and cone, ⅞-inch risers and strings.

Build stairs from kitchen down to grade landing of No. 1 Georgia pine, 1⅛-inch treads, ⅞-inch risers and strings; from landing to cellar of 1⅜-inch pine treads, 1¾-inch strings, all pine.

**Closets.**—Furnish all closets where shown, with two shelves and 3-inch beaded wardrobe strip all around, with steel wire coat and hat hooks spaced 1 foot apart.

**Pantry.**—Fit up pantry as shown, with all drawers and tilting flour box brought onto job made up. Build counter shelf and work 2 feet 6 inches high under counter shelf. Build cupboard with one shelf and inclose with panel doors. Above counter shelf build cupboard; extend doors to line with main door, finished at this point with neat cornice from there to ceiling. Build cupboard inclosed with short door for storage. Finish at ceiling with neat molding. Middle cupboard to have 15-inch shelving, spaced about 12 inches apart, inclosed with panel doors, all to be finished in Georgia pine.

**Picture Molding.**—Put up in principal rooms on first floor a 2-inch picture molding 18 inches from ceiling down, all of same materials as room in which they are placed.

**Floors.**—After finishing is completed lay over subfloors in kitchen and pantry a ⅞ x 2½ inch No. 1 kiln dried white maple match floor; in dining room, parlor, reception hall and bathroom a ⅞ x 2½ inch No. 1 kiln dried white oak match floor, and balance of second floor to be covered with ⅞ x 3 inch white pine.

All hard wood floors to be thoroughly dressed up true and even and finished with sandpaper, leaving perfectly even surface for finishing.

All attic surface to be covered with ⅞ x 4 inch matched hemlock, firmly nailed and strained up tight.

**Hardware.**—Front door to have Sargent 5-inch easy spring cylinder locks, with 3 x 10 inch bronze escutcheon and 2¼-inch bronze knobs, hung with three 4 x 4 inch steel bronze plated butts to each door. Sliding doors to be hung with McCabe's ball bearing roller, stops, strike, &c., complete, to be trimmed with bronze faced locks and cup escutcheon, same style as front door.

Double swing door from dining room to pantry and pantry to kitchen to be hung with Sargent's double acting bronze plated hinges. Push plate on dining room side of pantry door to be bronze, same style as escutcheon on other doors. Side entrance door to have Sargent's easy spring bronze front locks, with flat steel keys.

All other doors in house (except cellar, which will have heavy thumb latches and plain 4 x 4 inch steel butts) will have same make and style of locks, 3½ inches, all to be trimmed with bronze plated knobs and escutcheons, 2 x 8 inches, and hung with three 4 x 4 inch bronze plated steel butts. Push plates on pantry and kitchen side of double swing doors to correspond with escutcheons on doors and to be 3 x 10 inches. All cupboard doors to be hung with two 2-inch steel bronze plated butts and trimmed with bronze plated cupboard trim.

All windows shown in parlor, dining room and reception hall to have bronze sash locks and bronze cupboard sash lifts; all others to have bronze plated.

### Painting and Finishing.

Paint all wood work on exterior and porch floors with three coats of best white lead and linseed oil in colors to suit owner (except porch ceilings), having first shellacked all knots and pitchy spots; after first coat is dry putty all nail holes. Dip all shingles shown on sides and gables two-thirds their length in Cabot's creosote shingle stain; after being laid finish with one coat well brushed on.

Finish all porch ceilings with one coat best liquid filler; after dry and hard sandpaper lightly and finish with two coats best spar varnish.

Finish all wood work shown in dining room, reception hall, parlor and main stairs, including window sash, with one coat Berry Bros.' paste wood filler, well rubbed in and wiped off clean, after thoroughly dry and hard. Putty all nail holes with putty to match wood, and finish with one coat best white shellac, and follow with two coats best No. 1 Murphy & Co.'s transparent wood finish (interior). After last coat is dry, rub with pumice stone and oil to a dull gloss; pantry, kitchen and rear stairs, including window sash, to be finished with one coat filler and two coats varnish same as above, left with gloss.

Entire second story and all window sash to be finished with one coat best liquid filler and two coats best No. 1 Murphy & Co.'s transparent wood finish (interior) left with gloss.

All hard wood floors in parlor, dining room, bathroom and reception hall to be finished with one coat Berry Bros.' wood filler, rubbed off clean and finished with two coats Berry Bros.' floor finish.

Kitchen and pantry floors to have one coat oil put on hot, and after dry thoroughly wipe up all that does not penetrate the wood. All above work to be done in a first-class manner.

All metal work to be painted two coats best mineral paint.

### Electric Bell.

Furnish and place where directed one electric bell, wires to be carried under floor to point of rising, connected with push button at front door. Button to be furnished with hardware.

### Lighting.

Furnish and put in electric wires throughout the house with sufficiently large wires to carry the number of lights, as shown by the outings on the plan; furnish and put in two circuits or switches, as directed by owner or architect. All wires, material and workmanship to be subject to test under the order of the local lighting company and of the National Board of Underwriters.

All fixtures to be of neat design, and to correspond with hardware in rooms in which they are placed; all to be complete with lamps, shades and globes.

### Plumbing Specifications.

**Sewer.**—Furnish and connect with sewer and carry 5-inch vitrified pipe to house and to a point under bathrooms, as indicated on cellar plans. Connect the same with all 4-inch tile as shown, with proper Ys, Ts and elbows; connect fresh air inlets and traps as shown; all to be laid with cement joints and have proper drainage. At the points indicated on plans connect with cast iron pipe and carry same up and through roof and flash with lead; all joints calked with lead and oakum; lay off on stack openings for each set of fixtures.

**City Water.**—Furnish and start from water main in street; furnish all needed connections, with cut off at curb.

Water pipes in cellar to be ¾-inch galvanized iron; all other to be lead, with wiped joints and brass ferrules.

**Plumbing.**—Furnish and place in kitchen one 18 x 36 inch cast enameled sink, with 12-inch back, 3-inch roll rim, and connect same with hot and cold water through ½-inch Fuller patent bibs, and furnish waste with 1½-inch N. P. brass trap, connected to soil pipe.

Place a 40-gallon extra heavy galvanized boiler, set on ornamental iron stand, supplied with hot and cold water, with ½-inch compression stops, connected to range.

Furnish and place in bathroom on second floor a low down siphon closet, with quartered oak seat and tank, and connect same to soil pipe with lead bend and brass ferrule.

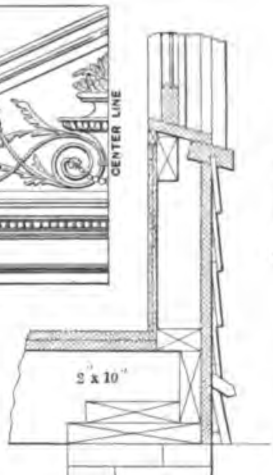
Furnish and set a 5 foot 3 inch roll rim cast enameled bathtub, with N. P. waste and overflow, hot and cold water supplied through ½-inch N. P. brass pipes, and No. 4½ Fuller patent double bath cocks, with 1½-inch N. P. brass trap, connected to soil pipe.

All above fixtures to be first class; all pipes well supported and left in perfect condition.

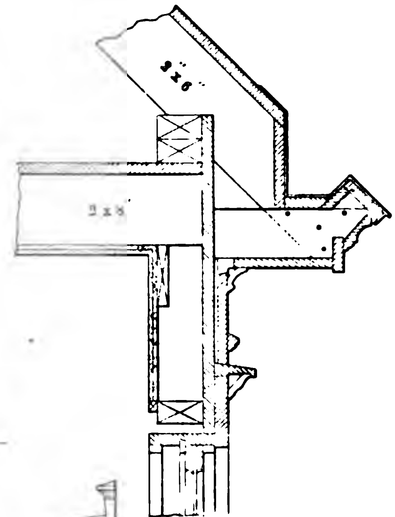
### Heating.

Furnish and set on foundation prepared by mason contractor one No. 352 Boynton "Renown" furnace, capacity 20,000 square feet, and connect same with 10-inch

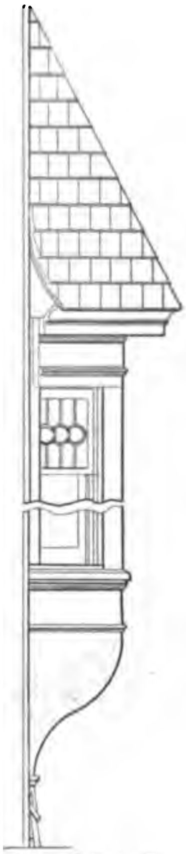
Details of Front Porch.—Scale, ¾ Inch to the Foot.




Details of Water Table. —Scale, ¾ Inch to the Foot.

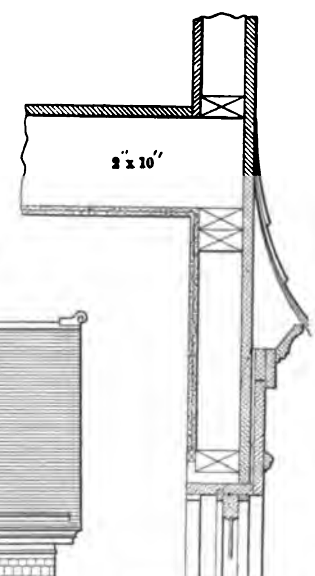



Details of Main Cornice.—Scale, ¾ Inch to the Foot.



Elevation of Stair Bay in Reception Hall.—Scale, ¾ Inch to the Foot.


Half Elevation of Gable Window. —Scale, ¾ Inch to the Foot.




Belt Course, Showing Construction at Second Story.—Scale, ¾ Inch to the Foot.

Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

*Competition in $3500 Houses.—Second-Prize Design.—Miscellaneous Constructive Details.*

IX tin pipes, running to parlor, dining room and reception hall, and 9-inch pipes to risers to second floor, as indicated on plans, all to be covered with asbestos. All pipes to be furnished with suitable dampers, so heat may be shut off from any one pipe at will.

First-floor registers to be japanned, 10 x 14 inches, parlor, reception hall and dining room, second-floor registers to be 9 x 12 inch circle top, japanned finish; all properly connected with suitable size wall pipes, covered with asbestos.

Connect furnace with chimney with 8-inch No. 24 galvanized iron pipe. Furnish and set one 9 x 12 inch cast iron door and frame in bottom of chimney.

All above to be done in a workmanlike manner and guaranteed to heat the house in zero weather; furnace dampers to be so arranged as to be operated from first floor.

### Detail Estimate of Cost.

The following is the estimate of cost in detail as furnished by the author:

**Excavating.**

| | |
|---|---|
| 225 yards, including all drains, trenches and footings, at 30 cents | $67.50 |

**Mason's Work.**

| | |
|---|---|
| 85 square yards cement floor in cellar, at 60 cents | $51.00 |
| 75 perch stone, laid and pointed, including all footings, at $2 | 150.00 |
| 2,300 brick in chimney, furnace foundations and cold air box, laid, at $18 M | 41.40 |
| 7,500 brick in foundations, laid, at $16 M | 120.00 |
| 30 square feet 2-inch flagstone for cold air box in cellar, at 15 cents | 4.50 |
| 725 square yards lath and plastering, including lath, at 35 cents | 253.75 |
| Filling in trenches and outside main wall | 10.00 |
| 140 linear feet drain tile, laid | 3.50 |
| 7 4 x 8 sandstone sills for cellar windows | 9.00 |
| Total mason work | $643.15 |

**Carpenter Work.**

| | |
|---|---|
| 12,500 feet framing materials, at $19 | $237.50 |
| 2,700 feet surfaced and jointed sheathing, at $20 | 54.00 |
| 875 feet surfaced and jointed subfloors, at $20 | 17.50 |
| 1,850 feet surfaced roof boards, including porches, at $20 | 37.00 |
| 13 M. shingles on roof, at $4.25 | 55.25 |
| 10 M. shingles on sides and gables, at $3.50 | 35.00 |
| 2 M. shingles for porch, at $3.50 | 7.00 |
| 80 pounds best manila sheathing paper, at 6 cents | 4.80 |
| 1,600 feet No. 1 pine siding, at $35 | 56.00 |
| 1,500 feet matched hemlock for attic floor and cellar partition, at $24 | 36.00 |
| 250 feet No. 1 maple floor for kitchen and pantry, at $35 | 8.75 |
| 850 feet No. 1 red oak flooring, balance first floor, at $50 | 42.50 |
| 1,100 feet soft pine flooring for second floor, at $30 | 33.00 |
| Total rough lumber | $624.30 |

MILL WORK.

| | |
|---|---|
| 80 linear feet water table, complete, at 4½ cents | $3.60 |
| 60 linear feet corner boards, at 4½ cents | 2.70 |
| 60 linear feet angle boards, at 1 cent | .60 |
| 138 linear feet belt course, including cornice to bay and porches, at 10 cents | 13.80 |
| 64 linear feet eave cornice, including gutter forms, at 15 cents | 9.60 |
| 222 linear feet gable cornice, including returns and belts across gables, at 12 cents | 26.64 |
| 36 feet dormer cornice, at 8 cents | 2.88 |
| 1 cornice bracket, left elevation | 1.25 |
| 70 linear feet ridge boards, including 4 ridge finials | 2.50 |
| Materials for porches, not including framing materials, roof, cornice or gable ornament | 113.08 |
| 234 linear feet molded 9-inch cypress base, 3 members | 11.98 |
| 130 linear feet molded 9-inch oak base, 3 members | 7.67 |
| 24 linear feet ⅝-inch matched and beaded cypress wainscoting, 4 feet high, for bathroom, with cap and strip | 4.68 |
| 57 linear feet ⅝-inch Georgia pine matched and beaded wainscoting, 3 feet high, for kitchen, with cap and strip | 5.46 |
| Materials for cupboard in bathroom, with drawers made up | 5.35 |
| Shelves and strip for all closets | 1.38 |
| 1 cypress wall angle, 4 feet, turned; 1 Georgia pine wall angle, 4 feet, turned; 2 red oak wall angles, 4 feet, turned | 1.00 |
| Seat and apron for stair bay | 1.34 |
| 100 linear feet 2-inch red oak picture mold | 1.00 |
| 12 sets red oak window trim, first story | 10.80 |
| 11 sets red oak door trimmings, first story | 9.90 |
| 3 sets Georgia pine window trimmings, first story | 2.25 |
| 11 sets Georgia pine door trimmings, first story | 8.25 |
| 10 sets cypress window trimmings, second story | 8.50 |
| 17 sets cypress door trimmings, second story | 14.45 |
| 9 sets door jambs and stops | 5.40 |
| 4 sets door jambs and stops, Georgia pine | 2.00 |
| 2 sets door jambs and stops, red oak | 1.30 |
| 2 sets red oak double sliding door jambs and stops | 2.60 |
| 1 set single sliding door jambs and stops | 1.30 |
| Materials for attic stairs, all treads with nosing and triangular treads glued up | 6.31 |
| Materials for rear stairs for kitchen to main landing, all treads with nosing and triangular treads glued up | 5.03 |
| Materials for main stairs, complete, with newels made up and treads with nosing | 66.47 |
| Materials for stairs for kitchen to grade landing | 3.38 |
| Materials for stairs from grade landing to cellar | 2.76 |
| Materials for pantry, dresser, shelves, &c., including all drawers and flour bins, made up, with panel doors | 22.83 |
| 37 windows and casements | 100.15 |
| 9 cellar sashes | 5.15 |
| 2 triple side gable frames, made up | 30.00 |
| 2 double frames for front gable and dormers, made up | 7.00 |
| 1 window frame for stair landing | 4.00 |
| 21 window frames, with pockets and pulleys, made up, complete | 36.75 |
| 4 outside door frames, made up | 7.00 |
| 2 double cellar frames, made up | 4.00 |
| 4 single cellar frames, made up | 4.00 |
| 1 frame for cold air flue | 1.00 |
| 1 front door with bevel plate glass, molded cypress | 10.00 |
| 1 rear side door, molded cypress | 4.51 |
| 1 rear side door, molded cypress, 1 lt | 4.66 |
| 1 side cellar door, molded cypress, 1 lt | 5.25 |
| 1 pair sliding doors, 2 feet 9 inches x 7 feet, molded cypress | 11.83 |
| 1 pair sliding doors, 3 feet x 7 feet, molded cypress | 12.07 |
| 1 single sliding door, 3 feet 6 inches x 7 feet, molded cypress | 7.39 |
| 5 doors, molded cypress | 16.05 |
| All above first floor. | |
| 10 doors, 5 panel, molded cypress, for second floor | 26.97 |
| 1 common stock cellar door | 2.00 |
| Total mill work | $689.82 |

**Metal and Iron Work.**

| | |
|---|---|
| 60 linear feet 28-inch gutter tin, at 30 cents | $18.00 |
| 80 linear feet 2-inch conductor, with crooks and elbows, complete, at 12½ cents | 10.00 |
| 72 linear feet 14-inch valley tin, at 10 cents | 7.20 |
| 1 zinc ornament for porch gable | 8.00 |
| 450 feet tin roofing, including all necessary flashings, at 7 cents | 31.50 |
| 5 gas pipe porch supports | 5.00 |
| Total metal and iron work | $79.70 |

RECAPITULATION.

| | |
|---|---|
| Excavating | $67.50 |
| Mason's work | 643.15 |
| Rough lumber | 624.30 |
| Mill work | 689.82 |
| Metal and iron work | 79.70 |
| Rough hardware | 35.00 |
| Finished hardware, including sliding door rolls | 80.00 |
| Heating, complete | 125.00 |
| Plumbing, including all pipe and connections with sewer | 165.00 |
| Lighting and fixtures, including electric bell | 80.00 |
| Painting and finishing | 175.00 |
| Carpenter work not included above | 715.00 |
| Total | $3,479.47 |

The builder's certificate was signed by Frank Harrison, Penn Yan, N. Y.

## No High Steel Framed Buildings in Berlin.

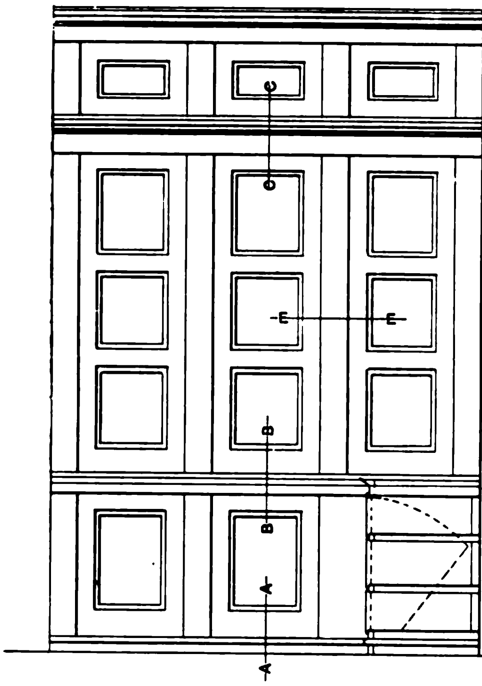
Some time ago the Central Association of German Industrials addressed the Ministry of the Interior urging that the present building laws, which do not permit the construction in Berlin of dwellings or business buildings having a greater hight from pavement to cornice than 72.18 feet, be so far relaxed as to allow steel framed buildings of higher altitude to be erected, if not generally, at least in exceptional cases where good reason for such variation could be offered. The reply to this request was after due consideration, a flat refusal for reasons which were stated at length, but which are condensed as follows in his report to the State Department by United States Consul-General Frank H. Mason at Berlin, Germany:

The Ministries are opposed to any system of building which will lead to an increase in the number of renting barracks (Miethscaserne), large buildings divided into a great number of small apartments or tenements, which are leased to families of working people, with the result that a great number of persons of both sexes and all ages are huddled together under conditions which are necessarily subversive of normal family life and prejudicial to public morals.

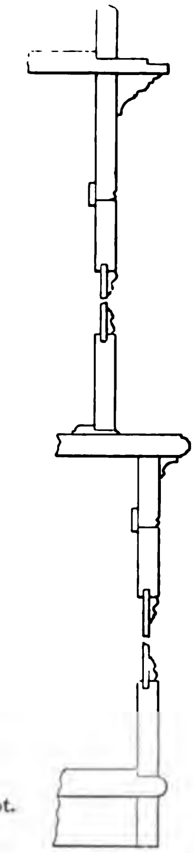
Buildings so high as to be beyond the lever of the present water supply could not be made clean and sanitary.

Any important increase in hight beyond the present limit would put the upper stories of the buildings beyond the protection of the fire department as at present equipped and organized. Whatever might be the material interests involved, the Ministries held themselves bound to consider and protect not only the architectural unity and beauty of the city, but the health and the moral and physical safety of the people, all of which would, in their opinion, be compromised by the proposed innovation.

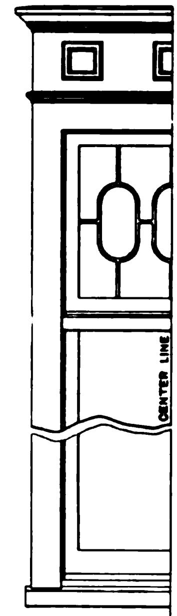
A BUILDING which, when completed, will be five stories and basement in hight and cover an area 136 x 200 feet is now in process of erection in Indianapolis, Ind., for W. J. Holliday & Co. It is arranged especially for carrying iron, steel and heavy hardware and combines the best features of modern warehouses. A private switch, 300 feet long, will serve the building, which will be so arranged that five cars can be loaded at one time.



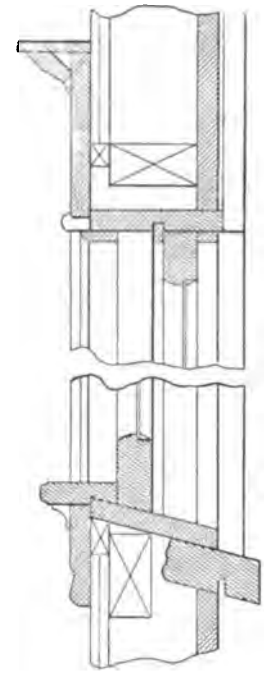

Elevation of Pantry Cupboard.—Scale, ⅜ Inch to the Foot.



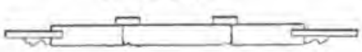
Section through Pantry Cupboard on Lines A A, B B and C C.—Scale, 1½ Inches to the Foot.



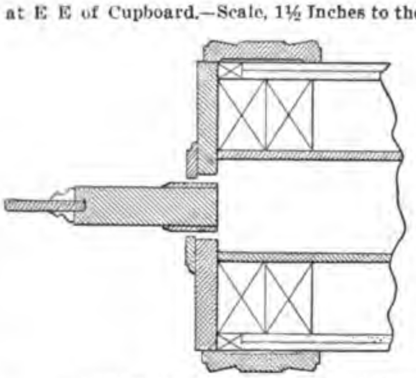

Half Elevation of Window on Stair Landing.—Scale, ½ Inch to the Foot.



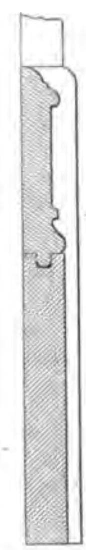
Details of Window Construction.—Scale, 1½ Inches to the Foot.



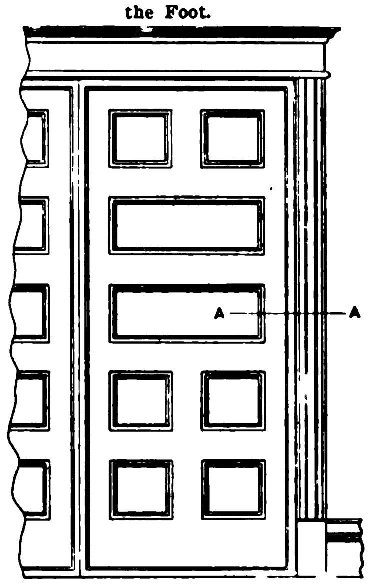
Section at E E of Cupboard.—Scale, 1½ Inches to the Foot.



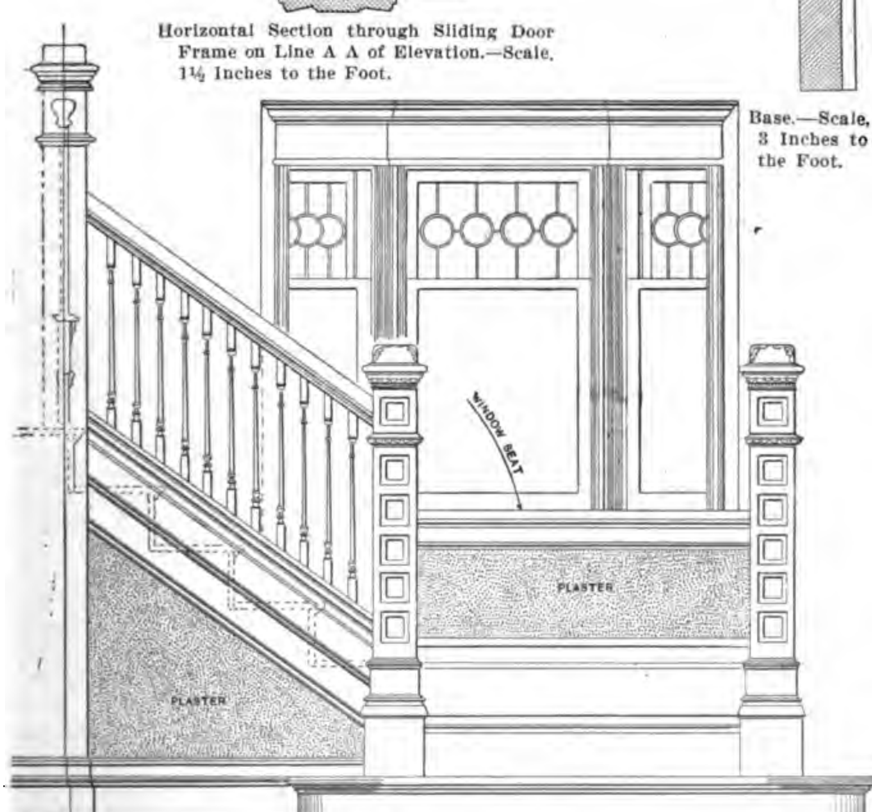
Horizontal Section through Sliding Door Frame on Line A A of Elevation.—Scale, 1½ Inches to the Foot.



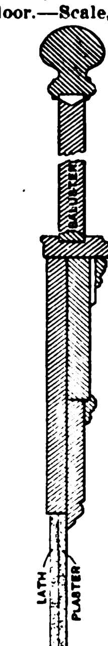
Base.—Scale, 3 Inches to the Foot.



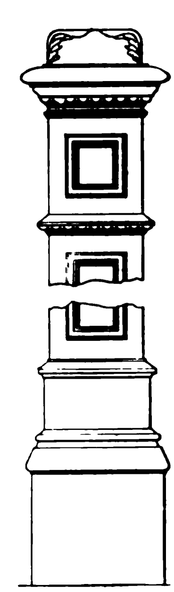

Partial Elevation of Sliding Doors, Showing Style of Doors and Trim on First Floor.—Scale, ⅜ Inch to the Foot.




Elevation of Main Stairs and Bay Window.—Scale, ½ Inch to the Foot.




Section through Stair Skirting.—Scale, 1½ Inches to the Foot.



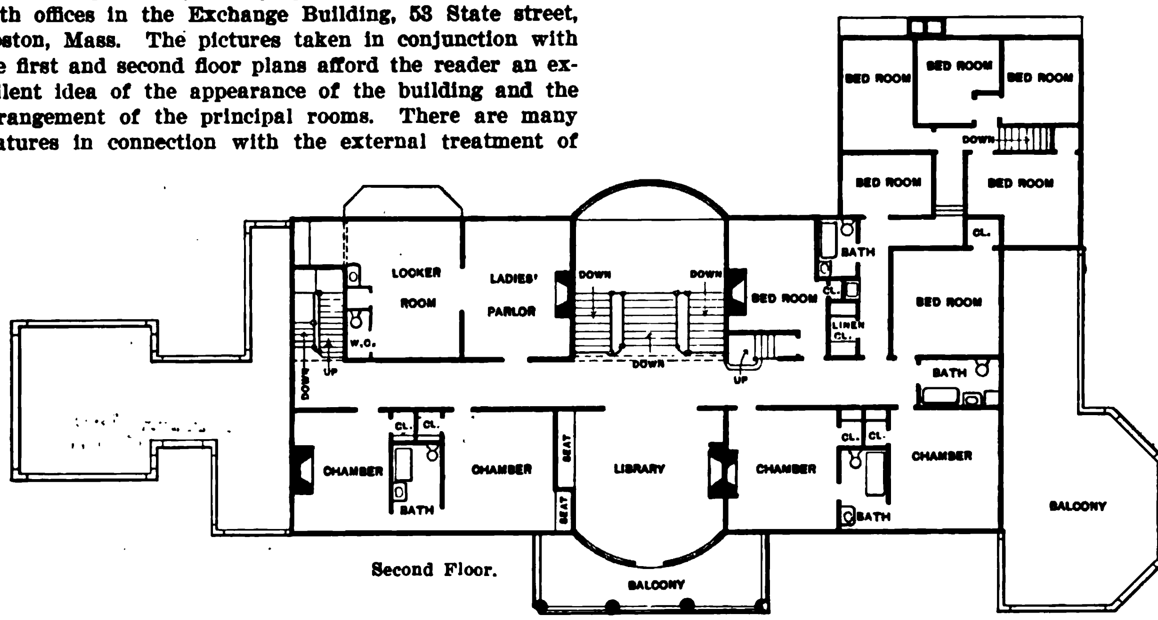
Elevation of Newel Post. — Scale, 1 Inch to the Foot.

*Competition in $3500 Houses.—Second-Prize Design.—Miscellaneous Constructive Details.*

## The Brae Burn Country Club House.

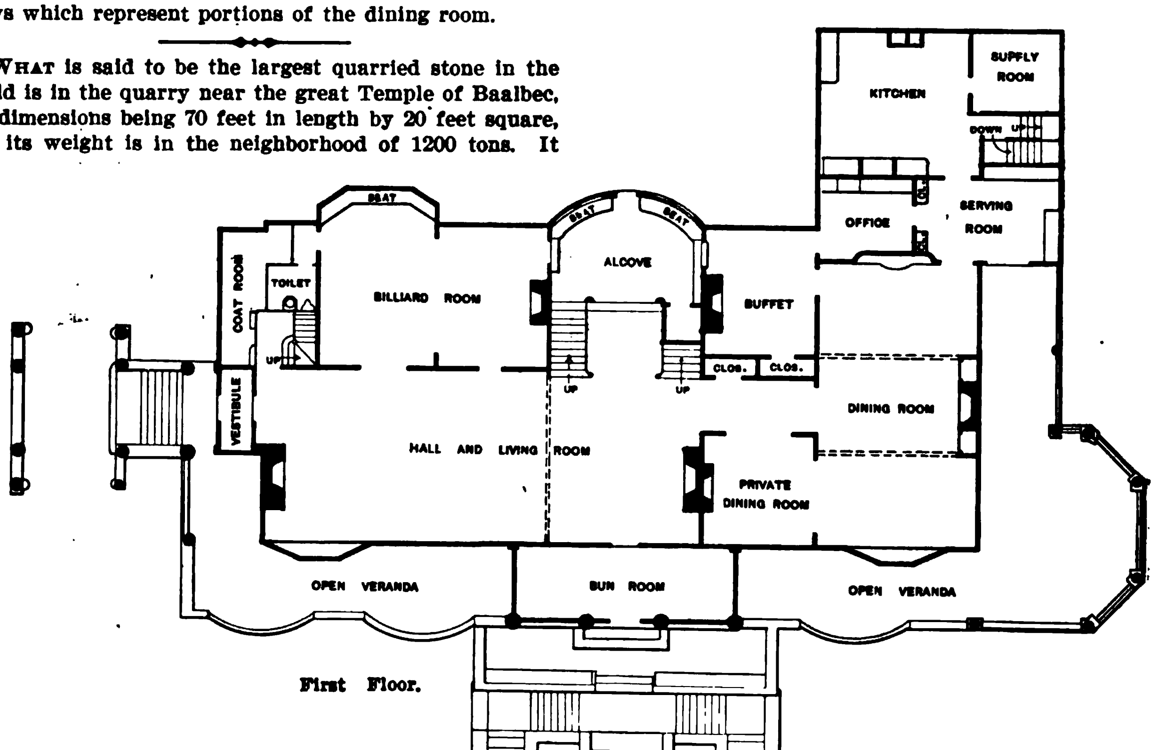
*(With Supplemental Plates.)*

We take pleasure in presenting as the basis of our half-tone supplemental plates this month exterior and interior views of the new Brae Burn Country Club House, formally opened a few weeks ago at West Newton, Mass., the drawings having been prepared by Loring & Phipps, with offices in the Exchange Building, 53 State street, Boston, Mass. The pictures taken in conjunction with the first and second floor plans afford the reader an excellent idea of the appearance of the building and the arrangement of the principal rooms. There are many features in connection with the external treatment of the structure which afford the basis for suggestions to architects and builders; for while they may not perhaps be called upon to execute as pretentious a design as that here shown, there are details which are susceptible of application in connection with smaller work. The club house is referred to as the finest in the vicinity of Boston, and some idea of the interior decoration and treatment may be gathered from a careful study of the two interior views which represent portions of the dining room.




Second Floor.

WHAT is said to be the largest quarried stone in the world is in the quarry near the great Temple of Baalbec, the dimensions being 70 feet in length by 20 feet square, and its weight is in the neighborhood of 1200 tons. It still remains in the quarry, as it is supposed after cutting it that it was too heavy and cumbersome to be transported with the means available at that time. In the subbasement of the Temple of Baalbec, which was probably much more ancient than the now ruined Roman superstructure, there is a stone 66 feet long by 12 feet in breadth and thickness. Other large stones were those required for the gigantic columns recently mounted in connection with the cathedral of St. John the Divine on Cathedral Heights, New York City, where each stone was 64 feet long, 8½ feet thick and 7 feet wide.




First Floor.

*New Brae Burn Country Club House.—Loring & Phipps, Architects, Boston, Mass.*

SCATTERED through the city are a number of model tenement houses erected at intervals in recent years for providing improved accommodations for working people, the success of which has been such as to justify the owners in extending their operations. To this end plans were filed about the middle of January for another group of model tenements to be erected in Sixty-fifth street, between First avenue and Avenue A, by the City & Suburban Homes Company. There are to be four buildings on a plot 300 x 100 feet in area, and accommodations will be provided for 235 families in apartments consisting of two, three and four rooms, the latter having baths. The architects, James E. Ware & Son, estimate the cost of the buildings at $280,000. This is the fourth operation undertaken by the City & Suburban Homes Company on the block bounded by Sixty-fourth and Sixty-fifth streets, First avenue and Avenue A, representing an investment of nearly $2,000,000. When the new buildings are completed there will remain unimproved of the entire block only the Avenue A frontage, 200 x 100 feet.

# ORNAMENTAL TURNINGS IN WOOD.

BY C. TOBYANSEN.

AS intimated in the last installment of this series, we shall now take up the turning and boring of balls and spindles for grill work, and touch upon some of the practical details of scroll design likely to prove of interest in this connection. At the very outset it may be stated that pleasing results in the line of ornamental turnings may be obtained by simple means and with the exercise of a little ingenuity. The candlestick shown in Fig. 1 is a sample of what may be accomplished by means of the turning lathe and jointer. In the first place the stuff for the shaft is planed square and then made octagon the full length. The taper of the shaft is obtained by setting the front bed of the jointer down ¼ inch or more. Rest the stick on the back bed and gradually bring the other end down to the front bed, holding it firmly so as not to be carried away by the cutters; then push it forward over the cutter as far as the shaft is desired to extend, repeating the operation on all eight sides. As a result we shall have our octagon tapered shaft. It may not be without interest to state that this is also a convenient and practical way of making octagon balusters, a view of the jointer being shown in Fig. 3.

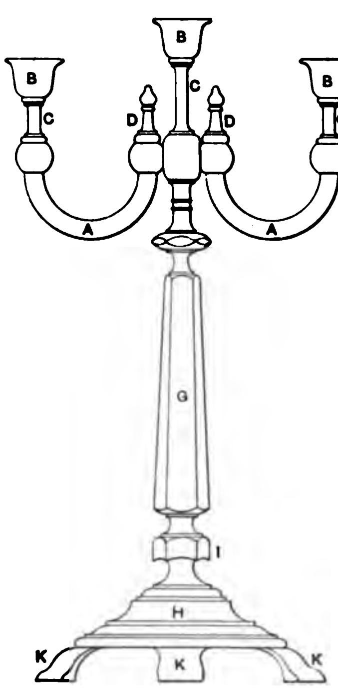



Fig. 1.—General View of Turned Candlestick.

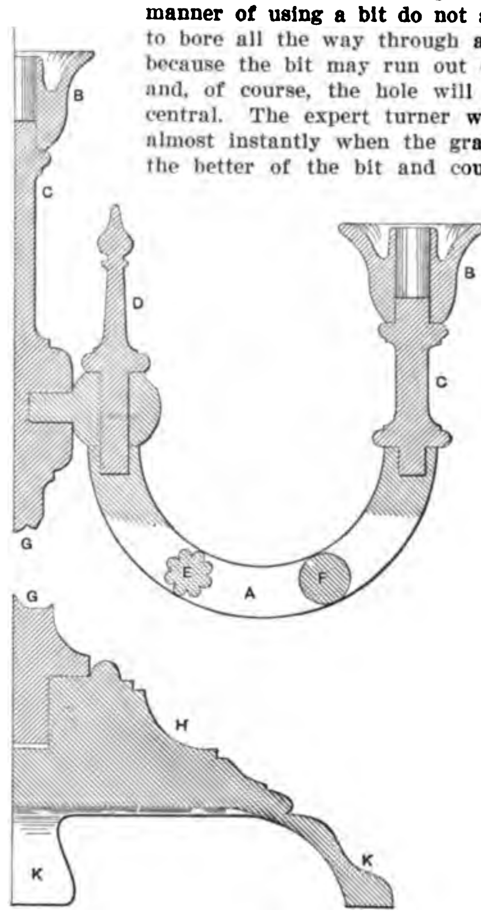



Fig. 2.—Details of the Candlestick.

*Ornamental Turnings in Wood.*

We will now proceed to the turning of the candlestick and by judicious cutting obtain pleasing facets, as shown in the illustration. The overhanging scallops, as at I, Fig. 1, are secured by cutting under the material. The constructive details of the top part and the base are shown in Fig. 2 of the drawings. The arms A A must be turned out of three-ply material—that is to say, glued up of three thicknesses of stuff. The grain of the two outer layers should run crosswise to the central piece, thus giving great tensile strength as compared with single piece material. This three-ply construction is also a feature of grill work, of which more will be said anon. The arms or the ring is turned as a whole—that is, a complete circle—and then cut in halves. After the stuff is cut out of the material, as noted in Fig. 4, using the band saw for the purpose, it is fastened on the screw plate and turned half way, then sanded and finished, as shown at A in Fig. 5. It is then reversed on the plate, as shown at B, and completed. Care must be taken not to cut entirely through until this half is sanded and finished satisfactorily. We then cut it into two half circles, taking care to sever it in such a place as to leave the grain in the central layer at right angles to the cut. The importance of this will be readily appreciated when we bore for the tenons. These arms may be turned plain round or beaded, as indicated at F E of Fig. 2, according to fancy. The cups B B, or candle holders, are bored entirely through in the lathe, a ¾-inch hole being about right. The tenon of the piece C enters a little ways and the balance of the hole forms the candle socket.

As will be noticed from an inspection of the sketch Fig, 6, the cups are preferably turned out of one piece by fastening the material in a hollow lathe chuck having one end free for boring. If one is not an expert in this manner of using a bit do not attempt to bore all the way through at once, because the bit may run out of true and, of course, the hole will not be central. The expert turner will feel almost instantly when the grain gets the better of the bit and counteract immediately, thus keeping it central. This, however, takes a lot of experience in just this special operation. The best form of bit for the purpose is the machine drill fitted with a handle.

The base H shown in Fig. 2 after being circled out on the band saw is fastened on the screw plate and hollowed out on the under side first and then reversed. The screw plate should be small enough to slip into this hollow space, otherwise a chuck must be turned to hold it while turning the upper side. In turning out the socket for the tenon of the shaft G make sure that you have a good fit, as indeed should be the case with all the tenons. The stuff used must be well seasoned lest the tenons shrink and become loose. After the base is turned and sanded the opening between the legs or feet may be cut with a bracket saw, the parts assembled, and the result should be a very satisfactory mantel ornament. If turned out of black walnut it will look well nicely polished, or it may be turned of white wood and stained ebony black, dead finish or polished. Again, it may be made of white pine and enameled ivory white or gilded. I once had occasion to make a pair of candlesticks 4 feet high with eight arms each, holding nine candles, counting the center one. The general design was much the same as the one shown in the illustration, and when finished in gold leaf the work appeared to great advantage considering the small cost. The candlesticks were intended for use in illuminating the altar of a country chapel.

Perhaps the most popular kind of interior ornamental wood work at the present day is the grill in its many forms and in the consideration of which turning plays an important part. In cases where grill work is the main portion of the product of an establishment it pays best to buy automatic turnings, which in large quantities can be secured at small expense. Where it is a question of an odd grill now and then it pays well enough to cut out the work by hand if gone about in the right way. The balls should be produced at a cost of about 1 cent a piece, counting turning at 60 cents an hour, the price generally charged for jobbing work in this locality. The rods can be stuck on a molder at slight cost. Generally speaking, there are three kinds of turned balls used in grill work, as shown in Fig. 7 of the drawings. At A is a ball with a solid tenon; B has a hole through it, while C has two holes and they enter the balls as shown. The ball A is most largely used to ornament the outside of the frame, B is slid on the rods and fastened with a small brad or glued at whatever point the design demands, while C finds its place in the network. These balls are all turned in the hollow chuck with one end free, the same as indicated in Fig. 5 for candle sockets.

We first gather up the odds and ends of material good for no other purpose, using anything large enough to make six to eight balls from one piece. After gathering enough for our purpose we proceed to saw it up in squares about 1-16 inch larger than the diameter of the ball. We then rough them out round between centers—that is, using head and tail stock of the lathe—and turn an end to fit the size of the chuck. It is of importance that these fit the chuck in such a manner as to require a couple of blows from a mallet or hammer to firmly fasten them in the socket. They can be truly centered by tapping them on the end one way or the other with the hammer. Assuming that we have them all in good order for the chuck we shove the tail stock out of the way, drive a piece in the chuck and proceed to turn the balls shown at A in Fig. 7.

In doing the work it is well to make a scratch marker, as shown in Fig. 8, giving the length of the ball and tenon. The material is now turned to the right size the full length and we shape the first ball, cutting the tenon of proper size by using a gauge similar to that shown in Fig. 10 of the article in the February number of the paper. If much of this kind of work is to be done it pays best to make a gauge with two sizes only—the diameter of the ball, generally 15-16, and the diameter of the tenon, 5-16—as a gauge of many sizes causes confusion and delay. The writer always uses a ⅝ chisel, which will cut the balls nicely and is not too wide to use in forming the tenon, thus obviating the necessity of a change of tools. After a little practice one can hold chisel, gauge and sandpaper in hand during the cutting of the six or eight balls and not be obliged to lay down or pick up anything during the entire operation. This saves a lot of time when it is a question of turning 600 to 800 balls. Always have the material of such a length or cut such a number of balls as will leave a residue of 1 inch or thereabouts outside of the chuck; the waste ends can then be speedily removed by resting the chisel on the tool rest and passing it under the stuff, pressing upward while the lathe is revolving and thus displacing the end in the chuck.

The ball B, with one hole through the center, is turned in the same manner, except that here we have the hole to deal with instead of cutting tenons. To do the work one must have a good sharp wood drill. If the two cutting edges of the drill are not just even the tool will run out of center and cause no end of trouble. Before starting the bit in the wood take the point of the chisel and cut a small hole in the end of the material to give the bit a true start. Lay the chisel across the tool rest and steady the bit on the chisel. Following these directions, with a good tool we should be able to bore the stick through endwise rapidly and truly. For these balls also we make a marker, evenly spaced, the brads being driven a little closer together than the diameter of the ball. On a ball 15-16 inch in diameter the brads would be ⅞ inch apart. Otherwise the balls appear elongated and do not look well. Care should be taken that the ball be turned truly round, for it is an odd fact that very few turners, even though good mechanics, turn a nice ball. I do not know why this should be so, as it appears an easy accomplishment, but such is the case.

The ball C requires different treatment because of the two operations. I have found it most practical to bore the material in the square on the vertical borer. Great care must be taken that the stuff for these balls is truly square and exact as to size. They can then be bored on a form like the one shown in Fig. 9. It is necessary to make the lines D, E, F across the face C to be bored with a square so as to be sure the holes will properly in-

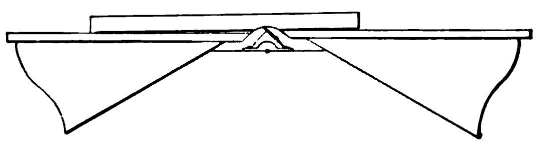


Fig. 3.—Showing How Shaft May Be Tapered on Jointer.

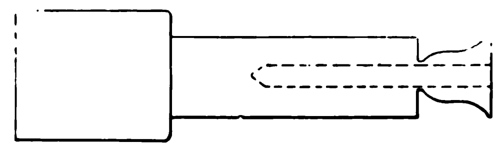


Fig. 6.—Material in Chuck for Candlesticks.

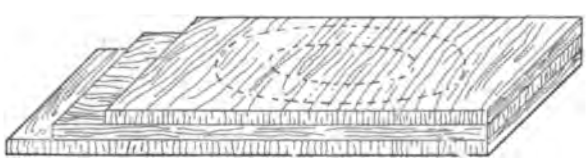


Fig. 4.—Three-Ply Material for Arms.

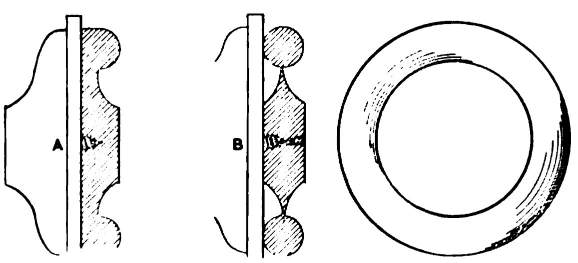



Fig. 5.—Turning the Circular Arms of Candlestick.

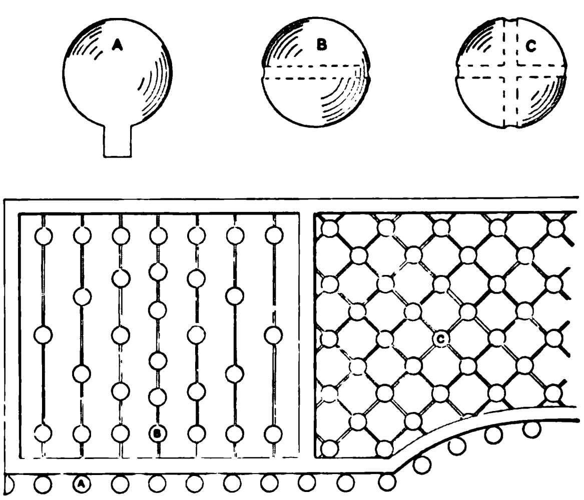



Fig. 7.—Turnings for Grill Work.

*Ornamental Turnings in Wood.*

tersect. This, however, is all the marking or spacing required. When the first hole is bored the piece is moved forward and the hole is slipped over the peg G; then bore again, slipping the second hole over, and so on. If the first two are bored accurately and centered to the lines then the rest will come true, provided the peg fits closely and the pattern is placed so as to bring the stick central to the bit, as shown in the end section H at the left of the sketch. The form is, of course, stationary, and so is the bit B, with the exception that it has a vertical movement. The same scheme may be used with a horizontal bit and sliding table, or a bit may be fastened in the lathe and a sliding table rigged up on the lathe bed. The balls may now be turned as before described, taking care that they are cut in such a way that the holes come in the center. The perforations can be plainly seen as the stick revolves.

## Cause of Collapsed Buildings in New York.

Some weeks ago, just when the frost was beginning to come out of the ground, a number of flat houses in course of construction in the upper part of New York City suddenly collapsed. While various reasons were assigned as the cause of the collapse, a committee of experts was appointed by the President of the Borough of Manhattan to investigate the matter and report at the earliest moment. This committee, consisting of Thomas J. Brady, Otto M. Eidlitz and George A. Just, reported on April 7 that "flagrant violations of the building codes" were responsible for the collapse. As a result of the investigation five amendments to the building laws are suggested. After giving the locations and description of the buildings examined, the report continues:

From our investigation we conclude that in every case the collapse or the partial destruction of these buildings was directly due to the failure of their foundation walls.

We found these walls full of voids, built of irregular and undersized stone, improperly bonded and imperfectly bedded. The mortar used was of an inferior quality and improperly mixed. Both the materials and workmanship were in flagrant violation of section 26 of the Building Code.

Although the sudden change in temperature which occurred on the night of March 18 may have contributed to the failure of the stone foundation walls in these various buildings, it is, nevertheless, a fact that these walls were of such inferior workmanship and materials as to make them insufficient to sustain with safety, at any time, the superimposed loads.

Our inspection revealed many violations of the Building Code, which, while not contributory to the destruction of the buildings, were in themselves a distinct menace to their permanency, inasmuch as they eliminated or reduced the factors of safety which the code provides.

Our comparison of the approved plans with the buildings showed that the corrections and amendments required by the Bureau of Buildings, as a prerequisite for the issuing of the permits, were generally disregarded in construction, although consented to in writing by the applicants in their desire to secure such permits. The work of the engineering staff of the Bureau of Buildings was, therefore, completely nullified.

The applications relating to the above mentioned buildings showed that in only one case was the architect of record to superintend the construction. In no case was the name of the builder stated. These omissions left in question the competency of those who were to supervise and the character of the contractors who might be selected to erect the buildings.

We can, therefore, only conclude that these buildings were erected without proper supervision, under inefficient inspection and by incompetent contractors; that the provisions of the Building Code were generally disregarded and that a very low standard of work is typical in this class of buildings.

In further compliance with your request and in view of these facts, we submit for your earnest consideration the following recommendations:

1. Architects should be required by law to supervise the construction of buildings for which they furnish plans.
2. A person before being allowed to practice as an architect should hold a diploma from some institution of learning or from a recognized board to be created hereafter. The *personnel* of this board and the methods of its operation should be left to a commission composed of representatives of the various architectural associations and members prominent in that profession.
3. A register of those authorized to practice architecture should be kept by the Bureau of Buildings, and permits for the erection or alteration of buildings should be issued by the Superintendent of Buildings only to those so registered.
4. All contractors for mason work or structural steel work should be licensed. The co-operation of the recognized organizations in these trades should be sought in the establishment of such board or bureau.
5. It shall be unlawful to permit the building of mason work or the erection of structural iron work by persons not so licensed.

The substance of these recommendations enacted into law would make the recurrence of similar accidents practically impossible, as such enactments would secure competent architectural supervision and capable contractors for all classes of building operations. The rigid, conscientious inspection of work in progress, which the Bureau of Buildings has failed to secure in these cases, is then a matter of secondary importance.

## A Bank Building of Wire Glass.

In these progressive days glass is being used for a great variety of purposes in connection with building construction and fittings, and among its latest applications may be mentioned its use in the construction of a bank building at Des Moines, Iowa, the plans for which have recently been completed by C. E. Eastman. The new building, intended to be used for banking purposes, is of classic design and is to be erected of glass after Mr. Eastman's plan of glass construction. The general scheme, says a recent issue of the Iowa State *Register*, consists in the use of a steel frame work supported by brackets attached to the beams of the floor, in duplicate, making two walls of opalescent wire glass, the latter being set in the steel frame work. The glass walls are approximately a foot apart, making an insulating dead air space to prevent loss of heat in winter and to prevent undue heat in summer. This system of construction allows of any arrangement of floor plan, because windows are unnecessary; and for the same reason the exterior will admit of any style of treatment entirely free of the restrictions of fenestration. The wall is fire resisting to a practical degree, as it has been demonstrated that wire glass will resist a hot fire, and, though necessary to replace it, the fire damage would be locally and easily repaired.

The cost compared to stone, terra cotta or brick is said to be from a quarter to a third less for the outer walls. The inner construction of the building is similar to that in general use.

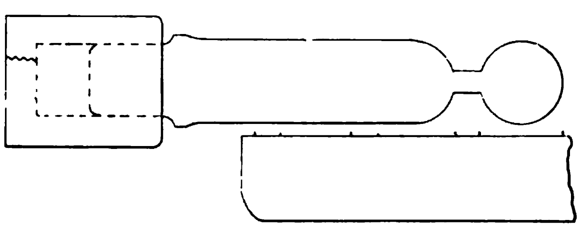


Fig. 8.—Material for Balls and "Marker."

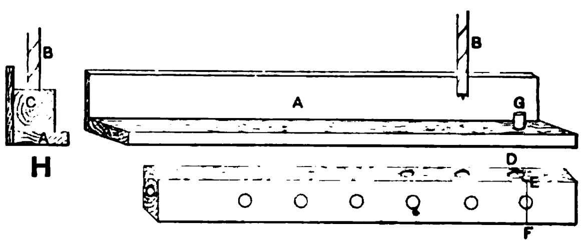



Fig. 9.—"Form" and Material for Grill Work.

*Ornamental Turnings in Wood.*

THE commissioner appointed some time ago to select plans for a new State capitol at Madison, Wis., made a report to the Legislature recommending the adoption of the plans and specifications submitted by Cass Gilbert of New York City. The new structure is estimated to cost in the neighborhood of $5,500,000, and will resemble in its architectural aspects the Minnesota capitol. The accepted design shows a main building with a large dome in the center and two wings projecting from the main structure.

# CABINET WORK FOR THE CARPENTER.

## SITTING ROOM FURNITURE.

By Paul D. Otter.

STYLE and fashion in everything are presented for our inspection and in a great majority of cases we adopt them. Some people are on the lookout all the while for that which is new, but others climb into the wagon after the "tailboard" is up, so fearful are they of being left behind in the procession of things and events. It is true we cannot divest our home of furniture as we would lay aside a three-button coat for a four-button furnished with slant pockets, but in considering the "modern" class of furniture, or rather the going back to the simple style, it gives us an article of furniture which we are not so likely to have supplanted by a flimsy trifle. Certainly the family sitting room table should have a sustaining dignity about it which the furniture of bamboo or Shakespeare class of table heretofore never possessed.

Very little additional information need be given for the table, Fig. 2, in the simple style. The plain posts and under framing are laid out on a drawing in a square of 21 x 40 inches, having the posts center along two intersecting diagonal lines, the open or top rails being mortised into the posts about 4 inches under the edge of the top. All edges should be chamfered 3-16 inch and just above the taper of the posts treated to a saw kerfed line, also chamfered to give finish. The top should be carefully matched from 1 5-16-inch lumber. Allow for the hight of the table 30 inches to the top either with or without casters. The weathered oak finish is undoubtedly best for this much used piece of furniture.

The couch should not be a difficult frame to construct. Indeed, after the inspection of the factory made article the craftsman may, with a little practice with pencil and paper, lay out from observation a frame which will have a pleasing, substantial outline, yet have the joints all cut square. With this thought Fig. 3 is presented with the necessary measuring memoranda given thereon. The frame is within a size of 27 x 73 inches, making it ample in length for a "six footer," or generous enough for an overflow accommodation in the event of a surprise party. The head posts terminate in a claw foot, the main rails and foot rail are made of not less than 1-inch boards. The shape given for head posts will come from a board 7½ inches wide. From a previously drawn detail showing the continuous character of line in its constructed form procure the separate marking out patterns, and right here be mindful that with the cut out paper pattern allow in the wood, in case of the line arching from claw post joint to the horizontal rail, an excess of stock which, when the parts are glued up, may be sawed or shaved to the correct free arching line. The union of parts in this way creates one of the pleasing features to attract the eye, and the eye following this line in fancy terminates in a foliated scroll as suggested, and in turn is met by a like, but less forceful, line springing from the foot post. In like manner, the inclination of head rest mold may have its abruptness folded up in a similar termination. The couch frame, of course, is to have the same treatment on the other side, for a one-side couch gives but one-half the number of positions in which it may be placed. A little consultation with the wife will often save a man doing some foolish things, even as to furniture, for the housewife tires of seeing her possessions always at the same angle or on the same side of the room. The fullness of the clawfoot is made by gluing on a 2-inch block, the upper portion of which will, by sawing or shaving, invisibly shade in a natural manner into the post. As treated in a previous article, no set directions can be given for cutting or carving this claw; the carved claw is now very much in evidence, and, as in everything else, a careful inspection will aid materially in producing a good effect, even with the chisel or gouge in use by the carpenter. The claw as a termination is selected, for with the inexperience of an amateur in carving the necessary unevenness and roughness will, by contrast to plain parts, make a pleasing feature. A rough claw is better than if it were produced from a turning lathe, if that were possible. A pleasing effect, in place of carving the ornaments on the side of a couch, is to jig saw the patterns detailed from a 2-inch block, then by passing them along a set straight gauge slit them on the band saw into frets 3-16 inch in thickness. Glue these along the proper line and direc-

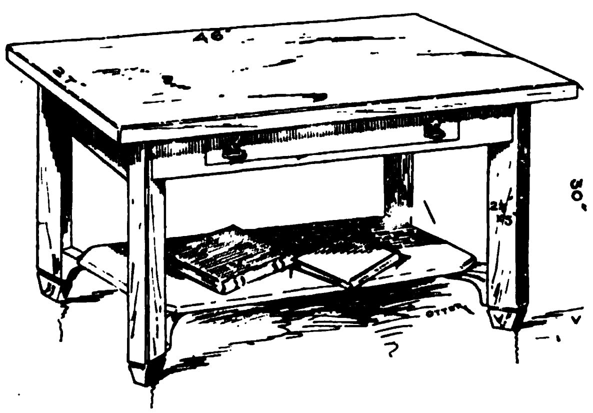


Fig. 2.—Sitting Room Table.

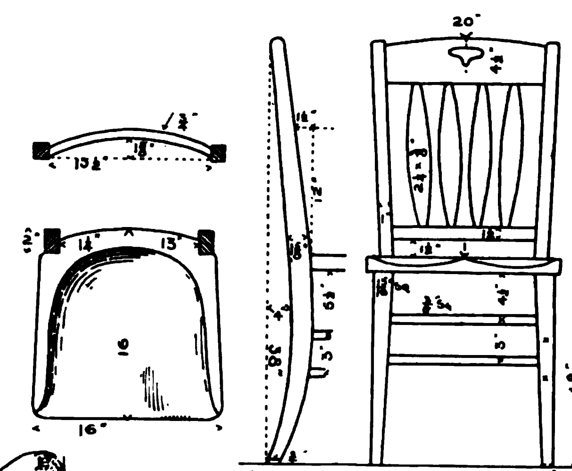


Fig. 5.—Details of the Side Chair.

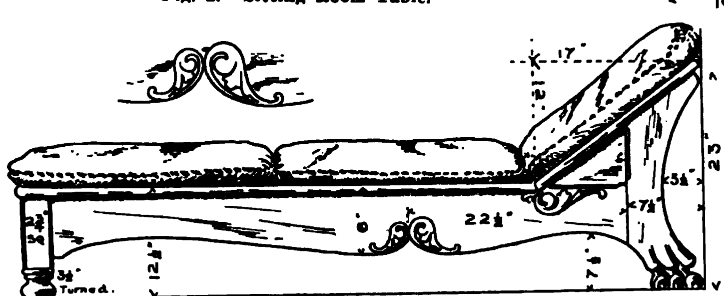


Fig. 3.—General View of Couch.

Fig. 4.—Method of Sewing the Leather Covers.

*Cabinet Work for the Carpenter—Sitting Room Furniture.*

tion, and after sanding the edges a very pleasing form of relief will result.

The foot posts are 2¾ inches square, with the three exposed corners chamfered. A turned ball 3½ inches in diameter gives a finished termination. The head end rail, 6 inches wide, is placed in line with the side and foot rail, and then panelling or veneer occupies the space between that and the inclined frame. The molded effect along the upper edge of the head support and rails may either be a narrow framing surmounting the construction or a molded strip secured as an after finish.

The form of upholstery shown in the cut is now very generally a part of the simple class of furniture and stands for just what they are—bags, made in a primative manner, filled with soft material. Here again the craftsman of to-day will be equal to the occasion and find little that requires special skill in making the cushions to fit his frames. Soft, pliable Spanish leather (sheep skin) in all colors may now be secured in many towns. Unnecessary expense may enter here as in everything else, and it would be well to make the selection by samples. The bottom cover piece may also be of the same color and grain imitation, but of pantasote or other substitute for leather. Likewise, instead of upholsterer's curled hair a half quantity with vegetable down may be used. It will be quite necessary as well as satisfactory to guard against waste and to find the exact size of leather to make a sample cushion one-half size of the couch body—that is, divide the couch into three pillows, using some cheap material, and cutting it ample to allow for pillow when filled to the width of the frame. The filling should not be less than 5 inches in thickness. From this bag material, if made to fill up properly, the exact size of the leather covers may be found, allowing more on these for ½ inch to be turned in on all sides. This ½ inch extra is turned and pressed or hammered into a crease, and the two creases of the four edges of each piece are brought together, rough side in, then held for a time while holes are made with a belt punch about 1 inch apart. Through these holes, as shown in Fig. 4, a thong strip, cut from the leather, is drawn, and in the after finish a second thong may be drawn, inserted so as to produce a cross weave effect. One side of the bag is of course left open to receive the inner filled bag, or the filling may be put in direct and the thong continued through the holes and finally tied in a neat manner.

**The Side Chair.**

This is a pattern in the modern style, appearing well as a wall chair or making a good, light chair for the table. The chair would be in keeping with the present primitive construction to have the back slats perfectly flat, but a more shapely and comfortable back will result by using curved back slats, as indicated in A, Fig. 5. A flat panel is usually steamed and bent, but for special purpose the curve is produced from a heavy plank, using an adze, or in default of this a gouge and heavy mallet, and after shaving to curvature determined by a wood template, used as the work advances. Much of the convex side can be planed to line and even thickness by holding the work in a vise. The back post shape may be secured from a 1-inch surfaced board. If oak is used show the quarter grain on the edge. In making the seat none but thoroughly seasoned stock should be used, and after the saddle effect is obtained it should not be unprotected by finish very long. As you will need a heavy cleat, or batten, screwed to bottom, as a means of holding it in the vise while shaping the hollow, it would be well to keep it on during construction of chair and until time for finishing, avoiding chance of warping. The hollow work is roughed out by a gouge and mallet, and then convex shaves and scrapers are used to bring about an even concave surface; these tools have been described in a previous paper. After all parts have been fitted with tenons and mortises, assemble them to see that they all come together well, also to give you an opportunity to note corrections which might be desirable to make, and the final finish to be given each part. With the chair knocked apart the edges are worked off with a plane or shave, and the four slats in the back are greatly improved with edges turned off to a quarter round, likewise top edge of top slat, and hand hole smoothly filed in a rounded manner. The back part is glued up first and held in bar clamps under the seat; two square stretchers should be fitted at the same position, as shown, for front stretchers. The side stretchers are indicated on the front leg. The seat is now set in, as shown on seat plan, and secured at each post by a 2½-inch screw countersunk. Turning the back part down, with seat face down on bench, put on the front portion of chair, the legs and front stretcher having previously been glued up, then provided with the side stretchers glued to legs and treated with hot glue in mortise holes of the back posts. Drive these in them, gluing the seat mortises; drive into place the legs. In this class of work—open and liable to spring out of true—it is well to have rule, or truing stick, to immediately square the frame before the glue has positively set, the bar clamps sometimes being brought into good use, to pull into place a refractory part. When the chair is well set, cut the back post at bottom ¾ inch to give proper inclination. Clean off any excess of glue and hand sand from top to bottom, taking off any crude edges.

An arm chair to match this pattern may be constructed from a drawing making the size of seat proportionately 2½ inches larger than called for in Fig. 5, and the hight 22 inches, between arms 19½ inches and the hight of arms 10 inches from seat.

**The Sitting Room Rocker.**

Our foreign friends say of us that we show our restless spirit even when supposedly at rest in a rocking chair, purely an American article of furniture. However this may be, the rocking chair is finding favor in many foreign countries, and among our makers it is the style of chair most made and given the widest range of

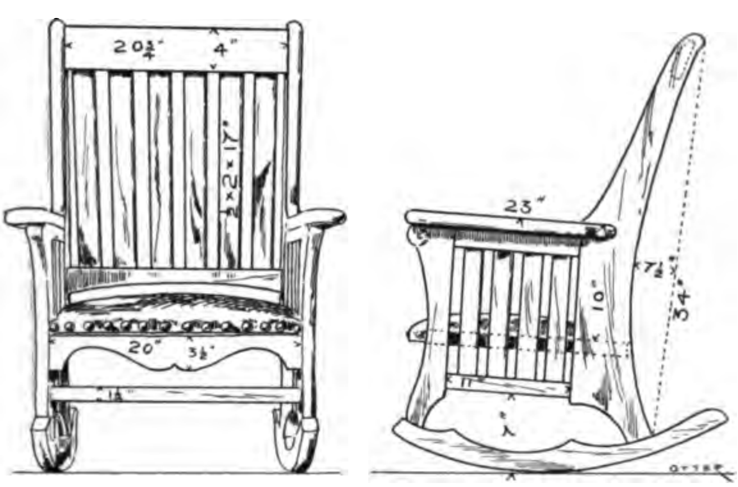


Fig. 6.—Front and Side Views of Sitting Room Rocking Chair.—Modern.

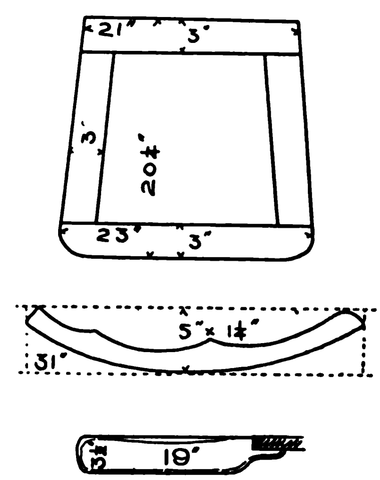


Fig. 7.—Seat Plan, Rocker and Arm of Rocking Chair.

*Cabinet Work for the Carpenter—Sitting Room Furniture.*

treatment. In constructing the rocker the main object sought should be the proper "hang" or swing. When attention is called to this it will no doubt be realized that many rockers have the annoying fault of pitching the occupant too far forward or backward, with no particular middle point of restful balance. The location of this fault will have to be determined by the maker, and in some cases it is much like making the suit to fit the customer to give perfect satisfaction; usually the lack of balance is adjusted by removing the rockers and cutting either the front or back legs, as indicated by rocker either throwing occupant too far forward or backward.

The rocking chair shown in Fig. 6 will be found a very comfortable resting place, even though built with flat back slats, the comfort being given principally from the generous curve to the back posts, with exception of slats in sides and back, the material is 1 inch in thickness, the

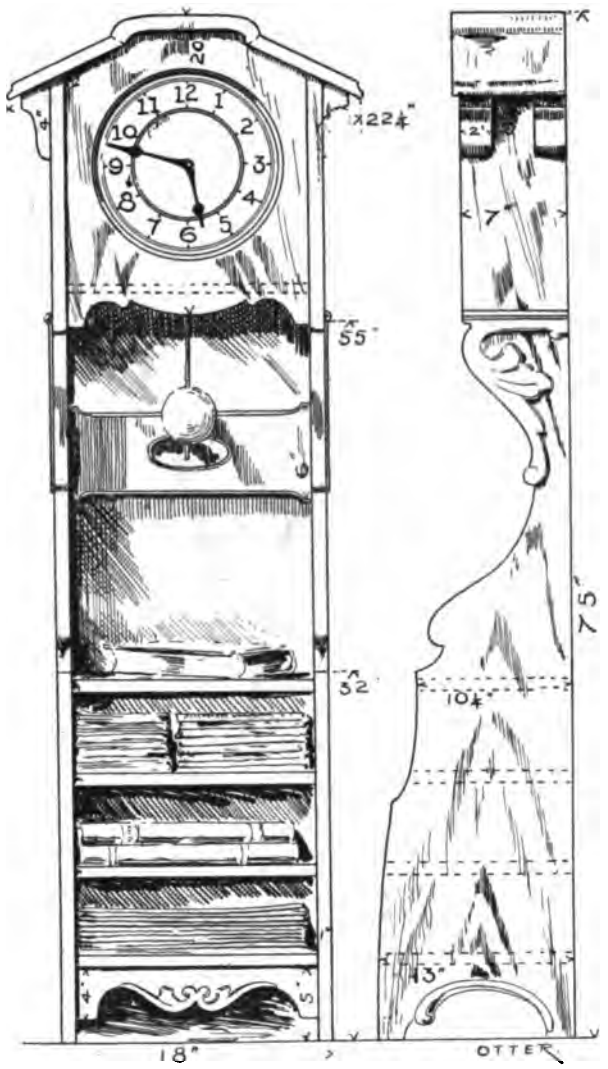



Fig. 8.—The Clock Stand.

*Cabinet Work for the Carpenter—Sitting Room Furniture.*

slats ½ inch thick, arms and rockers should be 1¼ inch thick, also the seat frame. The seat frame may be made of an inferior wood, the front and back edges will be covered by upholstery. The plan for the frame, also that of rocker and arm will be found in Fig. 7. The upholstery may be put on directly over the seat frame, as shown, or the style of leather bag described under head of the sitting room couch. In either case, burlap bands are tightly criss crossed over the opening, this being done on top of the frame should the loose bag pillow be preferred. If the permanent seat is desired, the bands are tacked to the under part of the seat, upon which are placed for this size seat eight double coil upholsterers' springs, three back, three front and two in middle space of opening. As the subject of spring upholstery has been treated in a former issue it will not be again taken up. An inspection of an upholstered seat will indicate the manner of going about the work, the even and partial compression of the springs, however, by stout twine is quite an important foundation work for the after padding and overlay of leather or fabric.

**The Clock.**

Even though it be the exacting alarm variety done up in a nickeled can, everybody turns to the clock. It is their faithful, almost animate companion, alive to the minute, yet weak and failing at times if we don't do it a good turn now and then. It is therefore well in setting up our home, or refurnishing it, to give the time keeper a prominent or high place in honor of his long service in keeping tab on our movements. Time was when the old clock had to have plenty of room to stretch, as it were, in the matter of ballast. This gave rise to the tall "grandfather" look it had. While it is true some kinds of the best modern clocks are framed in tall cases, with cords and weights, the desire is uppermost to economize space, and very reliable spring clock movements may be bought very reasonably, or the works of an eight-day clock may be transferred to such a case, to be discussed, as is shown in Fig. 8. Here the purpose is to utilize space in a tall case, which was in former times given over to the movement of the long pendulum and lowering weights.

The sketch may be followed out in the full drawing, or modified within outside limits as fancy or individual needs suggest. The back, instead of showing the wall, may be lined neatly with thin paneling; the lower front may also have a panel or glass door, protecting the magazines and books from dust.

The structural parts to be from 1-inch material, the shelves ⅞ or ¾ inch thick. A satisfactory framing to the dial face would be of laid up veneer cut a little less in diameter than the dial plate. This veneer may be made of successive layers of rotary cut veneer, built up to about 7-16 inch in thickness, or made of two 3-16-inch panels and three 1-16-inch veneers glued transversely, the outer veneer being first grade in figure, or quarter, and placed upright as to grain. The gluing together of these wood layers under favorable conditions as to high temperature of the room, proper clamping or heavy weight pressing device will give a panel which will not split, as would a solid panel, when the greater portion has been cut out, as in this instance of fitting the clock dial. The edges of circle of course would be greatly improved by rounding or chamfering. The fret ornaments are to be sawed out and slit to a thickness of 3-16 inch. These should be glued on to panels before outline has been cut. Then saw or trim to the exposed portion of fret, previously chamfering the edges with file or knife; and after they are glued on putting in a few vein cuts in middle of leaves will brighten the work very considerably.

(*To be continued.*)

## Contract Awarded for Carnegie Technical Schools.

The contract for the erection of the first of the buildings of the Carnegie Technical Schools at Pittsburgh, Pa., has been awarded to the Wells Brothers Company of New York, the figures being $449,700. This amount covers only the shell or frame of the building, as the lighting, plumbing, heating and equipment will constitute separate contracts. The buildings are to be of sandstone with trimmings of white Kittanning brick. It is expected that the first building will be completed by the first of September, the second by the first of November, and the third by the first of January next. We understand that there were 15 firms which competed for the work, the contract being awarded to the lowest bidder. The new buildings, while classed as three structures, will in reality be under one roof.

A PROJECT is on foot in Pittsburgh, Pa., to erect a large arcade market and office building on the site of the present market houses on Diamond square. The proposed building is to be 19 stories high and nearly 200 feet square. One entire floor is to be used as an auditorium with a seating capacity of 7500.

# CONCRETE SIDEWALKS AND BASEMENT FLOORS.*

By Frederick W. Taylor and Sanford E. Thompson.

SUCCESSFUL sidewalk construction is as dependent upon careful attention to small details which have been proved essential to good workmanship as upon adherence to the more general directions given in any set of specifications. The full description of methods to be employed in laying a walk is given for the benefit of those who are unable to take advantage of the experience of specialists in this line. Experienced contractors often can perform such work better and cheaper than it can be done by day labor.

A total thickness of 4 inches of concrete and mortar laid upon a 10-inch foundation of porous material gives excellent results for ordinary sidewalks, although 5 inches is often required for public works. In locations subject to wide changes in temperature, as Boston and vicinity, a thickness of 4 inches has proved satisfactory, while in some cities 3½ inches only is required. For a 4-inch walk it is advisable to make the base 3 or 3¼ inches and the wearing surface 1 or ¾ inch thick. The slope of surface often adopted is ¼ or ⅜ inch to the foot.

Driveways or walks which are subjected to excessive wear may be 5 or 6 inches thick, the upper 1 or 1½ inches constituting the wearing surface.

The construction of the foundation is as important as the laying of the concrete. For out of door construction the foundation should generally be from 6 to 12 inches thick, depending upon the character of the soil. In localities unaffected by frost and having soil sufficiently porous to carry off surface water the foundation may be omitted entirely and the concrete laid upon natural sand; (c) placing tarred paper between the blocks. The first method is usually preferable.

The size of the blocks depends upon the width and shape of the walk or floor. Blocks nearly but not quite square have a better appearance than those which are distinctly oblong. The limit of size for a 4-inch walk is generally placed at 6 feet square. In 5-inch work this may be safely increased to 8 feet square. Joints should be placed around trees and about 6 inches from buildings, manholes or other adjacent structures.

After ramming and leveling the foundation, if there is no curb to be formed, strips of scantling 2 inches thick and of a width corresponding to the thickness of the walk are placed on edge along the back and front lines of the walk, and held in place by stakes driven behind them. These strips should have notches cut in them to designate the location of the dividing line between the blocks. Other strips, located by these notches, are placed across the walk, which is now ready for the concrete.

The concrete materials in the specified proportions are mixed as described in the article by the writers in *Carpentry and Building* on page 78 of the March issue for 1904. If the surface of the road is hard and smooth the mixing may be done upon it without any platform. In

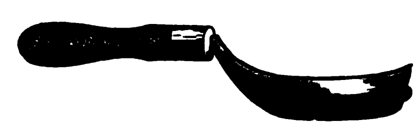


Fig. 2.—General View of Groover.

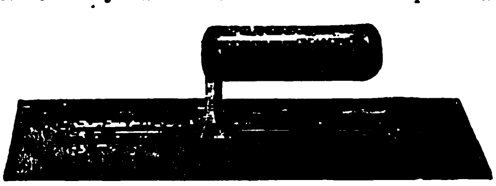


Fig. 1.—Plasterer's Trowel or Metal Float.

Fig. 3.—Edging Trowel.

*Concrete Sidewalks and Basement Floors.*

ground excavated to the required depth. In Washington, D. C.,† no foundation is specified, and even in Chicago† it is not required where the soil is clean, porous sand. For basement or cellar floors which are not to be subjected to frost the concrete may usually be placed directly upon the soil but in compact ground or where surface water is troublesome blind drains of pipe or of cobble stones, carefully rammed, should be laid at various points.

The materials for a foundation, where such is required, may be broken stone, gravel, cinders or coarse sand. In order to make it more porous broken stone or gravel should be screened. Whatever material is employed it must be thoroughly rammed so as to present a firm and unyielding surface. Cinders or sand should be thoroughly wet when being rammed.

*Concrete Base of Walk.*—The coarse concrete constituting the main body of the walk is generally called the base. Before this coarse concrete of the base is placed the surface must be carefully laid off into squares or blocks. Such divisions are absolutely essential, since the joints furnish lines of weakness along which cracks will occur if the concrete is affected by the freezing of the soil beneath, tree roots, unequal settlement, or temperature changes, and also facilitate the replacing of a block if one is injured from any cause.

There are three distinct methods of forming separate blocks: (*a*) Laying the blocks alternately, and then filling in between them; (*b*) allowing the scantling of the forms to remain in place until after the concrete is laid, and then filling the spaces they occupied with lean mortar or

* This article is adapted by the authors for *Carpentry and Building* from a chapter in their book, "Concrete—Plain and Reinforced." which has just been issued. 

† Specifications for 1899.

any case it must be very thorough. some contractors employing a man to rake each shovelful as it is turned by the two shovelers. Enough water should be added to produce a jelly-like consistency, the mortar rising to the surface when lightly rammed. The surface of the coarse concrete must be below the level of the top of the forms so as to give room for the finishing coat, or wearing surface.

If the walk or floor is laid in alternate blocks by the first method (*a*), described above, the forms around each block are left in until after the top coat or wearing surface has been placed and has slightly stiffened, when they may be removed and the alternate blocks laid. The latter must be placed on the same day, however, to avoid difficulty in forming the surface joints between the stones. If a filler is placed between the blocks the forms are lifted soon after the concrete of the base is laid, and before the wearing surface is spread, and the joints filled with sand or, in some cases, by a "separator" of lean mortar, mixed, say, 1 part cement to 4 or 5 parts sand. Whatever the material used it must be weaker than the concrete.

*Wearing Surface.*—As soon as a few of the blocks of concrete base have been laid, and before they have set, the mortar for the wearing surface must be placed. This surface, as described above, consists of a mixture of cement and sand, cement and fine crushed stone, or cement and a mixture of sand and stone. The materials should be very exactly proportioned so as to give a uniform color. The cement must not be mixed with the sand long in advance of its use because the natural moisture in the sand will cake the cement. If the work is progressing so slowly that the cement must be measured by pailfuls, a determination must first be made of the number of pails of loose cement in a bag or barrel of packed cement, and the number of pails of sand in a barrel of loose sand, then the relative volumes calculated to allow for the increase in bulk of the loose over the packed cement. Each pail must be filled in exactly the same way, so that one measure will not be more densely packed than the next. The sand and cement must be mixed dry until the color is absolutely uniform, when, if coloring matter is used, it is added to this dry material. Water is added to give about the consistency employed by a mason in laying brick, so that it can be readily leveled off with a straightedge. This mortar is carried from the mortar box to the walk in pails and smoothed off with a straightedge guided by the tops of the forms.

The surface is roughly floated with a plasterer's trowel, shown in Fig. 1, soon after leveling with the straightedge, but the final floating is not performed until the mortar has been in place from two to five hours and has partially set. The final floating is done first with a wooden float and afterward with a metal float or plasterer's trowel. Just before the floating a very thin layer of "dryer," consisting of dry cement and sand, mixed in proportions 1:1 or even richer, is frequently spread over the surface, but this is generally undesirable as it tends to make a glassy walk.

The surface is now ready to groove, for by this time the intermediate stones should be in place. As has been stated, the cross joints are in line with notches in the outside forms. The mason can thus locate the joints between the blocks of base concrete. To find the line

tion is likely to be small, not occupying more than a few days, so that the time and expense of transporting men and materials and the time getting started upon the work constitute an important item. The skill of the men employed in placing and finishing the concrete affects the cost still more, since an experienced gang may easily lay three times as much surface of walk in a day as inexperienced men, even if the latter are accustomed to ordinary concrete work. Excavation is another variable item, depending upon the quantity of earth to be removed and the character of the material.

A gang of convenient size consists of:

One mason.

One man to assist the mason in placing forms and to level and ram the concrete.

Three men mixing and placing coarse concrete for base.

One man mixing top dressing for wearing surface.

If excavation is included in the work, more laborers may be needed. The amount of walk covered by a gang is limited by the surface which can be floated and troweled by the mason. Unless he works overtime the laying of concrete must stop about the middle of the afternoon in order that the wearing surface may have opportunity to set. Meanwhile the concrete gang may prepare and ram the foundation and get everything in readiness to begin concreting promptly the next morning. With a gang of the size suggested a foreman adds considerably

Fig. 4.—A "Dot" Roller.

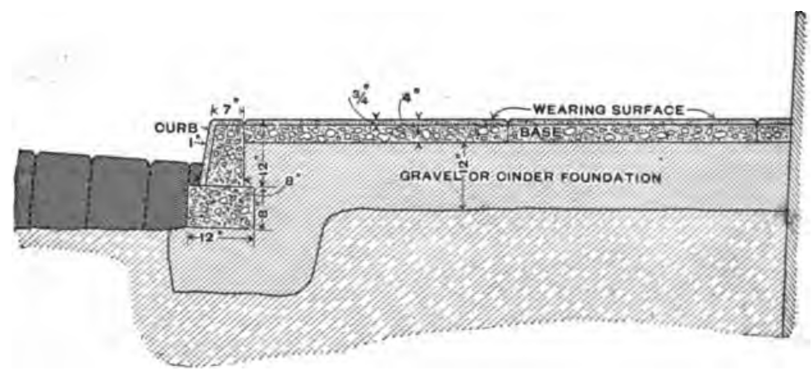



Fig. 5.—Section through a Typical Concrete Sidewalk and Curb.

*Concrete Sidewalks and Basement Floors.*

exactly he runs his small pointing trowel down through the upper layer and feels for the joint below. With the ends of the joints thus marked he lays a straightedge flat across the walk against these marks, and, walking across on the straightedge, marks the line and also cuts through the partially set mortar and concrete by running his small pointing trowel to the full length of the blade. Moving the straightedge back a fraction of an inch he runs his groover, Fig. 2, along the line cut by the trowel, using the straightedge as a rule. Both edges of the walk are rounded off by the edging trowel, Fig. 3, which is a small float with one of its edges curved. The entire surface is finally gone over once more with the metal float to erase any marks or scratches which may have been made. A dot roller, Fig. 4, or grooved roller may be employed to relieve the smoothness.

The exact time at which the surface should be floated depends upon the setting of the cement, and must be determined by the mason. Considerable skill is required in this troweling to prevent the formation of hair cracks by overtroweling and to insure a surface which will not wear rough as a result of insufficient troweling.

If the walk is exposed to the hot sun it may be necessary to cover it with a wood or canvas frame, or with moist sand, for several days after its completion, as it is absolutely necessary that it shall not dry out too quickly.

*Effect of Frost Upon New Concrete Sidewalks.*—If concrete sidewalks are exposed to frost before thoroughly hard and dry the surface is likely to blister and scale off in patches about 1-16 inch thick. It is best, therefore, to avoid sidewalk construction in freezing weather.

The cost of concrete sidewalk or basement floor construction is extremely variable. The job at any one loca-

to the expense, and it is often advantageous to so arrange the work as to make the mason responsible for its quantity and quality. A bonus paid for an excess over a certain area of surface covered is an effective incentive for a good day's work. In order to properly fix such a bonus the employer must know the relative times required for plain sidewalk and curb. The size of the blocks must also be considered, since the labor upon the joints forms a prominent division of the work.

Under average conditions a mason skilled in this class of work should float and trowel a surface of 600 to 700 square feet in eight hours, if no allowance is made for time which is necessarily lost between jobs and in commencing work. This lost time will lower the average by an amount varying with the size of the job. If the excavation is ready five men working with the mason should prepare the foundation and place the base concrete and the mortar for the wearing surface for a walk 4 to 4½ inches thick. For a thicker walk one more man may be required in the gang to keep up with the mason, since a thick walk requires more concrete or mortar.

The contract price for a granolithic or artificial walk from 4 to 5 inches in thickness, with Portland cement at about $2 per barrel, varies from 22 to 30 cents per square foot. The cost of curbing runs about 75 cents to $1 per linear foot, without a metal strip which is sometimes laid in the exposed edge of the curb to protect it from wear, and 25 to 50 cents higher when the strip is used.

For driveways the concrete is laid similarly to that in sidewalk construction. The total thickness may be 5 inches for light travel, or 6 to 7 inches for heavy teaming. Grooving the surface in 6-inch squares affords foothold for the horses.

# WHAT BUILDERS ARE DOING.

THE season is opening with indications of a volume of business for the year in the building line which will equal, if not exceed, all previous records. There is scarcely a section of the country from which reports are received that the feeling among architects and builders is not of a most optimistic nature, and all are looking forward to a period of unrivaled activity. Even where the feeling is less hopeful as to the immediate future it is due to labor troubles or specific causes which may be eradicated before it is too late to carry forward a reasonable amount of building. Generally speaking, the various branches of the building trades throughout the country are comparatively free from labor disturbances, and unless unforeseen differences arise between capital and labor there would appear to be no good reason why building improvements should not be conducted on a scale of unusual magnitude and furnish employment for a vast army of mechanics.

### Boston, Mass.

The members of the Master Builders' Association of Boston have entered a strong protest against the bills now before the Massachusetts Legislature which aim to restrict the amount of labor which a person may perform in the limits of a day. The protest was in the shape of a communication sent to members of the Legislature and bore the signatures of President Ira G. Hersey and Secretary William H. Sayward, and in part was as follows:

" Although the present bills appear to be directed toward limitations of this character on work done by, or undertaken for, the Commonwealth itself or for any county, city or town therein, it is apparent that such legislation tends toward similar restrictions on work for individual owners. In any event we look upon such legislation as dangerous in the extreme, it being an encroachment on the rights of the individual either as a workman or as an employer, and we sincerely trust that neither this Legislature nor any succeeding one will make the mistake of burdening our citizens with such restrictions.

" While we have no desire to lengthen the hours of labor, now very generally established, we do believe that legislation of the character proposed is a serious interference with constitutional rights."

### Brooklyn, N. Y.

While the amount of building in the Borough of Brooklyn in 1904 exceeded in volume that of any recent year, the indications seem to point to a degree of activity this year which will far surpass anything heretofore witnessed. According to the figures in the quarterly report of Superintendent Peter J. Collins of the Bureau of Buildings, permits were issued for 3518 new buildings and alterations during the first three months of the year, calling for an estimated outlay of $12,679,190, as compared with permits for 2570 new buildings, costing $7,765,381, in the corresponding period of last year. This, it will be seen, is an increase of nearly $5,000,000 over a year ago, and as the first three months of the year have usually been the dullest period for building, it is estimated that the total for 1905 will run considerably over the $50,000,000 mark.

The wards in which the greatest building activity exists are the Twenty-ninth, Thirtieth, Twenty-sixth and Eighth respectively. There were 75 applications for 470 dwellings to cost less than $20,000 each, at a total cost of $2,069,450. Permits were also issued for the erection of 75 new tenements to cost between $20,000 and $50,000 each, and for 249 new tenements to cost less than $20,000 each. Plans were filed for the erection of three new office buildings, for 84 stores and flats, for 37 manufactories and worshops, for 4 public buildings, 19 stables, 1 school and 1 church. There are 414 frame dwellings under construction, 81 frame tenements and 35 two-family frame stores.

### Buffalo, N Y.

The building outlook in the city is very promising and permits are being issued daily for building improvements which speak well for a season of unusual activity. The value of the improvements projected during March, however, shows a slight falling off as compared with a year ago at this season, although the number of permits are much in excess of March, 1904. Most of the work at present projected consists of new dwelling houses, with repairs and alterations to existing buildings. According to the figures of Deputy Building Commissioner Henry Rumrill, Jr., there were 241 permits issued in March this year for building improvements, estimated to cost $422,683, while in March last year there were 184 permits issued for buildings costing $564,271.

### Chicago, Ill.

The building situation in Chicago has been greatly cleared up by the agreement entered into by the carpenter contractors and the carpenters' Executive Council. This is a happy termination of a controversy which bade fair to end in a serious strike. The carpenters demanded 55 cents an hour, and also held out for an agreement on the part of the contractors that stair work, doors, sash and other work heretofore furnished by mills should hereafter be furnished by the carpenters at work on the job. The matter was finally compromised by the acceptance on the part of the union of the old wage scale of 50 cents an hour, the contractors agreeing to discontinue the use of mill work as demanded by members of the unions. Eight hours' time are to be allowed for seven hours' work at night. The immediate result of this settlement was a renewal of activity in the building trades and a release of the delay or hold-up orders which had been placed some months ago by contractors. Over 9000 union carpenters and several hundred contractors are parties to this settlement. There is only one prominent building trades union with which settlement has not yet been made—the structural iron workers—and this union is holding out for an advance in wages from 56¼ cents to 62½ cents an hour.

The clearing of the situation is all the more gratifying when the figures of the Building Department are considered showing the amount of work which is to be undertaken. The increase as compared with a year ago is highly significant, the figures of the Building Department showing that in March permits were issued for 665 buildings, having a frontage of nearly 27,000 feet and estimated to cost a trifle over $6,000,000, while in the same month last year permits were taken out for 600 buildings, involving an outlay of a trifle over $2,000,000. For the first quarter of the current year permits were issued for 1279 buildings, having a frontage of 44,276 feet and estimated to cost $11,437,000, while in the first quarter of last year permits were issued for 1092 buildings, having a frontage of 29,938 feet and costing $5,459,000.

### Cincinnati, Ohio.

The outlook for building was never better in the history of the city; in fact, it may be said to be phenomenal. A number of large business structures are going up, and there seems to be nothing in the way of labor difficulties except just now a slight flurry with the architectural iron workers. The permits issued by the Department of Inspection of Buildings during the month of March were 545 in number, and call for an estimated outlay of $1,274,225, as against 452 permits for building improvements, costing $752,540, in March of last year. For the first quarter of the current year there were 1084 permits issued for buildings estimated to cost $2,096,410, while in the first quarter for last year there were 830 permits issued for building improvements involving an outlay of $1,030,335, from which it will be seen that the amount of work in prospect is far in excess of that at the corresponding season a year ago.

### Cleveland, Ohio.

Representatives of the electrical contractors and of the electrical workers of the city have signed a compromise scale which is to continue in force for two years. This is the first scale to be signed this spring, and as it stands represents a compromise on both sides. The increase from $3.25 to $3.50 a day for the first year and $3.60 for the second year of the two-year contract asked for was granted, and the other details were arranged in a manner satisfactory to both sides.

The bricklayers, whose agreement expired on April 1, asked for an increase of wages from 50 to 55 cents an hour and a continuance of the present apprenticeship rule—that is, two apprentices for every firm, or one apprentice to five journeymen. It is understood that the contractors belonging to the Contractors' Association were willing to grant 55 cents an hour, but were not willing to limit the number of apprentices, and as a result the union bricklayers working for the 40 members of the Mason Contractors' Association in Cleveland went out on strike.

This is to be regretted, as the building season is opening most auspiciously throughout the country, and any protracted labor troubles cannot fail to interfere with what might otherwise be a profitable year for those engaged in the building line. The amount of work projected in March was considerably in excess of that for the same month last year, the value of the improvements being $858,065 and $501,365, respectively.

### Detroit, Mich.

The rapid industrial growth of the city has doubtless had much to do with the amount of building that has been in progress for some time past and for the brilliant outlook for the immediate future. A number of manufacturing enterprises have recently commenced operations here, the attraction doubtless being the fact that Detroit is an " open shop " city, and a large proportion of the wage earners own their own homes. Last year $6,000,000 were expended in the erection of new buildings, and according to the contracts closed and the work on the boards in architects' offices the present year promises to exceed the one just past. In the heart of the business district among the more pretentious buildings to go up is the six-story department store for Partridge & Blackwell, a conservatory arcade and office building to be erected by Breitmeyer, the florist, together with new factories for the Seamless Steel Bath Tub Company, a motor car company, a new steel castings plant, &c.

The figures compiled in the office of the Fire Marshal show that 398 permits were issued in March for building improvements, estimated to cost $726,100, as against 304 permits for buildings, costing $487,100, in March of last year. For the first quarter of the present year 704 permits were issued for building improvements, costing $1,350,950, as against 483 permits for improvements, involving an outlay of $788,800, for the corresponding quarter a year ago.

### Kansas City, Mo.

The stimulus which building operation are feeling in different sections of the country is strikingly illustrated in the figures of Superintendent of Buildings S. E. Edwards for the month of March, which show that 578 permits were issued for structures having a frontage of 11,219 feet, and estimated to cost $1,528,165. Classifying the improvements it is found that 68 permits were for brick buildings, costing $765,200, and 266 were for frame buildings, costing $636,990. The figures represent an increase for March, 1905, over March, 1904, of $494,585, and over March, 1903, of $202,925. Present indications warrant the opinion that Kansas City is likely to witness an unusually active building season, for it is estimated that at the rate building permits have been issued since the first of this year, building operations will aggregate $12,000,000, and will exceed those of last year by about $4,000,000. About half of this building is in residences and flats, and the other half is in business and factory buildings.

### Los Angeles, Cal.

With four exceptions in the history of Los Angeles, the month of March has broken the general building record. The permits issued during the month numbered 762, entailing an investment of $1,176,163. One cause of this remarkable activity is that building is now cheaper by at least 30 per cent. than it was a year ago. The reduction in the cost of lumber is probably the greatest factor, though the labor question has also settled itself in favor of builders. The value of the March permits in 1904 was $951,029, or nearly a quarter of a million less than during the March just closed. Contractors are well pleased with the character of the buildings now going up, both in Los Angeles and the suburbs. They report a steady tendency to put up a better class of residences and flats, and, judging by the work now in the hands of the architects, the building activity will be continued at least well into the fall.

The plans are about completed for extensive improvements in connection with the University of Southern California, whereby new buildings will be erected consisting of a memorial church, a building for languages, a library building, a science hall, a music building, a hall of history, a theological building and a gymnasium. These will be arranged in the form of a quadrangle, and on the university front of each will be a continuous porch 20 feet wide with clustered stone columns and circular arches.

### Lowell, Mass.

Judging from the present local conditions the prospects for Lowell builders compare most favorably with the generally improved tone throughout New England. The leading contractors already have much work in hand, and more is expected as soon as the season is fully under way. All the corporations are running full time and several are intending to make substantial additions to their plants. S. H. Weaver & Son, roofers, state that the local work in prospect exceeds any previous season in their 33 years' experience. Work on the eight-story mill building for the Bigelow Carpet Company is now under way and the new structure for the Appleton Company will be started by local contractors at once. C. H. Nelson has the general contract and the mason work is to be done by Patrick O'Hearn. The latter is building for himself a large brick apartment block, the contract for the carpentry work having been awarded to C. F. & J. B. Varnum. A brick block is to be erected by Patrick Conlon, a prominent member of the Builders' Exchange.

The Arlington Mills of Lawrence have leased the plant formerly operated by the Atherton Machine Company, which has been practically idle for some time, and will give employment to 400 or 500 hands. This will mean the erection of a number of new dwellings in that section of the city. Perhaps of equal significance as showing the general prosperity is the fact that several fine residences are to be built and the ground for some of them has already been broken. A member of the *Citizen* newspaper staff who has investigated the subject says that there is not a vacant mill building in the city and hardly a foot of vacant floor space suitable to be used for mill purposes. The Telephone Company has a large amount of conduit work laid out, and there will be considerable sewer work done by the city, the contract for the cement having been awarded to the Improved Shield and Dragon Portland brands.

Architect H. P. Graves, having been awarded first prize in a competitive trial, is preparing the detail plans for a $60,000 school house, and the advisability of making the halls and stairways of reinforced concrete construction is being strongly advocated on the ground of safety in case of fire. The same architect is also preparing plans for a 12-tenement block with stores.

### Milwaukee, Wis.

There is remarkable activity in building lines in Milwaukee this year. The building permits issued for the month of March show an increase of practically 160 per cent. over the same month a year ago, the increase being from $353,480 to $917,530. For one week alone there was a gain of almost $170,000. During the last week of March 183 permits were issued, having an aggregate value of $296,107. If only a part of the same ratio of increase is continued during the months to come, this year will be the greatest in building operations that Milwaukee has ever experienced. January and February showed increases of over $100,000, as compared with the corresponding months in 1904.

### Minneapolis, Minn.

The situation in this section of the country warrants the belief that mechanics in the building line will have plenty of work this season, unless, of course, labor troubles assume such proportions as will cause capital to hesitate and prevent the execution of many of the building operations now contemplated. The figures of the Building Department show that during March there were 569 permits issued for improvements, estimated to cost $854,560, which is a marked increase over the same month last year, when 338 permits were issued, for improvements involving an outlay of $445,470.

Among the new structures of note to be erected in the city is a ten-story office building to occupy a site at the corner of Second avenue south and Fourth street and to cost in the neighborhood of $600,000. The plans drawn by Architect L. L. Long of 828 Hennepin avenue call for a strictly fire proof structure with concrete floors. The exterior will be of cream colored enameled brick with terra cotta trimmings.

### New York City.

While the local conditions are not altogether normal in the city, more or less building is in progress, which in the aggregate amounts to a very fair total. Here, as in other leading cities of the country, indications point to a season of unusual activity, more particularly perhaps in the Boroughs of Brooklyn and the Bronx, where permits have been taken out upon a large scale. In the Borough of Manhattan permits were issued during March for 226 new buildings, estimated to cost $12,374,425, as compared with 113 permits for buildings, costing $8,180,330, in March of last year. Taking the figures for the first quarter of the current year it is found that the number of permits issued in the Boroughs of Manhattan and the Bronx was 1047, calling for an estimated expenditure of $36,313,507, as compared with 592 permits for building improvements, costing $19,108,120, in the corresponding quarter a year ago. No important individual operations are under way, but the amount of smaller work in prospect aggregates a large total.

A movement has been started by architects, civil engineers and some of the foremost builders of the city looking to a radical revision of the building laws in such a way that a check will be put upon shoddy construction and bribery and the responsibility for all violations determined. The initiative in the work was taken by the Society of Columbia University architects, but other organizations, including the New York and Brooklyn Chapters of the American Institute of Architects, the American Society of Civil Engineers, the Architectural League of New York and the Building Trades Employers' Association, are expected to lend their assistance. It is thought that Mayor McClellan will soon appoint a Committee of Architects, Engineers and Builders to take up the matter, and it is thought that this committee will recommend the licensing of all builders and architects, and in this way shut out a large number of speculators, who it is contended are indirectly responsible for the bad construction of the past winter.

The Building Trades Employers' Association of New York on Tuesday, April 11, appointed a committee to look into the advisability of building a $1,000,000 home for the organization and elected the following officers to serve for the ensuing year: President, William H. McCord of the Iron League; first vice-president, Lewis Harding, Master Carpenters' Association; second vice-president, Charles A. Cowen, Mason Builders' Association; treasurer, Paul Starrett, president of the George A. Fuller Company; secretary, P. K. Stephenson; chairman of the Board of Governors, James R. Strong, Electrical Contractors' Association.

### Philadelphia, Pa.

There are no signs of any diminution of the brilliancy of the prospects for the immediate future in the building line, and permits are being issued upon a scale which augurs well for the mechanics engaged in the various branches of the trade. The only cloud upon the horizon is the possible growth of friction between employer and employed, but it is felt that even this possibility may be reduced by conservative attitude on the part of those whose interests are most vitally concerned. There is so much of prosperity at stake that every step is likely to be carefully considered by both sides in interest, as it is readily conceded that any serious disturbance in the labor world would result in a practical cessation of building operations. As indicating the preparations which are being made for conducting building improvements in and about the city it is only necessary to mention that the estimated cost of the buildings for which permits were issued in March was $6,147,750, as compared with $3,704,300 in the same month a year ago. Among the important enterprises in prospect is a ten-story hotel on Chestnut street to cost $1,000,000, the plans having just been prepared by Architects Ralph E. White & Co. The structure will be known as the Boothby Hotel, and will have 250 sleeping rooms.

### Pittsburgh, Pa.

A noticeable feature of the building operations in Pittsburgh is the number of dwellings which will be put up in the city and suburbs during the coming year. Architects are said to have more work on their boards this season than they have had for months past, and much of the work that was held up last year is being brought forward for new estimates. Builders who have hesitated to invest in houses or flats for the last two years are now going ahead and having plans prepared for buildings which they would have built long ago had the conditions been favorable. Many of the jobs recently figured have been called in, and new bids ordered after the plans had been revised to meet the purse of the owners. There seems to be a decided tendency to be more conservative in building than in the years 1901 and 1902, when work was rushed ahead with apparently little regard for cost. One thing that greatly favors the building activity the coming summer is the greater ease in obtaining financial support for the projected undertakings. The situation is chiefly interesting just now on account of the comparatively few projects of unusual magnitude that are being made ready for work. These include the Carnegie Technical schools, which will cost several million dollars; an annex to the Frick Building to cost in the neighborhood of a million dollars; freight and passenger stations of the Baltimore & Ohio Railroad Company to cost about $1,000,000, while there are a number of structures to be erected ranging in cost from $100,000 to $500,000. On the South Side the one project of special interest is the group of 38 warehouses being built for the Pittsburgh Terminal & Transfer Company at a cost of approximately $2,000,000, but half a dozen house building projects already under way call for the erection of about 250 houses, and there is said to be more house building in prospect than for three years. The amount of flat building, especially of the ordinary three-story construction costing from $10,000 to $20,000, is also unusually large. It is probably safe to say that at this time the building projects under way and in preparation will call for an expenditure of $30,000,000, and taking everything into consideration the present outlook is probably the best that the city of Pittsburgh has ever experienced. Some idea of the prospects for work may be gained from the statement that in March 482 permits were issued for buildings, to cost $1,429,258, as against 330 permits for improvements, costing $468,233, in March of last year.

Another step in the settlement of the labor troubles in the city was taken when an understanding was reached between the Marble and Mosaic Dealers' Association and the Marble Cutters' and Setters' Union, by which agreement the men in that trade returned to work, the rate of wages being $4 for a day of eight hours. This leaves only the carpenters and the plumbers who have not yet signed any agreement with the employers.

### Rochester, N. Y.

The official report of Fire Marshall Walter for the month of March carries figures which indicate a volume of business which is likely to break all previous records. Permits are being taken out for a varied class of structures, although naturally dwelling houses are largely represented. During the month of March 204 permits were taken out for buildings, estimated to cost $706,612, and of the number named 132 permits were for dwellings. In March last year 54 permits were taken out for buildings, costing $95,640, from which it will be seen that the increase over last year is somewhat phenomenal. Among the notable improvements may be mentioned a brick apartment house to cost $43,000, a factory building for Taylor Brothers Company to cost $60,000, a brick building for the United States Automobile Company to cost $20,000, a car house for the Rochester Railway Company to cost $50,000 and ten two-story frame dwellings on Normandy avenue to cost $25,000.

### San Francisco, Cal.

Notwithstanding an easing off in general business conditions during the last two months, there seems to be no appreciable decrease in the amount of building undertaken. Contractors are, however, preparing for a slight falling off in new business during the latter part of the year. For the first time in several years complaints are heard that buildings do not rent readily. Investigation discloses the fact that some of the larger and more expensive flats are unoccupied. Three-story flats seem to be somewhat overdone, and, in fact, the demand for flats running above $40 per month seems to have been supplied. There is, however, a continued inquiry for flats running between $20 and $30.

The buildings for which permits were issued in March reached a total value of $2,086,919, which is close to the largest amount ever issued during any one month. The number of applications for building permits amounted to 571, or considerably more than were issued in any previous month. Besides these, free permits to the number of 223, with an estimated value of $46,437, were issued.

The general office building of the Pacific States Telephone & Telegraph Company, which is now in course of construction on New Montgomery street, will be a four-story and basement structure, with a frontage of 160 1-12 feet on New Montgomery street and 80 feet on both Minna and Natoma streets. The building will be of pressed brick and stone construction with copper cornices, the walls being heavy enough to permit of two additional stories. The elevators and staircases are to be located in the center of the building. The estimated cost of the building is $140,000. It is intended to have the structure complete and ready for occupancy by the end of July.

### Springfield, Mass.

The members of the Master Builders' Central Association of the Connecticut Valley held their annual banquet at the Highland Hotel on the evening of March 23, when covers were laid for nearly 300 people, of which more than 80 were guests from Worcester, Hartford, Holyoke, Northampton, Westfield and Chicopee. The gathering was highly representative of the building industry, there being present carpenters, architects, plumbers, lumbermen, hardware merchants, &c. An excellent ten-course dinner was provided, and beside each plate was a *menu* card of novel design, consisting of parchment tied with white silk ribbon in the form of specifications.

It was about 9.30 when President N. E. Russell arose and in appropriate words gracefully introduced the toastmaster of the evening, H. C. Wood of North Adams, president of the State Master Builders' Association. The first speaker on the programme was G. C. Gardner, who responded to the toast of "Architecture." In the course of his remarks he referred to the recent collapse of buildings in New York City, in which the architects received some measure of the blame, and stated that Springfield architects were never too busy to look after their work in a proper manner. Probably the remarks which attracted most attention and were followed with the closest interest were those of George A. Denison, secretary of the Employers' Association of Springfield, who discussed the "Open Shop." Among the other speakers who followed were William H. Reed and H. B. Philbrick of Hartford.

The Reception Committee having charge of the affair and to whom great credit is due for the very satisfactory manner in which the programme was carried out, embraced the following: F. J. Curley, E. E. Hart, D. H. Young of Holyoke, J. L. Scott, L. S. Wood, J. G. Roy, A. G. Chapman and J. W. Hayden of Springfield, A. C. Mosely and R. W. Humphreville of Westfield, M. C. Baffey and E. B. Emerson of Northampton.

### St. Louis, Mo.

The season has sufficiently opened to permit of a fairly good idea of what St. Louis is likely to experience in the building line in 1905. The extent to which work has been projected is far beyond that of the corresponding period of previous years, and it is somewhat remarkable not only that all records are being broken, but that it places St. Louis in the somewhat unique position among cities where great exposition have been held in that it is claimed to be the first building boom that ever followed a world's fair. While the new work consists very largely of dwellings and flat houses, more especially the latter, it is confined for the most part to the territory around what is known as Tower Grove Park, where, according to a member of the Building Commissioner's office, 75 per cent. of the building in the city is taking place in the district west of Grand avenue and between Natural Bridge road and Arsenal street. Some idea of the extent of the prospective building to be done in and about the city may be gathered from the statement of Deputy Building Commissioner James A. Smith, that since January 1 permits have been issued for as much improvement work as during the first six months of 1904. Practically all of these permits are for new brick buildings, whereas a large proportion of those issued for the same period last year were for temporary wooden structures for world's fair purposes only. The value of the improvements for which permits were issued the first quarter of the present year was in the neighborhood of $5,000,000, as compared with $3,373,574 in the first three months of last year.

### Taooma, Wash.

Tacoma is doing more building thus early in the season than has been done at this time for a number of years past. The records of the first three months of the year, when compared with previous years, indicate unusual activity. So far the improvements have been pretty well divided between business blocks and dwellings, and the residences that are being erected are of a better class than those built last year. The records show that the dwellings now going up cost an average of 20 per cent. more this year than last year, although the cost of building material has decreased considerably.

The records for March show 131 permits for buildings to cost $244,730, as compared with a record of 115 permits during March, 1904, for buildings to cost only $92,950. The figures for the first quarter of the year, when compared with the first quarter of last year, show almost as great a percentage of increase. During this period permits to the value of $511,478 were issued, as compared with $331,178 during the first quarter of 1904.

### Wilmington, Del.

The Master Builders' Association of Wilmington held its second annual banquet at the Hotel Wilmington on the evening of Saturday, March 11, covers being laid for something like 60 guests, which included many of the leading builders of the city. The affair was held in the dining room of the hotel, which was tastefully decorated for the occasion. In the absence of President George S. McKee Vice-President Samuel J. Newman acted as toastmaster and in appropriate and timely remarks introduced the various speakers of the evening. The Rev. R. K. Stephenson, who was an invited guest, complimented the organization and congratulated the members upon the fine buildings which were being erected in the city and for the attractiveness of which great credit was due the members of the association. Ex-Building Inspector Lewis T. Grubb, the first president and oldest member of the association, told of the objects of the organization and complimented Wilmington builders generally for their excellent work. While the dinner was in progress music was furnished by the Lyric Orchestra, which is composed of boys, some of whom are sons of members of the association.

The affair was admirably planned and carried out by the Committee of Arrangements, which consisted of J. M. Phillips, Frank N. Overdeer and Philip J. Isaac.

### Notes.

Preparations are being made for an active building season in Harrisburg, Pa., and judging from the number of permits which are being issued by Building Inspector Thomas F. Ferree, the value of the improvements will reach large figures.

Nearly all the contractors and builders in Williamsport, Pa., granted carpenters an advance of 2 cents an hour in wages, taking effect April 1. The carpenters have been working under a scale with a maximum rate per hour of 28 cents and the increase brings the rate to 30 cents.

The slate and tin roofers of Youngstown, Ohio, have presented a demand on the building contractors for an advance in wages, effective May 1. The contractors are favorable to an advance in wages, but will insist that the open shop clause be inserted in the wage agreement.

It is estimated that the building contracts under way and in prospect indicate an amount of building in McKeesport, Pa., this year, which will exceed anything heretofore witnessed in a corresponding period. Outside of the $10,000,000 tube plant, on which active operations are about to be commenced, there will be spent for business blocks and residences something like $1,500,000.

One of the places where a great deal of building is expected to be carried on this season is Far Rockaway, N. Y., where it is estimated that more than $150,000 will be spent in the erection of new structures. The largest undertaking will be the mansion of F. Haberman, which is to cost $50,000. A number of cottages are to be erected, ranging in cost from $6000 up to $14,000, the average being about $10,000.

The demand for new buildings is said to be such in Niagara Falls, N. Y., that the architects are working overtime to furnish plans, while the applications to the Board of Public Works for permits are such as to indicate a most active season. Last year marked a marvelous growth in the city, but 1905 is likely to prove a record breaker. A majority of the applications for permits this year are for dwelling houses ranging in cost from $1800 to $8000.

Judging from the improvements which are at present being planned and from the work under way in architects' offices, Schenectady, N. Y., is likely to witness a season of unusual building activity. We understand that nearly a dozen new business structures are to be erected on State street, that work on a new hospital on Wendell avenue to cost $150,000 will soon be commenced, while in the residential section of the city a large number of dwellings will be constructed.

A great deal of development work has been going on in the suburbs of Washington, D. C., and present plans contemplate a large amount of building, more especially in the way of dwellings. This is particularly true of the northwestern section of the city, where on what is known as Ingleside Terrace 33 dwellings are under way. The houses will have red brick and brownstone fronts, contain ten rooms each and be heated by steam. The entire operation is said to involve something like $250,000.

The builders of Reading, Pa., are actively engaged in operations which in the aggregate are expected to exceed anything heretofore witnessed in this line. The number of permits thus far issued is greatly in excess of those taken out during the same period last year, which was the banner year in building in Reading. There are many new builders in the field, and the old and experienced ones are greatly enlarging their operations. One concern already has plans for upward of 75 houses, and we understand that many of these were sold before the excavations had been commenced.

A committee of five builders from Toronto, Canada, visited the Master Builders' Exchange of Philadelphia early in March with a view to investigating the permanent builders' exhibit, for which the latter exchange is noted, and obtaining such information as would likely be of interest to the visitors in establishing an exhibit along the same general lines. The Toronto builders also visited New York, Boston and Baltimore in order to study the methods followed by the building organizations in those cities.

## New Office Building for Congressmen.

Some idea of the size of the new office building for the House of Representatives in Washington, D. C., may be gathered from the statement that it will have a frontage on B street of 476 feet; on New Jersey avenue of 470 feet; on C street 348 feet 5 inches, and on First street 452 feet 5 inches. It will be 3 stories in hight, and when completed will contain 436 offices, which are to be forever dedicated to the use of the members of the House of Representatives. The building will be classic in its style of architecture, and the B street front will be elaborate in its ornamentation, having 34 columns in pairs. The main rotunda will be one of the architectural glories of the building. It will be elaborately decorated in bronze, marble and plaster, and its otherwise splendid effects will be hightened by a monumental staircase. The interior arrangements of the building have been designed solely with a view to constituting it an ideal workshop for members of the House of Representatives. There will be a caucus or assembly hall 57 x 87 feet, which will be dedicated to the uses of the party organizations of the House. Another striking feature will be the dining room on the second floor, which will be one of the finest rooms of its kind in the country. The kitchen will be located in the attic directly over the dining room—an arrangement which will preclude the possibility of poisoning the atmosphere with the fumes and odors of cooking. There will be adequate bathrooms, a modern barber shop, heating and ventilating plants, and 12 elevators located in groups at the various entrances to the building. There will be a telephone switch board which will permit connection with every office, a modern post office in the basement through which members will receive their mail, and other features of convenience likely to be appreciated by the Congressmen.

The new building will occupy the entire square lying southeast of and diagonally opposite the Capitol, and Superintendent Elliott Woods expects to have the building ready for occupancy in two years. Mr. Woods has had the advice and assistance in his work of Thomas Hastings of the well known architectural firm of Carrère & Hastings of New York City. The position of advising architect was tendered to Mr. Hastings about a year ago, and Mr. Woods is said to have been so well satisfied with the results which followed that he subsequently asked Mr. Carrère to become his professional adviser and associate in connection with the construction of a similar office building for the Senate.

# CORRESPONDENCE.

**Construction of Ice Houses.**

*From* FRANK M. HAMLIN, *Lake Villa, Ill.*—In reply to the inquiry of "S. W. J." in the March issue for suggestions relative to the construction of refrigerators, ice houses, &c., I would refer him to the article entitled "The Construction of a Butchers' Refrigerator," contributed by me to the October number of the paper for 1902. The article, with the accompanying sketch, should make this branch of the subject clear to the reader, and needs no further explanation, except the trap which I failed to mention in the description, and attention to which was called by "W. S. M." in the November number for the same year. This trap should be placed in the main waste pipe and the latter empty into a clean open air space, or it may lead to and over a sink in the basement, but must not under any consideration be connected directly to the drainage system, as the air in the refrigerator would then be in danger of becoming contaminated by sewer gas. There was another criticism offered by "W. S. M." which was that the 2-inch holes near the top or the ice chamber were a detriment to the refrigerator. At the present time I am of the same opinion, as I have given the subject careful consideration and have come to the conclusion that "W. S. M." is right, but nevertheless I would like to hear from others on this point.

In regard to the question of "S. W. J." about the sawdust packing I will give my views on the subject by saying that I think the use of sawdust or any other light non-conducting material is a benefit to the keeping qualities of a wall. However, I would suggest that he make his walls so as to have two spaces, the outer one filled with sawdust and the inner one a dead air chamber. The accompanying sketches will plainly illustrate my idea. The heavy felt paper shown between the sheathing and siding and under the inside set of studding should be lapped solid at the angles. The outer boards are shown to fit into a groove plowed in the jambs. This is much better than cleats, as the latter are apt to become damaged by the ice in taking out and filling the house. These boards may be put in at the top of the opening, and as the ice is lowered into the house they may be removed and stored for future use. It is a good plan to have the tops of these boards a little higher than the top of the ice.

I trust that the above will be of some benefit to the correspondent as well as to others interested in the subject, for there seems to be a wide difference of opinion in regard to the proper construction of this class of building. The only way to arrive at a proper conclusion is to obtain the views of as many builders as possible, and from the number we can possibly decide which is the right one. I therefore shall be very glad to have the readers criticise my ideas, as it is only in this way that we shall be able to learn anything on the subject. I hope there will be a number sufficiently interested to offer comments and to criticise if need be what I have had to say, as I do not claim to be an authority on this subject, but am simply giving my views as to the way I think the work should be done. As the old saying goes: "He who makes no mistakes never does anything."

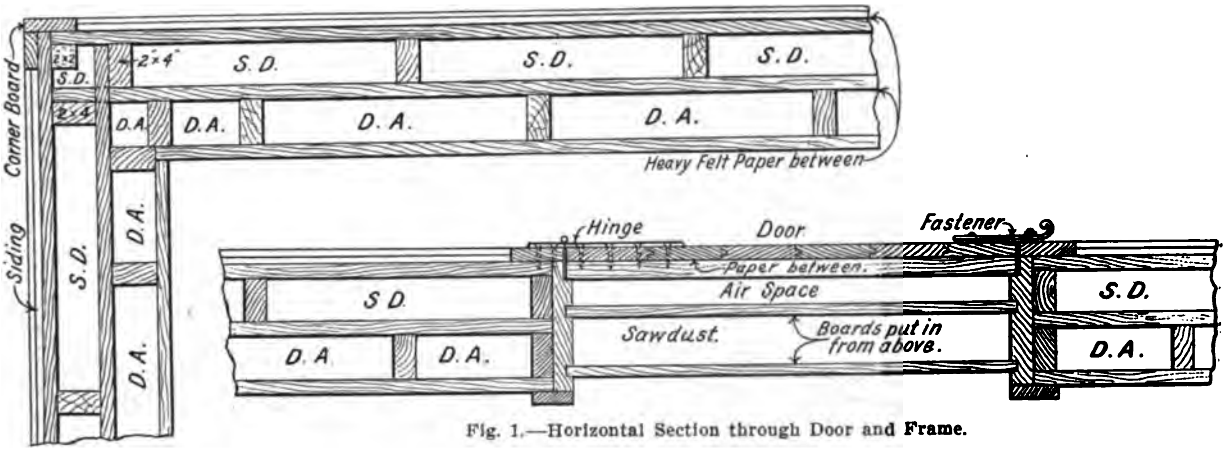



Fig. 1.—Horizontal Section through Door and Frame.

Fig. 2.—Horizontal Section at Corner.

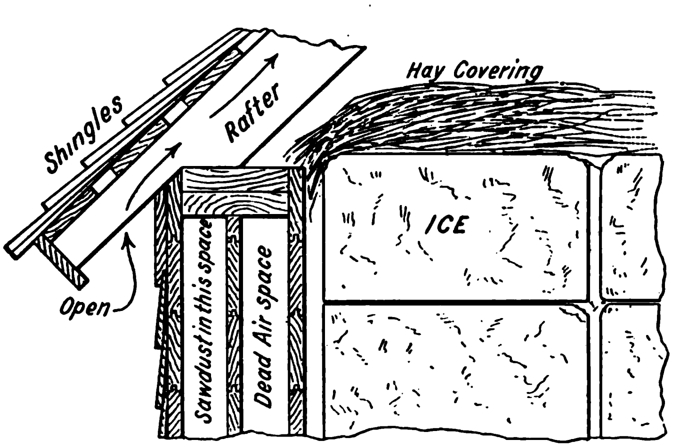



Fig. 3.—Vertical Cross Section at Plate.

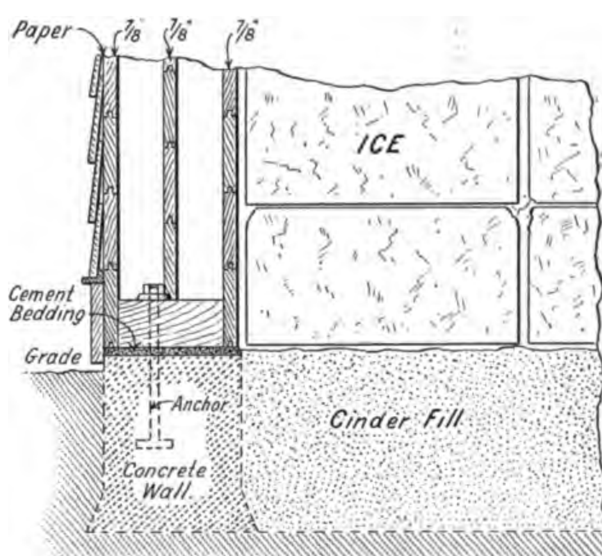


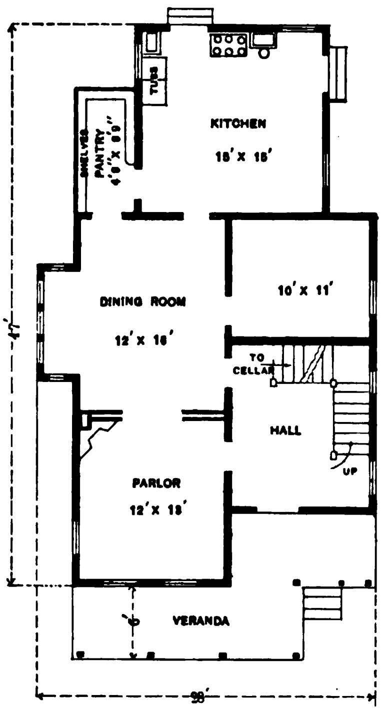

Fig. 4.—Vertical Cross Section at Sill.

*Construction of Ice Houses.—Scale, ¾ Inch to the Foot.*

**Galvanized Cut Nails.**

*From* "READER," *Connecticut.*—I have been very much interested in what has been said in past issues on the subject of "Cut and Wire Nails," and while I am not qualified to take sides in the discussion, I have a suggestion that will, if followed, make the question of whether the nails used are called iron or steel of secondary importance, so far as their use for outdoor work is concerned. It is my experience from years of observation as a builder that the nails of our day, whether they be branded iron or steel, fail to give the service required. My suggestion applies particularly to the nails used in laying shingles. If shingles are laid with ordinary black nails, whether they be cut nails or wire nails or so-called iron nails, the nails soon become rusted. Simultaneously with the rusting of the nails the hole made by the nail commences to enlarge and in a few years the shingles are ruined and have to be replaced.

Our firm long ago adopted the use of galvanized nails not only for shingling and slating, but for laying clapboards and for fence building as well. We find that even the first cost of using galvanized nails is not nearly as much as is generally supposed. We can buy the very




First Floor.

*Elevations Wanted for Floor Plans.*

best galvanized nails at an advance of about $2.50 per keg over ordinary black nails. Sixty pounds of galvanized nails will lay about 10,000 shingles, which is about the amount required for the ordinary cottage house. The cost of shingling the ordinary cottage house with galvanized nails is thus considerably less than $2 above what it would cost to use the black nails.

If the nails are heavily coated with pure zinc they will outlast the best of shingles. I have removed shingles laid with galvanized nails and found the nails to be as perfect as the day they were driven. I refer to nails coated with pure zinc, and not "leaded" nails or those coated with zinc dross. The latter can easily be detected by their color, being black and thinly coated, while the zinc coated nails are comparatively bright. The zinc coated nail costs but little more than a leaded nail, and leaded nails are little if any protection against rusting. The same is true of any light coated nail, whether the coating be zinc or zinc dross.

I find that many contractors and carpenters take the same view of the use of galvanized nails that I do. The head of one of the largest building firms in New England recently said, in a letter on the subject, in part, as follows: "We have about decided to use nothing but galvanized nails for shingling purposes. We find with the light weight of steel cut nails now on the market that their life is about 10 or 15 years, and that while the shingles on a roof are sound and still good for ten years more of service the nails are worthless and a new roof has to be put on."

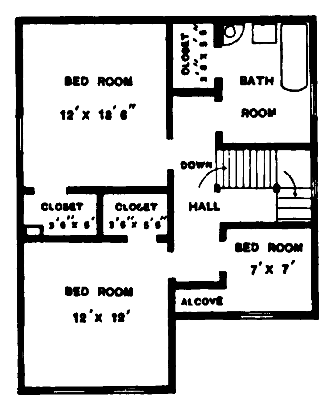
*Note.*—Accompanying the above letter our correspondent sent samples of some galvanized shingle nails that have recently been taken from a seashore cottage. These nails, our correspondent states, were driven over 26 years ago, and are still in good condition. The shingles which they held were so badly rotted away that they are being replaced.

### Making Horse Stalls Tight.

*From* R. C., *Elk Ridge, Md.*—I would like to ask through the Correspondence columns for some good method of putting stalls and drain in a horse stable to make the floors water tight, as there is a cow stable directly under the place where the horses are kept. I will greatly appreciate it if some practical reader will give early attention to the problem.

### Elevations Wanted for Floor Plans.

*From* A. E. P., *Brooklyn, N. Y.*—I inclose herewith drawings of first and second floor plans of a house for which I should like some of the interested readers to present attractive elevations. I have shown a veranda extending entirely across the front, as this is the kind of piazza that I feel is best suited to a house. I should at




Second Floor.

the same time like to have the readers criticise the arrangement of rooms shown and to offer such suggestions as may occur to them.

### Constructing a Silo of Concrete.

*From* G. A. N., *Calmar, Iowa.*—Can I obtain information through the Correspondence columns as to the proper method of building a silo of concrete, or sand and cement? Also when built of lumber, what kind of wood has proven the best for the purpose? If the correspondent answering the inquiry will accompany his description with sketches I have no doubt the matter will prove interesting to many others besides myself.

### Tying Knots in Sash Cord.

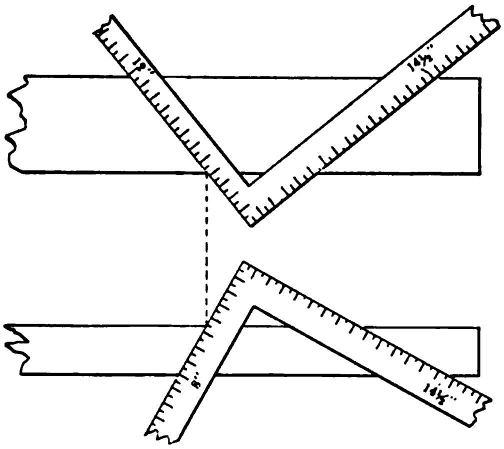
*From* OLD READER, *Evanston, Wyo.*—Will some of the readers explain through the Correspondence columns the knots they have used most successfully for tying on sash weights?

### Deafening a Floor.

*From* JOHN P. KINGSTON, *Worcester, Mass.*—In answer to the inquiry of "W. H." of Lethbridge, Can., in the February issue regarding the deafening of floors I would say that the bottle scheme is new to me and would be directly the opposite of what most bottles are, as they or their contents are apt to make things very noisy and loud. It also strikes me that with double floors and one of them running diagonally it would be something of a job to get them in place. My idea would be to take up the top floor, put on one or more thicknesses of the very best deadening paper I could get, then put the top floor directly over it, or put ⅞-inch strips over the paper, filling between these with some kind of plaster, then put paper over this, and finally nail down the top floor. I think this would be as efficient, if not more so, and a great deal cheaper, than filling between the joist. I would say that I use what is known as Florian paper between all double floors and for the best work I use a stamped paper between—that is, each side is full of little cells. It is not only a sound deadener, but is partially water and fire proof, and surely helps the warmth of a house.

**Finding Cut for Purlins.**

*From* W. N. H., *Newport, R. I.*—In reply to the question, "How to miter a purlin on a third pitch roof," I would say in the first place that a third pitch is a rise of 8 inches to a run of 12 inches. Take a steel square and measure with a rule from 8 inches on the tongue to 12 inches on the blade, which is 14½ inches. Now take 12 inches on the tongue and 14½ inches on the blade and



*Finding Cut for Purlins as Suggested by "W. N. H."*

the tongue will give the cut, while 8 inches on the tongue and 14½ inches on the blade will give the other bevel. The sketch submitted will render my meaning clear.

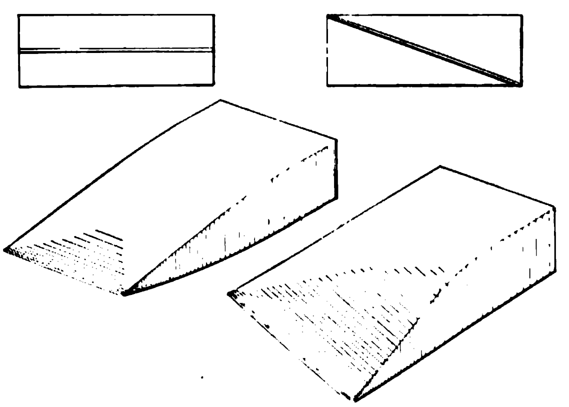
*From* J. E. N., *Leland, Ill.*—If it is not asking too much I would like to have "Hee H. See," Brockville, Ont., tell us through the Correspondence columns of the paper what he calls the "upper side of purlin," in Fig. 2, shown on page 109 of the April issue; also, if his rule will work where purlins do not run on the same plane but are of two different pitches? I think "Hee H. See" gives the correct solution to the problem of "J. C. W.," which appeared on page 44 of the February number, and that "T. Woods Sterrett," Fairview, Pa., is in error. His method is for getting a shoulder or miter cut on purlins where two ends meet, as in a hip or valley, while "Hee H. See" makes all his cuts on the one purlin and lets it butt up to or partly slip over the other, as, for instance, in building an addition onto an old structure and running it out square from the old part: it could be slipped over or slid sidewise anywhere and it would fit the old purlin. If I am right I would like to hear what "Hee H. See" and others have to say about it. I like *Carpentry and Building* very much, and am always longing for the next number to appear in order to see what it contains.

**Attaching Grounds to a Brick Wall.**

*From* A. P., *Victoria, B. C., Canada.*—In reply to "Carpenter," whose inquiry appears in the March issue relative to putting on grounds, I would advise him to plug the wall first, putting in top and bottom plug in one corner, then plumb them before sawing off. Repeat the operation in the opposite corner of the same wall, after which string a line from one to the other and cut off to the line. Many carpenters make a mistake in pointing their plugs. I inclose a diagram of what I consider wrong and also what I consider right. The outside lines represent the end of the plug to be inserted in the wall before it has been tapered and the inside lines after it has been tapered. The one tapered diagonally naturally locks itself in the wall, while the other is easily drawn out again.

*From* J. M. L., *Hillsboro, Ill.*—In the February issue of the paper a correspondent in Petersburg, W. Va., asks the proper way to put on grounds in connection with a brick wall. To do this work I would say, clean out the mortar well and use good, dry white pine plugs, driving them into the wall 3 to 4 inches and spacing them from 16 to 20 inches apart. By the way, I am glad to see a letter from a correspondent residing where I took my first lesson in turning the grindstone and shoving the "jack" plane, but I took Greeley's advice some 33 years ago and came West. I commenced to take *Carpentry and Building* about 20 years ago and find it very valuable.

*From* J. T. P., *Selma, Ala.*—I have been a reader of *Carpentry and Building* for some time and I regard it as a splendid paper, and cannot understand why some of my brother chips feel that they can get along without it. I think I am safe in saying that "every carpenter who is anybody takes *Carpentry and Building.*" In looking over the March issue I notice the inquiry of "Carpenter," Petersburg, Va., as to the proper method of putting on nailing grounds. If I was doing the work I should determine how high from the floor the grounds should be placed, then chalk my line and level it. After the line is made take the plugging chisel and gouge out every other mortar joint, usually about 4 inches deep. Next make the plugs, preferably of soft heart pine, after which we are ready to drive them in the mortar joints, which is done by means of a heavy hand axe or hand hammer. Draw the chalk line over these plugs, getting as near the wall as possible; either strike the line or else mark beside it with a lead pencil. Saw all of them off to the marks, but be careful to let the saw cuts be plumb so that the grounds will lay evenly against all the ends. We are now ready to nail on the grounds, which should be 9-16 x 2 inches. These of course should be sized so as to be of the same thickness. Use No. 8 casing or finishing nails, two to a plug. In putting on grounds for wainscoting it will be necessary to have a top and bottom ground. These must be plumb or the work will show up badly. I use an 8-ounce machinist's plumb bob, as it is small in diameter and will hang close to the brick wall, although some workmen use a straight edge and the plumb part of the spirit level. Sometimes it becomes necessary to put on three runs of grounds, especially when a panel goes on over the wainscoting. See to it that the grounds are all on a straight line and perpendicular. After the grounds are all on it will be best to fill in with good mortar and use the straight edge to



*Attaching Grounds to a Brick Wall—The Correct Form of Plug Suggested by "A. P." Is Shown at the Right.*

bring it down to the grounds. Of course it is understood that this is well dried before the wainscoting is put on. Do not be afraid of pounding the plugs too hard. It is to be understood that the plugs are made wedge shaped and a little pointed at the ends.

**Design Wanted for Masonic Hall.**

*From* M. H. G., *Speer, Ill.*—Will some of the architectural friends of the paper send for publication plans of a two-story Masonic hall, the first story to be used for store purposes and the second for a lodge room? The building should be of frame with 22-foot studding.

### Joining New Roof to Old Building.

*From* HEE H. SEE, *Brockville, Ont.*—In answer to the inquiry of "J. C. W.," Berlin, Pa., I think the accompanying plan of roof, Fig. 1, is about the best that can be done under the circumstances.

*From* H. H. POLK, *Louisville, Ky.*—Answering "J. C. W.," Berlin, Pa., on page 79 of the March issue, I inclose some sketches which may be of interest. Fig. 2 shows two simple but rather clumsy and ill-looking jobs that will connect the two buildings without disturbing the old roof. Either plan requires a gutter or valley that can be made to shed the water at whichever end is most convenient for the down spout. Both plans make a bad trap for snow and ice in winter. Plan B means ridge-roof the new building and flash its gable end to carry the water from the old roof intercepted by it. Plan C means hip the junction end of the new building and arrange the gutter or valley where the two roofs lap.

The ideal solution of this problem, however, seems to the writer to be that shown in Fig. 3, which practically explains itself. In this case the roof is symmetrical and looks well. There are no traps to accumulate snow and ice, and it requires but little more change in the old roof than hipping the rear end of the old building. It is, if preferred, easy to carry the ridges of the two roofs beyond the junction of the hips and thus make small gables for attic lights or louvres, and so benefit as well as enhance the appearance of the job. These gables are shown by the dotted lines A A and by the dotted rear elevation. The junction ridge falls midway of the lap of the two houses and parallel with the side of the new house.

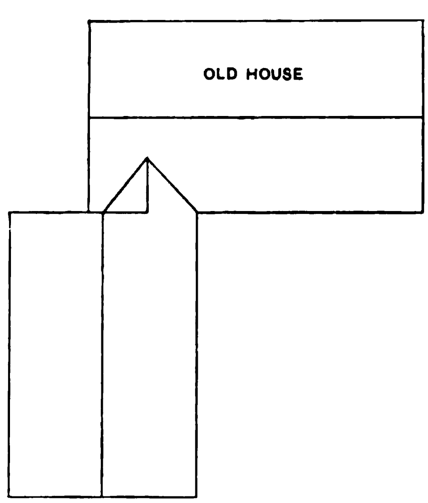



Fig. 1.—Solution Suggested by "Hee H. See."

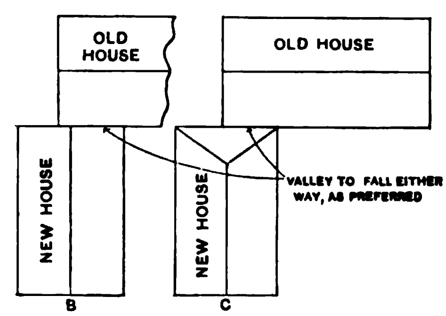



Fig. 2.—Plan of H. H. Polk for Not Disturbing Old Roof.

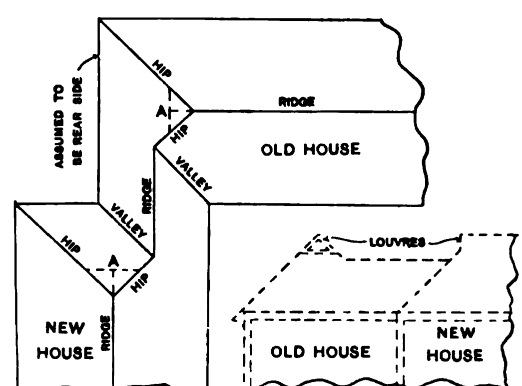



Fig. 3.—The Preferable Method Suggested by Mr. Polk.

*Joining New Roof to Old Building.*

### Cutting Circles of Glass.

*From* J. S., *New Berlin, Pa.*—Replying to the inquiry of "H. K.," Wheaton, Minn., I would say that I recently cut glass with a .35 cutter for circular and oval windows and did not break one. I made a quarter circular template of thin boards and cut around it. In like manner I cut glass for small alarm clocks, only in this case I used a full circular template.

### Camber Required for a Fifty-Foot Truss.

*From* C. J. C., *Johnsonburg, Pa.*—I would say to "C. E. W." of Hagerstown, Ind., whose inquiry appears on page 79 of the current volume of the paper that a 50-foot span truss properly constructed of timber and rods of suitable size needs no camber over the false work. Speaking of false work, the floor is the best and easiest place to assemble any truss if one has no jacks to raise it in its entirety, and generally speaking, "where there's a will there's a way." I find in practice that theories are fallacious and all construction which I can do below I do it. I came to this place about the middle of January to put new foundations and machinery in an old paving brick plant, and some of the problems I meet are very complicated and difficult. I work with my men day times and figure and make plans evenings, and I am still on top of the junk pile and doing business six days out of every seven. I often say to my men that the best legacy a father can leave to a son is "grit, pure and simple, then more grit." When all other known methods prove futile and the battle is seemingly lost, "grit well rammed in with honest hard work" will surely retrieve the cause, and if one has grit enough it is like the faith of holy writ and you can move mountains and men.

### A Question in Miters.

*From* C. J. C., *Johnsonburg, Pa.*—If "G. R." of Wilmer, B. C., means, by his inquiry on page 79 of the March issue, the cut under a valley or hip, I would suggest that he can solve the problem by placing his square on the face of the soffit at 8 inches and 17 inches and the 8-inch mark will be his miter cut. If, however, he means at the corner where the eave and rake intersect, a plain every day 12 and 12 cuts it. I think when he says, "rise 4 inches to the foot," he is thinking of 1-3 pitch and means that, hence I say 8 inches and 17 inches. If, on the other hand, he means just exactly what he says, why, then, 4 inches and 17 inches gives the cut.

### Framing a Large Porch.

*From* C. A. P., *Monongahela, Pa.*—As a subscriber and reader of the paper I would like to receive through the Correspondence department some information as to the framing of a large porch, more especially as to the best construction of gutter. The porch is to have a wide cornice and 12-inch turned posts. It will be 8 to 12 feet wide, and is to have square corners. What I want to know is how to arrange the rafters and ceiling joist, and how to cut out for the gutter. I shall be glad to have those who are experienced in this line give me the desired information.

## New Publications.

**Hendricks' Commercial Register of the United States for Buyers and Sellers.** Size 8 x 10½ inches; 1300 pages. Bound in board covers, with white enamel lettering. Published by Samuel E. Hendricks Company. Price $7.

This is the fourteenth annual edition of a well-known directory which is especially devoted to the interests of the architectural, mechanical, engineering, contracting, electrical, railroad, iron, steel, mining, mill, quarrying and kindred industries. There are more than 350,000 names and addresses, which are presented under more than 14,000 classifications. The work is more complete than ever before, and is a convenient and valuable index of the industries mentioned, while at the same time it embraces full lists of manufacturers of and dealers in everything employed in the manufacture of material, machinery and products used in these industries, from the raw material to the manufactured article and from the producer to the consumer.

As affording an idea of its scope it may be stated that over 20 pages are devoted to the names of architects; 120 are given up to carpenters, contractors and builders; 48 pages to masons and builders and dealers in materials used by them; 60 pages to plumbers, gas and steam fitters and supplies; 50 pages to roofers and tinners and roofing materials, while many pages are given up to lists of makers of sash, doors and blinds, saws, mechanics' tools, &c., manufacturers of sheet metal work, steel structural work, granite producers, hardware, water and bath heaters, lumber manufacturers and wholesalers, plasterers, concrete and mortar mixers, cement makers, &c. The matter is carefully indexed in alphabetical order and in such detail as to require 46 pages of the volume. As a whole it will be found a work of exceptional convenience to the architect, the building contractor, the quarryman, the hardwareman, and, in fact, all having occasion to buy or sell materials of any kind connected with the industries mentioned.

**Tables for Roof Framing.** By G. D. Inskip. Size 6 x 7½ inches; 205 pages. Illustrated by numerous diagrams. Bound in leather covers. Published by the author. Price, $2, postpaid.

This work consists of a series of tables for roof framing which have been revised and extended, the idea being to lessen the labor and to insure "accuracy in all computations of an oblique character." In the alternate table which is presented of squares and logarithms, the squares advance by sixteenths of an inch from zero to 60 feet, while the logarithms advance by thirty-seconds of an inch from zero to 60 feet. A table of pitches is also given advancing by thirty-seconds of an inch from 1 inch to 18 inches rise to 12 inches run. For a plan of 45 degrees the logarithm of hip and valley is given, the idea being that the need for this is likely to be as great as it is in connection with the rafter. The table of logarithms of sixty-fourths of an inch to 12 inches is likely to be found useful for close measurements, as in connection with stair work, &c. The table of logarithms of prime numbers to 1000 has been computed to 13 places of decimals and then reduced to 7 places. The work is likely to prove of interest to those who are more or less familiar with geometrical methods and are able to apply them in connection with roof framing.

**The Architects' and Builders' Directory of Detroit.** Size 4⅝ x 6 inches; 130 pages. Bound in colored paper covers. Published by Frank A. Barrett. Price, 55 cents, postpaid.

This little work presents the names and addresses of architects, builders, contractors, plumbers, masons, supply houses, &c., in the city of Detroit, and at the same time contains extracts from the city charter and the State code relative to the building and fire laws and ordinances of Detroit. It also gives a list of the officials of the Builders' and Traders' Exchange and of the Builders' Association, together with an ordinance to provide for the inspection and rendering safe of all theaters, opera houses and halls used for theatrical purposes in the city of Detroit. Another interesting feature of the little work is found in the rules and regulations governing plumbing and drainage work, the mechanics' lien law, an alphabetical index and a calendar for the current year. Probably a page which will be read with more than usual interest is that on which is described the founding of the city and its rapid development during the past 200 years.

**Measuring Builders' Work.**—By Paul N. Hasluck; 96 pages; size, 4¼ x 7 inches; illustrated by numerous diagrams; bound in board covers; published by Cassell & Co., Ltd.; price 40 cents, postpaid.

This is one of the mechanics' manuals issued by this well-known house and is intended to be a practical guide in measuring builders' work. The matter is comprised in eight chapters, the first of which deals with mathematical signs, weights and measures and abbreviations; the second takes up the measuring of carpenters' work, this being followed by bricklayers' and masons' work, then slaters' and plasterers' work, plumbing work, painters', glaziers' and paper hangers' work, and then the measuring of old buildings. The concluding chapter deals with the Scottish system of measuring builders' work. Although showing the methods of estimating builders' work in Great Britain, there are many features which are likely to interest building mechanics in this country.

**Rafter and Brace Tables.** By H. J. Aurlie. Size 4 x 6½ inches; 32 pages. Bound in leatherette. Published by the author. Price, 75 cents in leather and 50 cents in paper.

This compilation of tables has been prepared for the convenience of architects, builders and carpenters, and is designed to show at a glance the length of rafters and braces. Following this information are tables giving the strength of chains, ropes, wooden posts, &c.; also weights and measures and miscellaneous information.

## Sheet Metal Buildings.

The problem of providing school houses and places of worship of a character suitable to the locality, and at the same time at a cost not so great as to prevent the

*Sheet Metal Buildings.—A Church Built of Sheet Metal.*

structure from being moved away to make place for a larger one as the increase in population warrants, is not at all uncommon in rapidly growing suburban districts of the larger cities, as well as in country towns. For such a purpose a portable building made of sheet metal has found much favor with architects and municipal authorities. In the accompanying illustration we present a view of a church, or chapel, of sheet metal built not long since in the upper section of the city of New York in order to meet specific requirements. An examination of the picture shows the foundations to be made of pressed steel siding, the outer walls of imitation rock face stone and pressed brick and the roof to be covered with plain metal, all very natural in appearance and giving a substantial effect. In addition to the flat metal used there are sheet metal ornaments shown above the entrance and on the front and rear of the main roofs. Builders and sheet metal workers throughout the country will doubtless find it interesting to look up the matter of sheet metal buildings with a view to meeting the requirements of clients in their own localities, as there seems to be a rapidly increasing demand for this class of structure in portable form, more especially, perhaps, by school boards in places where there is a congestion of pupils. The church described above was built by the Ducker Company, 277 Broadway, New York City, while the sheet metal work was supplied by the Wheeling Corrugating Company, Wheeling, W. Va.

## Commencement Exercises New York Trade School.

The commencement exercises of the twenty-fourth season of the New York Trade School, at Sixty-seventh street and First avenue, New York City, were held on the evening of Wednesday, April 5, in the presence of a large gathering of pupils and their friends estimated at considerably over 1000 persons. The auditorium was tastefully decorated with bunting and flags, and the student body as usual was in full spirit of the occasion. The exercises were opened by President R. Fulton Cutting, who in his usual felicitous manner gave the young men some very good advice, emphasizing the importance of the opportunities which they had enjoyed to acquire a practical knowledge of useful trades, and bade them success in their life work. He then introduced Edward Murphy and Frank Reynolds of the Master Plumbers' Association, who presented the graduation certificates, the popular members of the classes being cheered as they went forward to receive the coveted diplomas. The honor roll certificates were presented by President Cutting, assisted by Superintendent H. V. Brill.

John Noll of the Master Painters' and Decorators' Association then presented the medal, which is each year offered by the *Painters' Magazine*, the fortunate candidate being G. M. Knight. As a reward for ranking highest in the carpentry class, Elmer J. Williams of Millmont, N. Y., was presented with a number of books on carpentry. President Cutting then introduced George A. Suter of the Trade School Committee of the Master Steam Fitters' Association, who referred to the custom of the association of presenting each year gold medals to the most proficient pupils in the steam fitting class, the award being made after a close investigation of the skill as workmen, as well as the technical knowledge possessed by the students. This year three of the young men secured a percentage of over 90 per cent. in their examinations, and the medal was awarded to the student who stood highest and honorable mention accorded the other two.

After these young men were cheered to the echo, President Cutting introduced United States Senator Chauncey M. Depew, who as usual in making public addresses held the close attention of his audience. This was the third time in the past ten years that the Senator had appeared before the students of the New York Trade School, and in his remarks he stated that he had never seen "a better epitome of the resources of this great country than is presented by the students gathering from every section of it to acquire that character of training which makes for the best element of American citizenship." He stated that it was only necessary to become familiar with the great men of to-day to learn that they do not come from the college, but from the scenes of practical life. "The world got along after a fashion with a college education until this wonderful century began, and then men who are better known for their practical training than their college degree took such a position that the necessity of practical training is now recognized. Men who graduate from such schools as this on the honor roll have a good equipment toward the mastery of their chosen line." He referred to the fact that there was no such thing as luck in shaping a man's business career, but that there was opportunity, and that we all rise according to our capacity and not from luck. A man with the right qualities will get the necessary information and qualifications that with determination will compel success. Almost every failure is due to the fault of the man. He pointed out that from experience he knew that success comes from work; that there should be temperance in all things, and advised the students not to overwork themselves, but to husband their energies and use them to the best advantage. He counseled temperance in eating and in drinking and to look after the dollars. "Nothing," he said, "adds so much to the dignity of the man as his pecuniary independence, due to a little pile in the savings bank to tide him over hard times. Everybody can have a little by saving, and nobody makes so little but something can be saved." In conclusion, he urged the graduates to be patriotic and proud of their country, and to do their part in upholding its good name and flag on all occasions.

The year just closed had the largest enrollment of pupils in the history of the school, amounting to 850, as compared with 750 last year. There were 32 graduates on the roll of honor—the carpentry class have 2, the bricklaying 2, the electrical work 5, plumbing 15, the cornice and skylight work 3 and sign painting, house and fresco painting and blacksmithing 1 each. The number of graduates receiving certificates was 251, there being in the carpentry class 12; bricklaying, 8; cornice and skylight work, 18; electrical work, 46; plumbing, 122; steam and hot water fitting, 24; sign painting, 7; house and fresco painting, 6; pattern making, 1; blacksmithing, 2, and printing, 3.

IN the "Prospectus for 1905," which has just reached us from the Working Men's College at Melbourne, Australia, there is presented a great amount of interesting and valuable information relative to this institution of instruction. Many of the courses are of a nature to command the attention of those engaged in the building business, relating as they do to carpentry, cabinet making, architectural drawing and perspective, building construction, geometry, modeling, wood carving, house painting and decorating, plumbing and gas fitting, electricity, &c. The staff of instructors, regulations, terms, fees, &c., are given as well as general information for prospective students.

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LORING AND PHIPPS, ARCHITECTS.

ELLISON & BENOIT PHOTOGRAPHERS.

THE BRAE BURN COUNTRY CLUB HOUSE JUST COMPLETED AT WEST NEWTON, MASS.

LORING AND PHIPPS, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING, MAY, 1905.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

232-238 WILLIAM STREET, NEW YORK.

JUNE, 1905.

## The General Building Situation.

The reports which have come to hand since our last issue went to press continue to reflect brilliant prospects for a record breaking volume of business in the building line in practically every leading center of the country. The season has now sufficiently advanced to demonstrate the fact that the earlier indications were not misleading, and a degree of activity prevails which is highly gratifying to employers and workmen alike. May 1 passed with comparative freedom from labor disturbances and in marked contrast to the conditions existing at this date in some of the more recent years. Here and there slight friction is to be found in some branches of the trade, but taking the country over the situation so far as it affects building operations seems to be strongly tending toward peace and harmony. The new work in progress is of a highly diversified character, with suburban and country homes, flats and business blocks forming a conspicuous part. According to the figures compiled by the building departments in representative cities of the country for the month of April it is only here and there that a decrease in the volume of operations is shown when compared with the same month a year ago. In some instances the increase is very marked, running up to a high percentage, particularly in the smaller cities and towns. Where a decreased volume of operations is shown the places are so scattered as to indicate that the falling off has been due to special rather than general causes.

## Pennsylvania Ventilation Law.

The passage by the Legislature of Pennsylvania of a law governing the ventilation of school buildings in that State is noted in another column in this issue. The event is one of no little importance, for there is at present no widespread demand on the part of the people in general for ventilation on the scale on which it should be furnished in fully inhabited buildings, but rather a feeling on the part of legislators that their constituents, especially in the smaller communities, are being taxed for refinements in building equipment, and that by enacting such measures they run a chance of legalizing some patented methods or of benefiting the few. The effect of the measure and the influence which it should exert have, however, already been emphasized in the article mentioned. It remains to examine briefly the stipulations of the law. In comparison with the enactment of the New York Legislature the Pennsylvania bill needs several important additions to make it all that is desired. It lays down that no school house shall be erected, provided the cost shall exceed $4000, until plans and specifications shall show a proper system of heating, lighting and ventilation; but it does not decree who is to exercise the authority of vetoing such proposed construction. In New York plans for school buildings must carry the certification of the Commissioner of Education that they comply with the law, and moreover, such compliance must be had on any school building construction involving as little as $500. The stipulations regarding the degree of ventilation—the important features of the act—are, however, the same in the two laws. Each states that there must be 15 square feet of floor space per pupil; 200 cubic feet of room space per pupil and 30 cubic feet of fresh air supply per minute per pupil. The New York law says further in the latter connection that there must be means for a positive exhaust for the vitiated air without regard to the atmospheric conditions. These few statements show that New York's law is to be preferred when making the opening in other States, the fact that Pennsylvania is also in line being used mainly to force the entering wedge. Notwithstanding the absence of certain definite stipulations we cannot conclude this comment without congratulating heartily those to whom the credit is due for this latest successful bit of legislation, for there is no question that the main object sought is accomplished. Once a bill is enacted amendments are easy of adoption, and few there be who can recall any legislation that was eminently satisfactory at its inception.

## Necessity of Continued Study.

The period of the year is at hand when the students of the trade schools are terminating their courses of instruction pursued during the winter months, and one cannot refrain from repeating the admonitions of the orators of the graduating exercises: "Don't think you know it all." Too many people are prone to become self satisfied with early meritorious efforts, and rest from continued special application on the assumption that they have knowledge of the fundamentals, scanty though it probably be. It cannot be too strongly emphasized that one must always expect to do a certain amount of study if he means to keep apace with the times and thereby be able to meet a sudden emergency. While he may fail to see any immediate reward for continued study, even if his efforts are not particularly irksome or the labors not unpleasant he will discover, too late perhaps, that ultimate success largely depends on having retained a receptivity of mind; a ready adaptability to change of conditions and an unquestioned ability to handle the unexpected or difficult. Luck, as pointed out by Senator Depew in his address to the New York Trade School and referred to in our May issue, has little to do with success; instead, the successful man owes his position in life more than most of us feel inclined to admit, to capacity, industry and trustworthiness. Though capacity is partly a matter of birth it may be made a matter of cultivation to a very large extent. How important an attribute it is of one's advancement is only too well emphasized by the many cases one can readily call to mind of individuals who are industrious and trusted, yet who, through lack of capacity, are unable to rise above certain levels of endeavor. There is an old saying in substance that the more one knows the less he feels he knows; but it follows from this that the more one knows the more he discovers how to learn still more. In these days of free lectures and low priced literature it is hard to excuse the altogether too frequent encounter with the individual who is trying to kill time. It is a matter of regret that such do not grasp opportunities for enlarging their information, for little as they would jeopardize their precious health by well timed efforts of this kind they would indeed improve it. All learning cannot of course be obtained from books, but observation may accompany the study of past and present achievements. Finally, if these remarks succeed in forcing the reader to ponder the words of advice from the commencement stage, and if they suggest to these younger men the value of periodical literature, they are worth the space they occupy.

## Convention of Architectural League of America.

The sixth annual convention of the Architectural League of America was held at the Hotel Schenley, Pittsburgh, Pa., the opening session being called on the morning of April 17 with President William B. Ittner in the chair, and with representatives of the profession in attendance from leading cities of the country. The delegates were welcomed to the city by John T. Comes, president of the Pittsburgh Architectural Club, and the response to the address of welcome was made by Mr. Ittner. After a few words from William S. Eames, president of the American Institute of Architects, the president announced the Committee on Records and Publicity, after which the speaker for the convention was selected, the unanimous choice being N. Max Dunning of the Chicago Architectural Club. Percy Ash of Washington, D. C., was chosen secretary.

President Ittner then presented the annual report of the Executive Board, in which there were a number of recommendations, these being given with a view to drawing out a full discussion on the points raised. Treasurer E. C. Klipstein presented his report, showing a comfortable balance on hand.

The next order of business was the report of the Committee on Publicity and Promotion, and following its presentation the secretary read the report of the Committee on Code of Ethics of Competitions, the chairman, Mr. Harder of New York City, being unable to be present. Various other committee reports were presented and discussed, and then the meeting adjourned.

In the afternoon the delegates visited the plants of the Standard Sanitary Mfg. Company and some of the sights of Pittsburgh and vicinity.

In the evening there was a public meeting in the Pittsburgh Conservatory of Music, one of the interesting features being a paper by Mulford Robinson on the "Planning of Cities." This was followed by a paper by F. S. Lamb on the "Grouping of Municipal Buildings," interest in the matter being intensified by the remarks of President Ittner, who spoke on the general effect of a city and the grouping of buildings, showing with panoramic views the school buildings of St. Louis and how they might be arranged in a way to add to the general beauty of a city.

The second day's proceedings opened with a consideration of routine matters and an expression of opinion on the part of many relative to plans for beautifying the cities of the country.

One of the pleasant features of the convention was the luncheon given by the firm of Rutan & Russell of Pittsburgh at the Duquesne Club. The tables were arranged in the form of a T-square and prettily decorated. Informal remarks were made by Mr. Ittner of St. Louis, Karl Bitters, president of the National Sculpture Society; Joseph Lauber of the National Society of Mural Painters and President William S. Eames of the American Institute of Architects. At the close of the luncheon a vote of thanks was extended to the hosts for their delightful entertainment, and then the delegates returned to the hotel, when additional reports were considered. Nominations for president were then in order, the result being the unanimous election of N. Max Dunning of Chicago.

While the tellers were counting the votes for president the delegates listened to the revised resolution to be submitted to the Allegheny County Commissioners relative to the addition of two more stories to the Allegheny Court House. So deeply interested were the architects in preserving the court house, which is one of the most noted monumental public buildings in the country and probably the best example of Romanesque architecture in America, that they deplored any action by the commissioners looking to the contemplated addition.

The place for holding the next convention was decided to be New York City and the time was left to the Governing Board, so that the members of it might arrange to co-operate to the fullest extent with the New York societies.

A hearty vote of thanks was tendered the outgoing officers and also to all those individuals and concerns who had extended courtesies to the members during the convention. Before the meeting adjourned the members listened to a paper by Titus de Bobula, a Pittsburgh architect, in which he declared that "architects must become Americanized in building. The have followed the old style long enough," he said, "and it is now time to show their individuality by expressing their ideas and planning buildings accordingly."

The concluding event of the convention was a banquet held Tuesday evening, at which C. G. MacClure of Pittsburgh was toastmaster. Numerous addresses were made, among the more interesting being those of E. Z. Smith, representing the Art Society of Pittsburgh, and Arthur Hamerslag of the Carnegie Technical Schools. Mr. Hamerslag told the delegates the purposes of the institution in relation to architecture, pointing out that three types in architecture would be taught in the curriculum and special emphasis would be laid on the molding of the character of the young men. John Moliter of Philadelphia spoke on the relation of mural painting to architecture. Other speakers devoted themselves to a discussion of topics relating to architecture and building, and finally, after singing the last verse of "America," the body adjourned.

## The Labor Bureau Secretaries' League.

The secretaries of many of the labor bureaus of the United States have organized themselves into an association known as the Labor Bureau Secretaries' League. A constitution has been adopted, which sets forth that the object of the association shall be to establish and promote friendly and co-operative relations between the several labor bureaus and the officers thereof, the interchange of information and experience and the mutual education and advancement of its members, to the end that the labor bureaus shall be placed on the highest plane of efficiency and usefulness. The officers are: President, H. C. Hunter, commissioner of the New York Metal Trades Association, New York City; vice-president, S. D. W. Cleveland, secretary of the Syracuse Metal Trades Association, Syracuse, N. Y.; and secretary and treasurer. Herman S. Hastings, secretary of the Worcester Labor Bureau, Worcester, Mass. The members of the associations are convinced that much benefit to themselves and the associations that they represent will be obtained from the work of the Secretaries' League. The labor bureau is, comparatively speaking, in its infancy, The systems in use in various cities differ in some essential points. Each secretary is compelled to master new problems and to work out details concerning which there is little precedent. Naturally much good can be done by the interchange of ideas which will result from the meetings of the league.

THE work of excavating has been commenced for a 10-story loft and office building, 42 x 179 feet, on East Twenty-fifth street, New York City, between Third and Fourth avenues, and running through to Twenty-sixth street. The structure will be of fire proof construction, steel frame, and have exterior fronts of Indiana limestone and light colored brick. It will have passenger and freight elevators, steam heat, electric light system and all other modern improvements. The building will cost $210,000, according to the estimates of Gordon Tracy & Swartwout, the architects, whose offices are at 156 Fifth avenue.

# COMPETITION IN $3500 HOUSES.

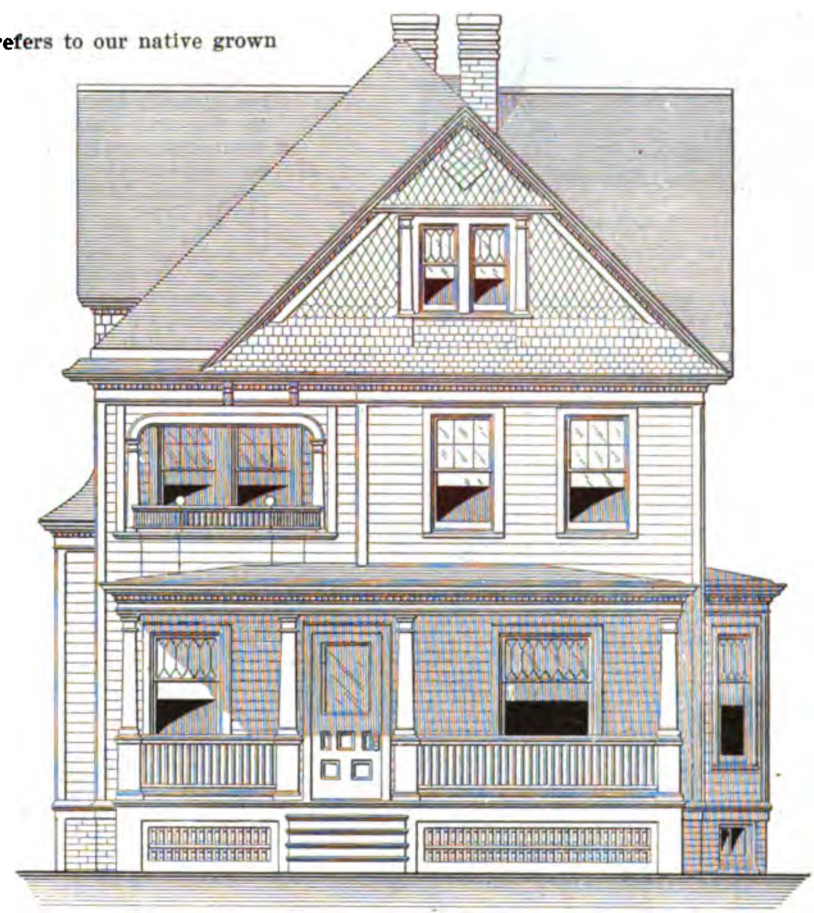
## THIRD-PRIZE DESIGN.

THE winner of the third prize in the competition in $3500 houses, as announced in the April issue, was C. A. Wagner, 89 Jersey avenue, Port Jervis, N. Y., and we take pleasure in presenting his design herewith. In submitting the drawings to the committee having charge of the contest the author offered a few remarks in regard to labor and materials which may not be without interest at this time. He said: "Our mechanics hereabouts are paid as follows: carpenters, 17½ to 28 cents per hour; laborers, 17½ cents per hour; painters, 17½ to 22½ cents per hour; plumbers, 35 cents per hour; tinsmiths. and metal workers, 17½ to 30 cents per hour; masons and plasterers, 35 cents per hour; mason tenders and lathers, 20 cents per hour.

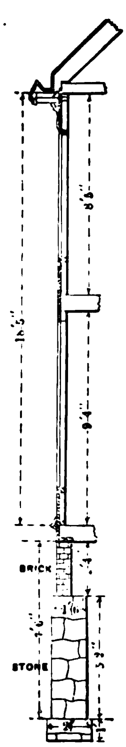
"My bill of rough lumber refers to our native grown

The committee of award in commenting upon the design illustrated herewith said: "The arrangement of the first floor is good, the stairway is attractive and convenient, but we consider the second floor cut up more than would seem to be necessary. If it was desired to change the design we would suggest that the cost of the superfluous brick work in the cellar could be applied to carrying up the dining room bay window and rearranging the second floor in a way we think would give a more satisfactory plan."

Many of our readers will doubtless be interested in making the acquaintance of the author of the third-



Front Elevation.—Scale, ⅛ Inch to the Foot.




Section.

*Competition in $3500 Houses.—Third-Prize Design.—C. A. Wagner, Architect, Port Jervis, N. Y.*

hemlock of goodly quality, which is delivered on the ground for the stated price, our native hemlock being as good as any we can buy in the market. As to the front piazza columns not being exactly in accordance with the rules of architecture as to cap protruding over soffit, I would say that I had a cause for this change. It was to prevent the birds roosting thereon.

"I will also state that the refrigerator can be placed in the rear entry if so preferred by any one, but in such a case I would advise that the rear porch be enlarged 2 feet in depth and the door changed to the rear of the entry for convenience in icing. I mention this fact for the consideration of the committee, but in this locality every one prefers the refrigerator in the kitchen; therefore I have placed it as shown. As to the waste from the same, there will be three traps between the refrigerator proper and the sewer; one just below the connection at the laundry tubs, one just below the first floor and then an open pan resting on the floor, while the drip pipe of the refrigerator will also have a trap. The waste from the drip pan can, however, be run to any other point just as well, preferably under the rear porch, and not add to the cost of the plumbing."

prize design in this competition, and we take pleasure in presenting an excellent likeness of him herewith. Mr. Wagner was born in Port Jervis, N. Y., August 9, 1870, and was the eldest of four children. His father died when he was five years of age, and early in life he took up its struggles to assist his mother in supporting the family. He attended the public schools at Matamoras, Pa., and Port Jervis, until he was 13 years old, when he took a position at Pountney's glass factory at Port Jervis, where he continued for two years. He then conceived the idea of building a rowboat for his own pleasure on the river, and his experiment in this line demonstrated so thoroughly that he possessed the knack of handling carpenters' tools that he was advised to take up carpentering as a trade. This he did, serving his first time with Henry Lorenz, an old time builder of Matamoras. He remained with him about three months, and then until he reached the age of 26, he worked with various contractors and builders in the vicinity of Port Jervis, filling all positions from helper to boss. He then decided to engage in the building contracting business on his own account, and early realizing that architecture and drafting were to play an important part in his future business career, he in April, 1901, took up a course in these branches with the International Correspondence Schools at Scranton, Pa. Diligent application evenings

C. A. WAGNER,
Winner of Third Prize in $3500 House Competition.

and rainy days brought him a diploma from that institution in November, 1902.

For 14 years he has been a diligent reader and student of *Carpentry and Building*, following with keen interest the many articles which have sought to excite the ambitious to greater efforts and keep his honorable trade in the van of the procession of improved methods in building construction. For four years or more he has been an occasional contributor to its columns.

### Specifications.

The specifications and detailed estimate of cost of the design awarded the third prize read as follows:

**Excavation.**—Excavate the cellar as per plans, and make all trenches for bed stones, piers and other places as may be required and shown by drawings. The materials taken from cellar to be left on ground, owner to use same for grading; remove all top loam to a proper place for owner to use for top dressing or grading.

**Foundations.**—Furnish, build and fit in place all materials to complete foundation work, as shown by drawings, in first-class manner. To be built of local field stone, with footings, well bedded, of large flat stone. All stone work to be laid up in best manner, in lime and sand mortar. To be well bonded and laid to a line. The outside and inside of walls must be trowel pointed; all walls to be left level on top ready for sills.

**Filling.**—After pointing is dry on outside, earth to be filled in and tamped down even with grade.

**Stone Sills.**—Furnish and set 3 x 8 inch blue stone sills to all cellar window frames, well bedded in mortar.

**Brick Work.**—Furnish and build foundation walls and center partitions in cellar from grade to sill line with good, hard burned standard size brick.

All exposed brick work of an even color and laid in red mortar, with ¼-inch neatly struck joints properly bonded; all outside brick work mortar to be composed of lime, cement and sand of a proper consistency.

**Chimneys.**—Build chimneys where shown on plans of same kind of brick as specified for walls, all to be carried up true and plumb. Build in fire place where shown, with arch to support tile hearth. All to be carried true and finished at top with blue stone cap, as shown. All above roof to be laid in red mortar, ¼-inch joints, neatly struck. All to be well jointed on inside their entire length. All above roof to be laid in cement mortar. Provide all necessary thimbles, clean outs, doors and covers. All work to be done in a thorough manner.

**Cellar Concreting.**—The whole of cellar bottom is to be cemented 2 inches thick, composed of one part Portland cement and three parts coarse sand, floated off true and even while fresh.

The mason is to clean up all his rubbish, and he is to assist the other workmen or mechanics employed in building wherever his help is necessary; also to do all cutting and jobbing required in his line without extra charge and leave all work perfect.

**Lathing.**—Furnish and lath all finished parts of building, where plastered, with best clear, sound and dry hemlock lath. To be well nailed with at least four nails to every whole lath, and joints broken every eighth lath. All lathing to continue down to floors. All corners to be solid, and no lath to run through.

Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.

*Competition in $3500 Houses.—Third-Prize Design.*

**Plastering.**—Furnish and plaster the walls and ceilings of the entire building where finished. To be plastered with two coats of best lime mortar. To be scratched and browned at one time, well worked into lath, and smoothed up in best manner. The last coat to be hard finish "Kings." Back plaster will have only one coat. The mortar is to be made with best long hair, lime and clean, sharp sand. To be thoroughly run, mixed and manipulated, and to be made at least 14 days before putting on. All work must be made to all grounds true, even, straight and left perfect.

As soon as possible after work is completed the entire building must be broom cleaned of all dirt and rubbish occasioned by this work.

### Carpenter Work and Materials.

Furnish, work out and fit in place all materials to be hereinafter described, or shown, in first-class manner. Do all cutting, fitting and plastering to make all parts complete and water tight. The framing work is to be done in usual manner for such a building.

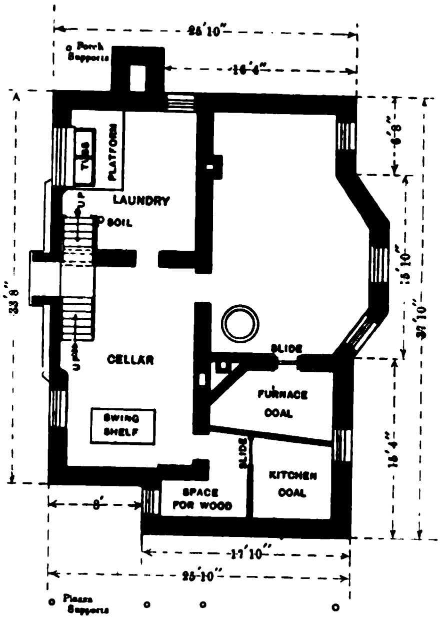
The timber to be hemlock and of good merchantable quality: Sills, 2 x 8 inches; first and second floor joist, 2 x 8 inches; third floor, or ceiling, joist, 2 x 6 inches; exterior and interior wall studs, 2 x 4 inches; also all plates; all set not more than 16 inches on centers; hips, valleys and ridges, 2 x 8 inches; rafters to be 2 x 6 inches, 24 inches on centers.

All joists bridged once in their entire length; if over 12-foot span, twice, with 1 x 2½ inch, cut to fit at both ends, and fastened with two 8-penny nails at each end. Corner post to be 4 x 6 inches; porch joist, 2 x 8 inches; soffit beam, 2 x 10 inches. All corners and angles to be made solid; cut in all blocks for wainscot, stairs and other places necessary to make the job complete.

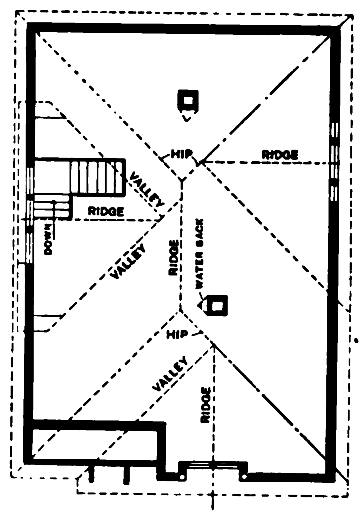
**Coal Bin.**—Partition for coal bin to have 2 x 4 inch studding, 20 inches on centers. All to be covered with ⅞-inch matched hemlock lumber and firmly nailed. Truss over all openings at right angles to joists. All door studs to be doubled to hight of headers, which will be doubled and rest on top of inside door studs.

**Swing Shelf.**—Swing shelf in cellar, No. 2 white pine, matched.

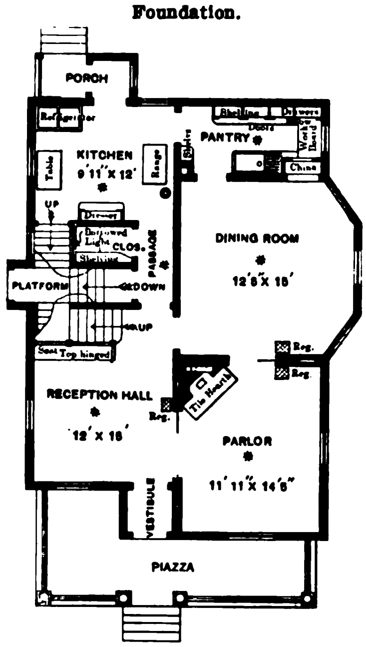
**Sheathing Side Walls.**—The walls, gables, tin roofs and attic floor to be done with No. 2 ⅞ x 8 inch surfaced hemlock, strained up tight, joints broken and surface nailed, with two 8-penny nails to each bearing.



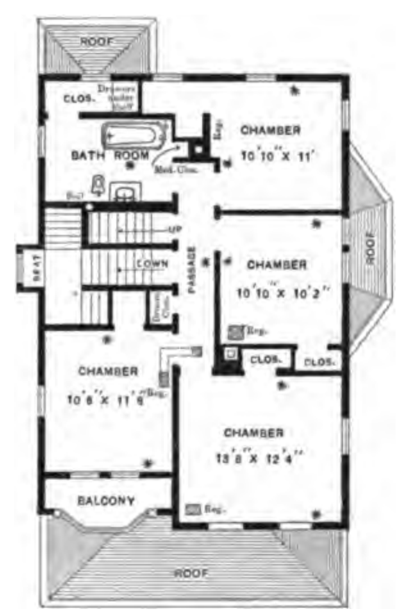

Foundation.




Attic, with Dotted Lines Showing Roof Plan.




First Floor.




Second Floor.

*Competition in* $3500 *Houses.—Third-Prize Design.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

**Main Roof.**—Cover all main roof surfaces with 1 x 6 inch hemlock boards, laid about 2½ inches apart, firmly nailed with two 8-penny nails to each bearing, well fitted out to all openings, hips, valleys, ridges and cornices. All valleys and hips to be laid straight.

**Bottom Floors.**—Cover all first floor with ⅞ x 8 inch No. 2 surfaced hemlock, put on diagonally, close together, and well nailed in place.

**Clapboarding.**—All the outside wall surface between water table and main cornice to be covered with second best quality 6-inch wide white pine clapboards, to be laid not more than 4½ inches exposed, nailed at least once at each studding and each end. All joints made even and true.

**Papering.**—Cover all side walls (except gables) and subfloors with a good quality of rosin sized building paper, well lapped, all angles, corners and openings to have a double lap. All to be well tacked on.

**Gable Shingles.**—Furnish and cover the gables with smooth white pine cut dimension shingles, put on not more than 5 inches exposed, with joints even and true on bottom.

**Roof Shingles.**—The roofs not tinned to be shingled with No. 1 16-inch white cedar shingles, laid ½ inch less than one-third their length to the weather. All to be double nailed and joints well broken. The hips to be covered with 5 x 7 inch tin lapped over outside of shingles. Valleys to be laid open, about in usual manner, over tin 20 inches wide, soldered in one continuous piece. All tin and flashing to be painted two coats, both sides. Put water back at chimneys, flash up tight against all chimneys and other places necessary. Put on all ridges on main roof 6-inch novelty siding saddle boards well nailed and painted.

**Metal and Iron Work.**—Lay all gutters in roof, to be formed of 28-inch tin; cover roof to dining room extension, balcony floor, porch, cellarway hood and piazza roofs with tin, all well soldered; and all other work necessary for a water proof job in all cases. All to be done with N. & G. Taylor Company's IX "Old Style" tin. Grade all gutters to outlets and connect with 3-inch corrugated galvanized iron conductors, to be carried down to within 1 foot of grade, with all necessary crooks and bends, and all firmly fastened to house. Place 2-inch gas pipe supports under porch and piazza, as shown, with adjustable collars.

**Cornices.**—All cornices as per details, of good grade No. 1 white pine cornice lumber; all worked as per drawings; put up straight and true, with all moldings neatly membered; corner boards, 1⅛ x 4½ inches; water table as per detail; all of No. 1 cornice lumber.

**Porch and Piazza.**—Build porch and piazza as shown, with turned columns, pedestals and molded rail, &c., per details. All porch floors to be laid with white lead, of 1⅛ x 2¼ inch white pine No. 1 matched porch flooring, well driven up.

Ceilings, including balcony, of No. 1 ½-inch North Carolina pine, matched and beaded; steps 1⅛-inch treads, ⅞-inch risers, No. 1 white pine, per plan and details.

Balcony balustrade, per detail, of white pine; all exterior finish and trim work lumber of No. 1 white pine and No. 1 cornice lumber.

**Window and Door Frames.**—All cellar frames of 2 x 6 inch No. 2 white pine lumber; all other window frames per detail, usual manner, with ⅞-inch jamb, 1⅛-inch face casing, ⅞-inch subsill and 2-inch sill. All will be fitted with pockets and 2-inch steel axle sash pulleys, except attic, and "borrowed light," which will be provided with spring bolts; all to be grooved for parting strip. All door frames ⅞-inch jamb, 1⅛ x 4½ inch face casing, stops nailed in, capped same as per detail of window frames, of such sizes as shown by plans.

**Sash and Glazing.**—All windows shown on plans to have 1⅜-inch C. C. white pine sash glazed with No. 1 American glass, double strength for large lights, single for small ones, all to be oiled, back puttied, well sprigged and puttied in best manner.

All to be hung on best braided cotton sash cord and balanced with cast iron weights. All attic, cellar and small sash or windows to be 1¼ inches thick. Attic and "borrowed light" to have spring sash bolts, cellar sash hung at top, and provided with hook and button; all well fitted in place.

**Outside Doors.**—The front door to be good No. 1 white pine 1¾ inches thick, flush molded inside and raised mold outside; to have raised panels outside, and clear bevel edge plate glass in top; inside vestibule same pattern as front, only double thick No. 1 glass in top.

Rear and cellar doors 1½ inches thick, flush molded, and No. 1 double thick glass in top; rear one glass 2 feet high, cellar one 16 inches high, to be properly hung and fitted in place, provided with three 4½ x 4½ inch butts to a door.

**Interior Trimming and Finish.**—Furnish, work out and fit in place all materials to complete the inside finish work, as follows, and as shown by plans and per details in first-class manner, thoroughly seasoned, well smoothed up and sandpapered and kiln dried before putting in place. To be put up by careful workmen, with all joints close and well smoothed over, and by no means bring any work of finish in building until walls are thoroughly dry and windows in place.

**Top Floors.**—The kitchen, pantry, rear vestibule and bathroom to have a finished or top floor, of best ⅞ x 2 inch white maple T. & G. flooring; vestibule, reception hall, dining room and parlor to have a top floor of best ⅞ x 2 inch R. oak or birch T. & G. flooring, blind nailed, laid close with running joints, and well smoothed up. These floors are to be laid after all finish is put on, papered on first story subfloor, and delivered clean and in good order to the painter. All remaining finished floors to be well seasoned ⅞ x 6 inch white pine flooring, No. 1, T. & G., well driven up and nailed to each joist; attic, ⅞ x 8 inch square edge hemlock, all well nailed and strained up tight.

**Finish.**—The finish in the several parts to be as follows: Vestibule, reception hall, parlor and dining room, red oak or black ash; the kitchen, pantry, rear vestibule and bathroom to be finished with North Carolina pine; all second floor of good quality white pine, to be painted; all doors shown in rooms on first floor finished in hard wood to be veneered with wood to correspond with wood of the rooms in which they show, and to be five panels, as per details.

All doors on second floor to be solid white pine, stock design, four panels, blind tenoned, wedged and glued in best manner.

**Door Frames and Jambs.**—To be ⅞ inch thick, beaded edges, all set perfectly level, plumb and true; to be properly blocked where hinges are to be, cased ⅛ inch back on all second-floor openings, and no beaded edges of jambs.

**Doors.**—All first floor as per details; second floor stock designs, as mentioned heretofore; slide doors hung on McCabe ball bearing roller, stop and strike complete. All inside doors hung on two butts; all doors to be properly fitted and hung in workmanlike manner, and of such sizes as are shown by drawings.

**Door and Window Trimmings.**—As per details; stops of windows nailed in at top, and four screws, brass or nickeled, round head, on each side; all outside, cellarway, attic and vestibule doors to have ⅝-inch threshold, properly put in place.

**Base and Moldings.**—As per details, closets to have just plain base, no mold; base to be ⅞ x 6 inches.

**Wainscot.**—The kitchen and pantry 3 feet high, including base and cap, as per detail; bathroom and back of sink 4 feet high, with No. 1 ½ x 3 inch beaded T. & G. North Carolina pine, put on vertically, blind nailed, all corners made solid by nailing corners before putting in place.

**Closets.**—The closets to have 6-inch plain base and 4-inch plain casings; clothes closets to have one row of 3-inch beaded strip with wire wardrobe hooks about 1 foot apart, to have one shelf; closet in kitchen to have counter shelf, one shelf below this, and five shelves on left side, as shown by plans; closet in or off of bathroom, to be provided with three shelves above, drawers below, as per plans. Broom closet provide with one shelf and one hanging strip. Medicine closet to have four shelves; all to be No. 2 shelving, same to be painted.

**Pantry.**—Fit up pantry, as shown, with all drawers and tilting bins as per plan and details, brought onto job made up. Build counter shelf and work shelf 2 feet 6 inches high under counter shelf. Build cupboard under, with one shelf, drawers and bins and inclosed with panel doors. Above counter shelf build cupboard. Extend doors to hight or line of main doors, finish at this point with cornice, as shown. Shelving spaced about 12 inches, and inclosed with panel doors.

**China Closet.**—As per plan and detail, to have a panel door, opening into pantry Provided with two shelves above and two shelves below; drawers as shown by detail.

**Picture Mold.**—Put up in all main rooms and chambers a 1½-inch picture mold 18 inches down from ceiling, all of same materials as room finish.

**Mantels and Shelves.**—Mantel in parlor to cost $35; No. 655 in E. A. Jackson & Brother's, New York, catalogue, provided with grate, &c.; wood work to match finish of room. Kitchen and bathroom to have a shelf 3 feet long 8 inches wide and placed as directed.

**Bathroom.**—To be fitted in usual manner for open work. Plumber to furnish all materials, but carpenter will put in place all wood work for a complete job.

**Stairs.**—Main stairs as per plan and details; rear, cellar and attic as per plan; main stairs same wood as reception hall up to the second flight, where the rear flight connects; from there on to be good pine, to be painted.

Attic stairs pine, to be painted; all to be box stairs, properly housed and keyed, glued and firmly secured in place.

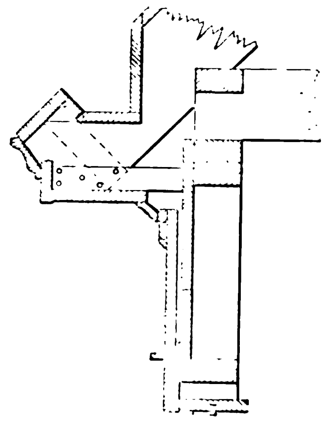
Cellar stairs, 2-inch plank string, 1⅛-inch North Carolina pine tread, no risers, inclose flight to laundry with ⅞-inch matched pine, per plan. All to be left properly finished and protected from other workmen marring or injuring the same.

**Hardware.**—Front door to have Sargent's 5-inch easy spring cylinder locks, with 3 x 10 inch bronze escutcheons and 2¼-inch bronze knobs; keys to pass vestibule door.

Vestibule door to have same style escutcheons and knobs, only smaller escutcheons. These doors and all outside ones to be hung with three 4½ x 4½ inch steel bronze plated butts to each door.

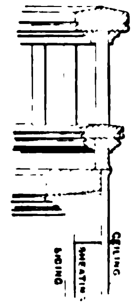
Sliding doors to be hung with McCabe ball bearing roller stops, strikes, &c., complete, to be trimmed with bronze faced locks and cup escutcheons, same style as front and vestibule doors.

All other doors in house to have (except cellar, which will have heavy thumb latches and plain 8-inch T-hinges) same make and style of locks, Sargent's 3½-inch easy spring bronze faced locks. Same style escutcheons and

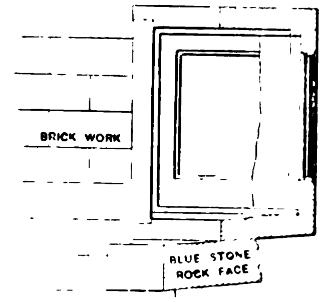


Details of Main Cornice.—Scale, ¾ Inch to the Foot.

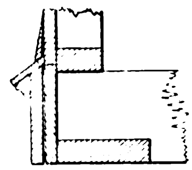
Piazza Cornice.—Scale, ¾ Inch to the Foot.



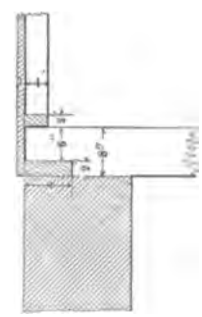
Section through Front Balcony. — Scale, ¾ Inch to the Foot.



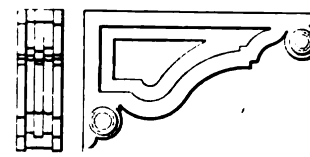

Detail Cellar Window Frame.—Scale, ¾ Inch to the Foot.



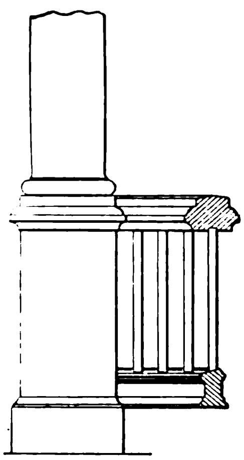
Water Table.—Scale, ¾ Inch to the Foot.



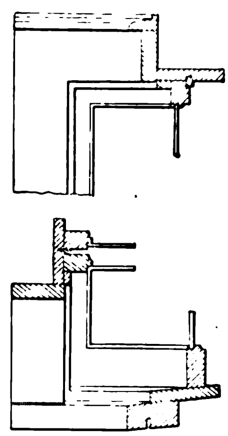
Detail of Framing at Sill.—Scale, ⅜ Inch to the Foot.



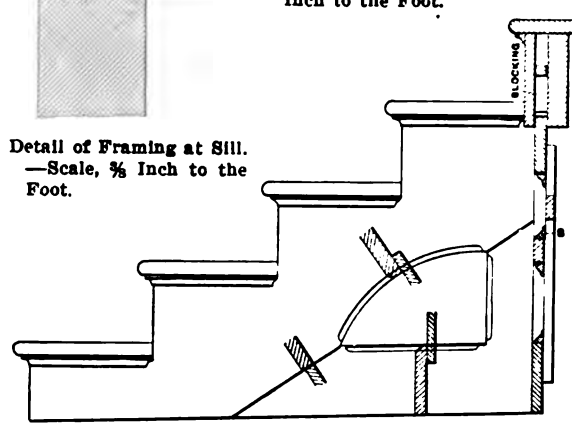
End and Side Views of Brackets Over Front Balcony.—Scale, ¾ Inch to the Foot.



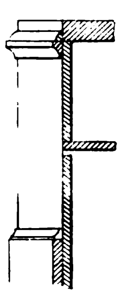
Detail Front Piazza Column and Railing.—Scale, ½ Inch to the Foot.



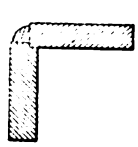
Details of Window Frames.—Scale, ¾ Inch to the Foot.



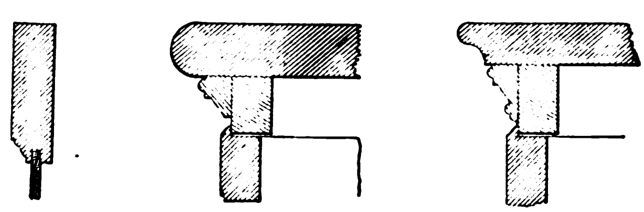

Details of Steps.—Scale, ¾ Inch to the Foot.



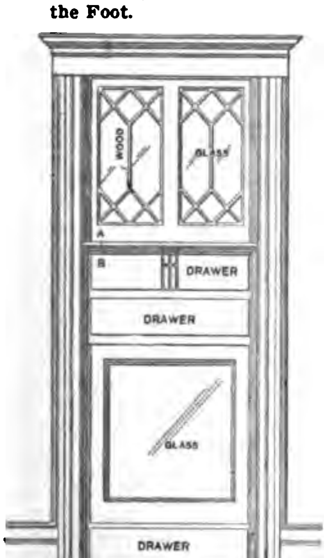
Section of Pedestal.—Scale, ½ Inch to the Foot.



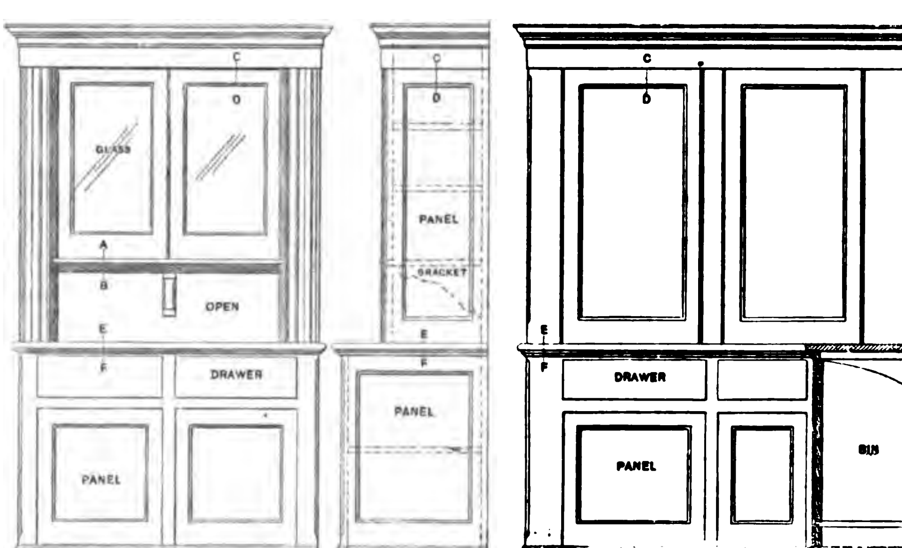
Corner Board.—Scale, ½ Inch to the Foot.



Sections of Kitchen Dresser on Lines C D, E F and A B, Respectively.—Scale, 3 Inches to the Foot.




Elevation of China Closet.—Scale, ⅜ Inch to the Foot.




Front and End Elevations of Kitchen Dresser, with Partial Elevation and Section of Pantry Dresser.—Scale, ⅜ Inch to the Foot.

*Competition in $3500 Houses.—Third-Prize Design.—Miscellaneous Constructive Details.*

knobs as vestibule, to be hung with two 4 x 4 inch butts to a door, steel, bronze plated. All second-floor doors to have same locks, but bronze plated escutcheons 2 x 8 inch and mineral knobs. Double swing door from dining room to pantry to be hung with Sargent's double acting bronze plated hinges. Push plates 3 x 10 inches to correspond with other hardware.

All cupboard doors, &c., to be hung with two 2-inch steel bronze plated butts, and trimmed with bronze plated cupboard trim; all windows on first floor to have bronze sash locks, and bronze cup sash lifts; all second floor bronze plated. Furnish all butts, hooks, buttons, base knobs, spring bolts, &c., that may be required to complete the job.

**Electric Bell.**—Furnish and set one electric bell complete, with push button to match front door hardware. All to be carefully and neatly fitted in their places, and not to be damaged by painter in his work.

### Gas Piping and Work.

Provide and fit up in a thorough, workmanlike manner all the gas pipe necessary to carry gas to the several outlets marked on drawings, all pipes to be sizes and quality to conform to the gas company's rules and regulations.

The main pipe is to continue through cellar and connect to street main. All pipes and outlets to be properly graded and fastened in place with plumbers' iron clips and screws.

All pipes to be tested before any other work is put in place, and all outlets to have caps.

### Heating.

Furnish and set on foundation prepared by mason contractor one No. 544 "Boynton" portable "Crusader" furnace, and connect same with such sizes of pipe as shown by drawings, of IX tin, all to be covered with asbestos. All pipes to be furnished with suitable dampers so heat may be shut off from any one pipe at will.

Registers to be japanned, all properly connected with risers, &c. All risers covered with asbestos. Connect furnace with chimney with 8-inch No. 24 galvanized iron pipe. Furnish and set 9 x 12 inch cast iron door and frame in bottom at each chimney for cleanout. All above work to be done in a workmanlike manner and guaranteed to heat the house in zero weather to 72 degrees. Furnace dampers to be so arranged as to be operated from first floor.

### Painting and Finishing.

Furnish and put on the materials to complete the painting work as follows, in first-class manner:

**Outside.**—All exterior work, except otherwise specified, to be painted with two coats of pure lead and linseed oil and turpentine, all colors to suit and please owner.

**Ceilings of Porches, &c.**—Finish all porch, piazza and balcony ceilings with one coat best liquid filler; after dry and hard, sandpaper lightly and finish with two coats best spar varnish.

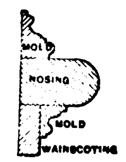
**Tin Work.**—All metal work to be painted two coats best mineral paint.

**Interior.**—All hard wood to have one coat of good paste filler well worked in and cleaned off, after thoroughly dry and hard putty all nail holes, &c., with putty to match wood, and finish with two coats best No. 1. Murphy & Co. transparent wood finish, left with gloss.

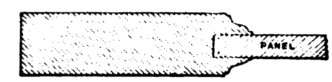
Entire second floor, except bathroom, to be finished with two coats lead and oil, flat finish, colors to please owner.

All hard wood floors in parlor, dining room, reception hall and vestibule to be finished with one coat Berry Bros.' wood filler, rubbed off clean and finished with two coats Berry Bros.' floor finish. Kitchen, pantry, bathroom, vestibule to have one coat linseed oil, put on hot, and after dry thoroughly wipe up all that does not penetrate the wood.

Section of Casing.

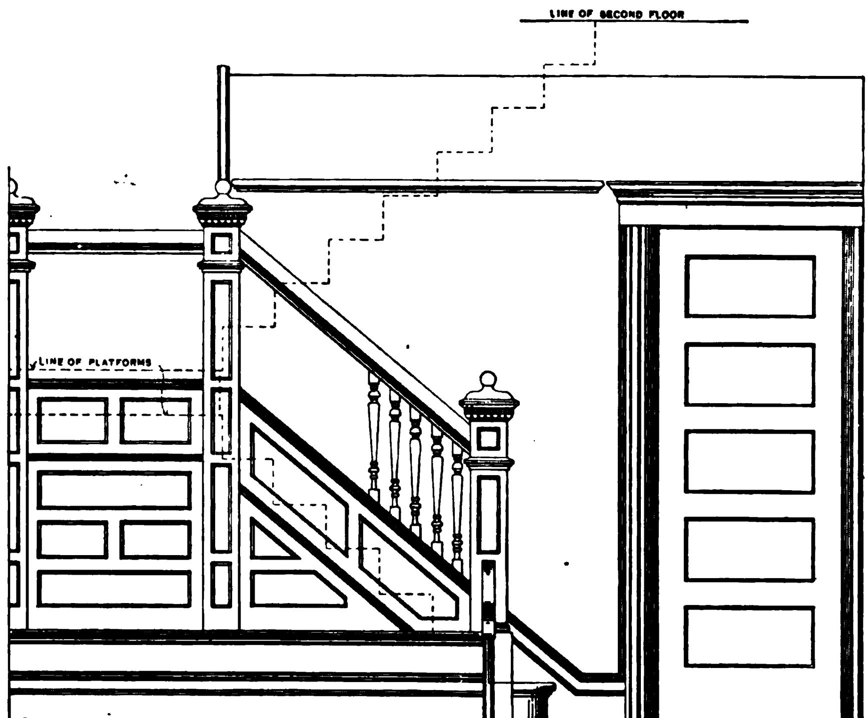



Wainscot Cap.

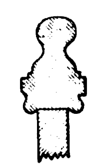



Section of Door Stile and Panel.

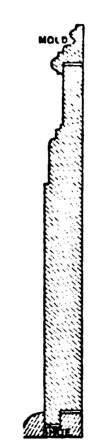
Scale, 3 Inches to the Foot.



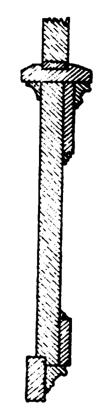

Elevation of Stairs as Viewed from the Reception Hall.—Scale, ¾ Inch to the Foot.



Section of Hand Rail.—Scale, 3 Inches to the Foot.




Base.—Scale, 3 Inches to the Foot.



Section of Stair Stringer.—Scale, 1½ Inches to the Foot.

*Competition in $3500 Houses.—Third-Prize Design.—Miscellaneous Constructive Details.*

All the above work to be done in a first-class workmanlike manner in all cases.

### Plumbing.

The work is to be done and finished in every part and detail so as not to delay any other workman, in a good, substantial and workmanlike manner.

To be a sewer pipe connected to street sewer, and continue to cellar of best tile 4-inch soil pipe, with joints made with Portland cement.

From this run a 4-inch iron soil pipe with hand hole and fresh air inlet just inside of wall, continue soil pipe through cellar bottom to line of stack, to bathroom fixtures, then up through building and out through roof at least 18 inches, all flashed tight with 3-pound sheet lead.

Waste from sink and laundry tubs to be 2-inch iron pipe. Leave out the proper Y's and T's and elbows to connect the several branches onto. All traps and fixtures to have proper back air pipes connected to main soil pipe above the highest fixtures connected. The sink to have a McClellan antisiphon trap vent, all joints to be made in the proper manner with brass ferrules, oakum and molten lead, well driven in and properly calked.

**City Water.**—Furnish and start from water main in street; furnish all needed connections with cut off at curb.

Water pipes in cellar to be ¾-inch galvanized iron; all others to be lead with wiped joints, brass ferrules, unless otherwise mentioned.

**Tubs.**—Furnish and place in laundry where indicated on plan one set of two soapstone laundry tubs connected with city water by ½-inch galvanized iron pipe and ½-inch N. P. Fuller's patent bibs for hot and cold water, and connected to drain with 1½-inch lead pipe and 1½-inch lead trap.

**Sink.**—Furnish and place in pantry where indicated on plan one 18 x 30 inch cast iron sink, and connect same with hot and cold water through ½-inch Fuller's patent bibs and furnish waste with 1½-inch lead pipe, 1½-inch lead trap connected to soil pipe.

**Boiler.**—Place 40-gallon extra heavy galvanized boiler, set on ornamental stand, supplied with hot and cold water, with ½-inch compression stops, connected to range with ½-inch brass pipes. To have all necessary couplings, sediment cock, stop cock, &c., complete and done in a workmanlike manner in all details.

**Bathroom.**—Furnish and place in bathroom a low down siphon closet with seat and copper lined tank complete. Connect same to soil pipe with lead bend and brass ferrule, properly trapped and vented, all exposed parts to be nickel plated.

**Bowl.**—To have marble slab 1⅛ inches thick, dished top, O. G. edges and round corners, resting on N. P. brackets, with a 14 x 17 inch white earthen ware bowl, properly clamped to same.

Back to be 8 inches high, ⅞ inch thick, of marble, fastened to wainscot with round head screws. To have china index compression basin cocks, chain, stay and plug complete, all nickel plated. Connect with hot and cold water through N. P. fixtures, ⅝-inch water pipes and 1¼-inch trap and waste.

**Bathtub.**—Provide and fit up one Standard make 2½-inch roll rim iron bathtub, porcelain enameled inside and on roll. To have china index compression double bath cocks, overflows, waste, chain, rubber stopper and soap cup. All exposed fittings, pipes and fixtures not otherwise mentioned to be nickel plated.

All above fixtures to be first class; all pipes well supported and left in perfect condition, and according to city or town rules and regulations.

**Refrigerator.**—Waste from refrigerator to be 1¼-inch lead pipe, constructed for easy removing in case of clogging. To have brass couplings underneath floor, and at waste of laundry tub, so as to disconnect at these points at any time when necessary, provided with trap and fresh air inlet, but not fastened to waste proper from refrigerator, only to come through floor and copper funnel at this point.

## Detailed Estimate of Cost.

The cost in detail of the design awarded the third prize in this competition is as follows:

EXCAVATIONS AND MASON WORK.

| | |
|---|---|
| 168 cubic yards excavating at 20 cents | $33.60 |
| 81 perch stone work (16½ feet) laid and pointed, at $1.75 | 141.75 |
| 5,978 brick in foundations and cross wall, laid, at $13 | 77.71 |
| 3,148 brick in chimneys and fireplace, laid, at $14 | 44.00 |
| 68 square yards concreting, at 40 cents | 27.20 |
| 725 square yards lath and plastering, put on, at 27 cents | 195.75 |
| Flashings, caps, thimbles, iron doors, &c | 15.35 |
| Total mason work | $535.36 |

TINNING, CONDUCTORS, ETC.

| | |
|---|---|
| 397 square feet tin roof, put on, at 7 cents | $27.79 |
| 88 linear feet 28-inch gutter tin, laid, at 22½ cents | 19.80 |
| 81 linear feet 20-inch valley tin, laid, at 11 cents | 8.91 |
| 175 feet flashing, 5 x 7 inch, for hips, &c | 3.15 |
| Conductors, bends and elbows, put up | 8.25 |
| Pipe supports and sleeves | 8.14 |
| Total metal work | $76.04 |

FRAMING MATERIALS, ROUGH LUMBER.

| | |
|---|---|
| 3,972 square feet 2 x 4 inch framing, at $16 | $63.65 |
| 1,922 square feet 2 x 6 inch framing, at $16 | 30.75 |
| 3,418 square feet 2 x 8 inch framing, at $16 | 54.69 |
| 162 square feet 2 x 10 inch framing, at $16 | 2.59 |
| 800 linear feet 1 x 2½ inch | 2.36 |
| 1,328 square feet 1 x 6 inch roof boards, &c., at $16 | 21.25 |
| 712 square feet surfaced boards No. 2, for gables, at $17 | 12.10 |
| 4,683 square feet surfaced boards No. 2, sides, attic and subfloor, at $17 | 79.61 |
| 389 square feet surfaced boards No. 2, porches, bay and hood roof | 6.61 |
| Partition for coal bins, complete | 2.83 |
| 14,428 white cedar roof shingles No. 1, at $3.75 | 54.10 |
| 96 square feet ridge cap, at $25 | 2.40 |
| 1,968 white pine cut dimension shingles No. 1, at $4.50 | 8.86 |
| 920 square feet No. 1 white pine floor, T. & G., at $28 | 25.76 |
| 2,163 square feet white pine clapboard, at $26 | 56.24 |
| 10 rolls, 500 square feet, red rosin sized paper, at 45 cents | 4.50 |
| 380 square feet No. 1 white maple flooring, ½-inch, at $45 | 17.10 |
| 648 square feet No. 1 red birch flooring, ½-inch, at $45 | 29.16 |
| Grounds, &c | 2.14 |
| Shelves, hanging strips, base, &c., for closets | 2.97 |
| Incidentals | 16.90 |
| Total frame | $496.57 |

OUTSIDE FINISH LUMBER, ETC.

| | |
|---|---|
| 4 cellar plank door frames and batten doors, at $1.30 | $5.20 |
| 300 square feet No. 1 white pine, 5¼-inch, porch flooring, at $55 | 17.00 |
| 2 sets outside steps, including soffit | 6.87 |
| 149 linear feet corner board, No. 1 white pine casing, at 4 cents | 5.96 |
| 105 square feet white pine No. 1 cornice water table, at 4 cents | 4.20 |
| 225 square feet ½-inch No. 1 N. C. ceiling, balcony and porches, at $22 | 4.95 |
| 272 square feet white pine No. 1 cornice, for eave cornice, at $40 | 10.88 |
| 144 square feet white pine No. 1 cornice, gable, bay and cellarway, at $40 | 5.76 |
| 140 square feet white pine No. 1 cornice, piazza, at $40 | 5.60 |
| 55 square feet white pine No. 1 cornice, rear porch, at $40 | 2.20 |
| Balcony, overhead and bottom finish | 3.44 |
| Platform for laundry tubs | 1.49 |
| Swing shelf | .84 |
| Cellar stairs, incloser and finish | 6.26 |
| Attic stairs and rail | 6.90 |
| Cold air duct | 5.37 |
| Incidentals, not above | 3.18 |
| Total finish lumber | $96.10 |

CARPENTER WORK; LABOR.

| | |
|---|---|
| 10,174 square feet framing, at $7.50 | $76.31 |
| 7,114 square feet sheathing, at $7 | 49.80 |
| 14,428 roof shingles, including cap, at $1.50 | 21.64 |
| 1,968 dimension shingles, at $4.25 | 9.85 |
| 2,163 clapboard, at $10.80 | 23.36 |
| 920 square feet white pine flooring, at $4.25 | 3.91 |
| Coal bin | 3.60 |
| Grounds in all | 3.40 |
| Porch, piazza and balcony ceiling | 4.20 |
| Porch and piazza floors | 16.75 |
| Porch and piazza steps, soffit, &c | 9.80 |
| 136 linear feet main cornice, at 18 cents | 24.48 |
| 123 linear feet gable, dining, cellarway cornice, at 16 cents | 19.68 |
| 65 linear feet porch and piazza cornice, at 16½ cents | 10.73 |
| Cellar stairs, &c | 11.40 |
| Attic stairs, &c | 9.15 |
| Hard wood floors | 53.40 |
| Cellar door frames and batten doors | 4.45 |
| Outside door frames, put together and set | 1.70 |
| Window frames, put together and set | 18.40 |
| Water table | 5.40 |
| Corner boards | 6.25 |
| Balcony finish, not in mill work | 7.85 |
| Rear porch and piazza, not in mill work | 2.40 |
| Cold air duct | 6.15 |
| Platform for laundry tub and swing shelf | 2.65 |
| Wall shelves, put up | .90 |
| Setting mantel | 1.15 |
| Cutting and fitting for heating and plumbing | 6.10 |
| To one-third cost mill work, less freight, for work to put in place; $820.18 ÷ 3 | 273.39 |
| To incidentals not above | 28.33 |
| Total labor | $711.13 |

MISCELLANEOUS.

| | |
|---|---|
| Nails and rough hardware | $30.60 |
| Painting | 200.00 |
| Plumbing | 250.00 |
| Gas piping, including connection to street | 28.48 |
| Heating | 150.75 |
| Finished hardware | 52.85 |
| Mantel | 35.00 |
| Refrigerator | 20.00 |
| Total | $778.68 |

RECAPITULATION.

| | |
|---|---|
| Mason work | $535.36 |
| Metal work | 76.04 |
| Framing materials | 496.57 |
| Outside finish materials | 96.10 |
| Carpenter work | 711.13 |
| Mill work | 807.91 |
| Miscellaneous | 778.68 |
| Total cost | $3,496.79 |

The builder's certificate was signed by William F. Wilkin, 6 Buckley street; the contract for the painting and finishing by W. E. Millspaugh and the plumbing, heating, gas fitting, &c., by Charles D. Patterson, corner Pike and Hammond streets, all of Port Jervis, N. Y. The estimate on the mill work was furnished by the Chicago Mill Work Supply Company, 239 to 245 West Twenty-second street, Chicago, Ill.

IT is stated that Secretary Taft has approved the plans submitted by General Mills, superintendent of the Military Academy, for the engineering work in the big project of rebuilding the U. S. Military Academy at West Point, at an estimated cost of $1,500,000. The first work to be done, represented by the plans which have received departmental approval, includes the officers' quarters, to replace those torn down; the cadet barracks, the laborers' barracks and stables, gun shed, post headquarters, bachelor officers' quarters and chapel. Secretary Taft on April 4 authorized the call for bids, the work to be done under contract. General Mills will remain on duty at West Point as superintendent of the Military Academy for at least another year, in view of the important project which is now to begin.

# WAGES IN BUILDING TRADES IN NEW YORK STATE.

THE rates of wages prevailing in the various branches of any leading industry are always interesting, not alone to those most vitally concerned but to the general public as well. This is particularly true of the building business, where conditions are constantly undergoing changes which affect a large body of workingmen and employers throughout the country. As showing the wages paid in the building trades in the leading cities of New York State and some of the cities of Ohio and Pennsylvania we present herewith a table in which the wage scale is compiled on an hourly basis and is revised to May 1 of the current year. It was prepared for the New York State Association of Builders by its enterprising secretary, James M. Carter, and in comparing the figures presented in the table with those prevailing in the corresponding branches of trade a year ago some notable changes will be observed, all however in the nature of an advance.

| | Bricklayers. | Carpenters. | Cement finishers. | Electricians. | Hoisting engineers. | Laborers. | Lathers. | Painters. | Plasterers. | Plumbers. | Stone masons. | Stone cutters. | Steam fitters. | Structural iron workers. | Sheet metal workers. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Albany, N. Y. | 50 | 31-64¼ | 50 | 37½ | $3.00 d. | 25 | 45 | 34⅜ | 50 | 43¾ | 50 | 45 | 43¾ | 45 | 50 |
| Bath, N. Y. | 30-35 | 25-30 | .. | .. | .... | 15 | $1.50 M. | 25 | 35 | .. | 35 | .. | .. | .. | .. |
| Binghamton, N. Y. | 50 | 25 | 40 | 25 | $12 wk. | 20 | 1.50 M. | 25 | 45 | 37½ | 43¾ | 43¾ | 26 7-9 | .. | 26 7-9 |
| Buffalo, N. Y. | 50 | 37½ | 45 | 37½ | $21 wk. | 17-22 | 2.00 M. | 37½ | 50 | 43½ | 45 | 50 | 43½ | 50 | 35 |
| Ithaca, N. Y. | 45 | 31¼ | .. | .. | .... | .. | .... | 28 | 45 | 37⅝ | 45 | 45 | 37½ | .. | 28⅛ |
| Jamestown, N. Y. | 50 | 30 5-9 | .. | .. | $2.25 d. | 20 | .... | 27 7-9 | 40 | 36 | 45 | 45 | 36 | .. | 27 7-9 |
| New York, N. Y. | 70 | 56¼ | 60 | 50 | 62½ | 33 | 50 | 50 | 68¾ | 56¼ | 56¼ | 62½ | 56¼ | 56¼ | 50 |
| Niagara Falls, N. Y. | 50 | 35 | 50 | 37½ | 30 | 20 | 3c. yd. | 30 | 45 | 37½ | 50 | 50 | 37½ | 50 | 35 |
| Olean, N. Y. | 55 | 27½ | 40 | .. | 27½ | 22 | 3c. yd. | 25 | 40 | 30½ | 39 | 40 | 30½ | .. | 30½ |
| Rochester, N. Y. | 53 | 35 | 31¼ | 37½ | $2.50 d. | 21-23 | $2.00 M. | 30 | 50 | 40 | 50 | 43 | 40 | 40 | .. |
| Syracuse, N. Y. | 50 | 35 | 35 | 35 | 35 | 20 | $2.00 M. | 37½ | 50 | 45 | 50 | 50 | 41½ | 50 | .. |
| Troy, N. Y. | 50 | 35 | 30 | 30 5-9 | $2.50 d. | 15-25 | 45 | 32 | 50 | 38 | 50 | 40 | 38 | 50 | 30-40 |
| Utica, N. Y. | 50 | 34⅜ | 50 | 25 | 31¼ | 20 | $2.00 M. | 34⅜ | 50 | 34⅜ | 50 | 50 | 34⅜ | .. | 31¼ |
| Watertown, N. Y. | 45 | 27½ | 45 | 45 | 25 | 22½ | 1.50 M. | 28 | 45 | 40 | 45 | 45 | 30 | 25 | 40 |
| Cleveland, Ohio | 50 | 35 | 36 | 40 | 35 | 25 | .... | 37½ | 50 | 50 | 45 | 50 | 44 | 47½ | 37½ |
| Columbus, Ohio | 55 | 35 | 35 | 35 | 30 | 28½-31¼ | 45 | 30 | 50 | 40 | 50 | 50 | 35 | 40 | 35 |
| Erie, Pa. | 50 | 30 | 33⅓ | 30 | .. | 20-25 | 3c. yd. | 25 | 33⅓ | 37½ | 45 | 40 | 37½ | 45 | 25-30 |
| Pittsburgh, Pa. | 60 | 43¾ | .. | 50 | 37½ | 35 | 40 | 42½ | 52½ | 50 | 50 | 50 | 50 | 50 | 42½ |
| Toledo, Ohio | 55 | 30-35 | 20-27½ | 50 | 35 | 25-28 | 45 | 31¼ | 50 | 43¾ | 50-55 | 50 | 37½ | 40 | 30-45 |

# HARMONY IN THE NEW YORK BUILDING TRADES.

AS a result of a meeting held in the rooms of the Building Trades Club, Townsend Building, New York City, on April 22, a joint arbitration agreement was unanimously adopted by representatives of the Building Trades Employers' Association and of the various unions working under the old arbitration agreement which it is hoped will mean permanent peace in the trade and prevent strikes and lockouts for a long time to come. Out of 32 trade associations of employers 31 were represented at the conference by three delegates each, as were also 32 unions.

Under the new agreement, which went into effect April 24, the General Arbitration Board will consist of two representatives from each employers' association and two from each recognized union. The board will determine the manner of adjustment of any dispute, will adopt a code of procedure and will determine the manner in which the expenses of special arbitration boards shall be paid. The secretary of the General Arbitration Board will be paid by both the employer and employee, and the headquarters of the secretary will be at a neutral point convenient to both. In place of an emergency committee of employers the new agreement provides for an Executive Committee of the General Arbitration Board, which will have all the powers of the Emergency Committee.

The agreement has many new sections, and those relating to the General Arbitration Board are as follows:

There shall be a general arbitration board, consisting of two representatives from each employers' association affiliated with the Building Trades Employers' Association and two representatives from each union recognized as a party to this plan.

The general arbitration board shall exercise the powers delegated to it by the several provisions of this plan; they shall determine the manner of adjustment of any dispute which is not specifically covered by this plan; shall adopt and amend a code of procedure, and shall determine the manner in which and by whom the expenses of special arbitration boards shall be paid.

The following provision in the new arbitration agreement covers the question of strikes and lockouts:

The unions as a whole, or as a single union, shall not order any strike against a member of the Building Trades Employers' Association, nor shall any number of union men leave the works of a member of the Building Trades Employers' Association, nor shall any member of the Building Trades Employers' Association lock out his employees.

There was a good deal of vagueness in the old arbitration agreement regarding the employment of union men exclusively. This point is cleared up by the following provision in the new agreement:

The employers parties to this arbitration plan agree to employ members of the trade unions only, directly or indirectly, through subcontractors or otherwise, on the work and within the territory described in Section 1 of this plan.

The final steps were taken on April 28, when at a meeting of the Board of Governors of the Building Trades Employers' Association the lockout of the Brotherhood of Carpenters and the Amalgamated Carpenters' Society was officially declared off, thus ending a fight with the two unions which had lasted nearly nine months and resulted in a heavy loss of wages.

A trade agreement was made between the Master Carpenters' Association and the unions by which the carpenters will get $4.50 for a day of eight hours and double pay for overtime. The agreement runs to December 31, and this brings the carpenters in line with the 31 other trades now working under the arbitration agreement, so that in the future the yearly trade agreements will begin on January 1 instead of May 1.

Many thousands of mechanics are now working under the arbitration agreement, and for the first time since the arbitration plan was issued, in 1903, both sides appear to be satisfied. The situation is unique in the building industry, as the present arbitration plan is the joint work of the employers and the unions instead of being issued as an ultimatum by the employers.

Lewis Harding, chairman of the Press Committee of the Building Trades Employers' Association, expressed himself as follows regarding the outlook:

There is more prospect of a prosperous and peaceful building season in New York City this year than New York has seen in ten years. There is not a single mechanic now working under the arbitration agreement who is not satisfied with it. It guarantees peace to both sides and was prepared with the utmost care, the framers being equally divided between union men and employers and the agreement being adopted by a convention composed of equal numbers of employers and employees. The unions are now satisfied that the arbitration agreement is the best guarantee of peace.

P. K. Stephenson, secretary of the Building Trades Employers' Association, is said to have figured out that about $200,000,000 would be spent in building in New York this season. This was not a snap estimate, he said, but was based on an investigation he had been making into the number of plans for buildings already filed and those which architects and contractors were preparing to file.

# DOORS AND DOORWAYS.

BY FRED. T. HODGSON.

GENERALLY the form and style of a doorway is determined by the architectural style of the building in which it is placed. In classical buildings it is rectangular, both Greeks and Romans following the Egyptians. Occasionally the opening toward the top was diminished, and in later times the Romans very frequently threw over it the circular arch now so popular as the "Romanesque arch." English speaking people call the earliest architecture Saxon, but on the continent of Europe the same style is called Romanic. In the Norman style there gradually grew up more ornamentation, though a few quaint Norman doors exist which have no ornament except projecting nails and a simple iron scroll, projecting from the hinges and stretching over the door. Early English doorways generally terminated in pointed arches and were deeply recessed.

Names that are familiar but not always understood are: "Batten" doors, consisting of two or more boards placed longitudinally side by side, and held together by two or more transverse rails; "panel" doors, which panels, when wider than they are high, are called "lying" panels, and when longer than they are wide are called "standing" panels; "jib" doors, those that are concealed as much as possible when shut, and "wicket" doors, small ones closing openings in larger doors.

Among the items of artistic interest concerning doors is the fact that in at least one picture a door is made one of the central points and elevated to a religious element in pictorial importance by the dignity of its treatment. This is the fine, yet simple, representation of Christ standing at the door knocking. He has a lantern in His hand and His attitude befits the passage in Revelations, "Behold, I stand at the door and knock." The picture was painted about 40 years ago by Holman Hunt in the pre-Raphaelite style, and by many is considered superior to his "The Shadow of the Cross," in which Christ stands in His carpenter shop surrounded by His tools. He has raised His arms to rest Himself, and these, with His body, form a distinct shadow of the cross on the wall behind Him. Albert Durer, another famous artist, used a door in his coat of arms, "Durer" meaning "a door."

A modern American writer in speaking of doors says: "While looking for good examples for doors and doorways the following conversation was overheard:

"'Wilt thou build me a house?'

"'Aye, that I will; but in what style?'

"'Let it be dignified that it may stand in good repute among its neighbors, but not severe that it may dishearten the neighbors of its master from seeking him. Let it not set with its face upon the road, but rather let it retire a bit that he who seeketh it may know the pleasure of something not seen all at one glance of the eye. Let it support a porch of appropriate dimensions; not so wide that it lesseneth the door too much, not so narrow that it giveth not shelter to a group of friends who may seek it from the storm, not so low roofed that it shutteth out the light of the sun, nor so high that the eye tireth when it seeketh the roof, not so far from the ground that one loseth his eagerness for a meeting before he reacheth the door, nor so near the ground that the visitor feeleth contemptuous, as if he would say, 'A house that is so near unto the earth containeth a groveling master.' Let there be a tower that towereth not like a steeple, but that suggesteth a something different from the square rooms of the house, as of a pleasure to be sought for reception. And, above all, let there be windows, and windows, and again windows, that each one inside that seeketh the sun can find him, and that each one outside that seeketh the cheer of the lamps at night can find it.'

"If this picture pleases, then build in the modern classic Colonial style, which is the most graceful production which genius ever evolved. It is simple, yet grand; suggestive of solidity and permanence, and offers unlimited facilities for light. Be it Doric, Ionic or Corinthian, then the entrance door and doorway may be designed on lines similar to those made use of by the designers and workmen of the first days of the nineteenth century."

The door and doorway shown in Fig. 1 is a fine example of early work. This was measured and drawn from an actual example in a house situated on North Moore street, New York, but which was taken down some 10 or 12 years ago. The door was 2¼ inches thick, well framed together, the muntins running well into the rails,

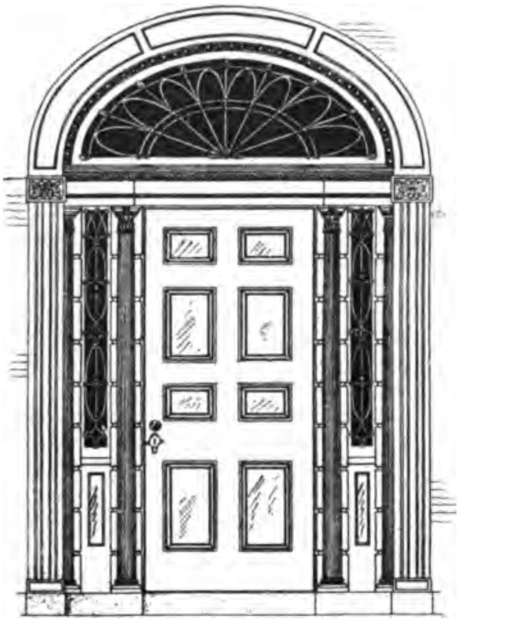


Fig. 1.—A Fine Example of Door and Doorway in Early New York.

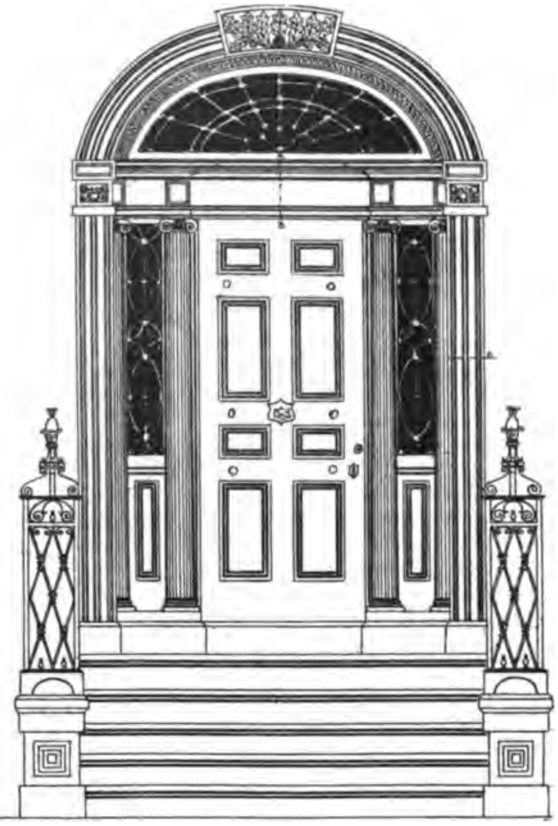


Fig. 2.—Door and Doorway in West Houston Street, New York City.

*Doors and Doorways.*

to which they were glued and pinned. The house, so far as could be ascertained, was built about 1818 or 1820, and every door and sash throughout the whole building was as nearly perfect as when first made. The door shown in the illustration, which had stood the wear and tear of nearly three-quarters of a century, was little the worse, the hinges only showing signs of age and constant usage. The material used throughout the whole work was white pine. The drawing from which the engraving is produced was made some time in 1888.

Often the entire effect of an otherwise pleasing structure is hopelessly marred by the treatment accorded the doorway, and more than one façade is reduced to the commonplace by the utter neglect of the architectural decoration to which the door, if any part of the building, is most legitimately entitled. To the eye the doorway and the roof line are the critical points in a building, and the good treatment of either will do much toward remedying the defects of a poor design. It will hardly do, however, to blame the architects for the stagnation of public taste for half a century in regard to architectually meritorious doorways. In this country, particularly among a class of owners that, above all others, might have done so much to bring about the much needed revolution of an architectural sense, art has been subjected to rules and restrictions that might aptly apply to card etiquette, but the effect of which upon architecture can only be deplored. When a doorway essentially ugly has come to be considered the only proper thing by a vast number of people in the community, the era of the studied commonplace can be said to have reached the climax.

This was preeminently the case some 30 years ago. Our revolutionary forefathers in this respect had better taste; they followed the classical ideals they had with a zeal that gave us, if not a new style, at least a strong impulse toward something good. The decadence was, however, rapid. In 1850 doorways were mere holes in the wall, and thereafter followed a period of barren ugliness and dull respectability; an era of unredeemed bad taste, from which the newer departure in architecture and its more general appreciation are beginning to save us.

Recently, however, a change for the better has taken place, and the entrance door and doorway are given more attention, and the results are gratifying in the extreme. An example of an entrance designed for a house in Newark, N. J., by Architect Jas. M. A. Darroch, shows a great advance over the doorways of 50 years ago. The example shown in Fig. 2 is taken from a house in West Houston street, New York City, but specimens of this kind are rapidly disappearing from old New York, which 30 years ago were so plentiful. Such examples as this one are worth preserving, as they will prove of value to posterity.

## The New Baltimore & Ohio Office Building.

Work upon the new office building of the Baltimore & Ohio Railroad Company has just been commenced in the city of Baltimore, the contract having been secured by Wells Brothers Company at an approximate price of $1,500,000. The new structure will be 13 stories high, have a frontage of 159 feet on Baltimore street and 144 feet on Charles street, its situation insuring exceptionally good light on all sides. The selection of the design and arranging for the construction of the building were in charge of a committee of officials of the company, competitive designs being submitted early last winter by a number of architectural firms in Baltimore and other cities. The successful architects were Parker & Thomas, 612 North Calvert street, Baltimore, and H. D. Hale, 92 William street, New York.

The plan of the new building is in the form of the letter H, the arrangement being such as to furnish the largest possible amount of window space for the interior offices. The building will be of the best fire proof construction, and advantage will be taken of the many lessons drawn from the great fire which devastated the business portion of the city a year ago last February. The exterior will be of stone, brick and terra cotta. The entrance to the structure will be impressive, and on the Charles street side, above the center of the archway, will be allegorical figures carved on either side of the globe, and on either side of the arch will be placed bronze lamps. The first floor will be somewhat monumental in character, the lower surface being Pavanazzo marble. The second floor will be occupied by what might be called "the bank" of the building, being devoted to the financial department of the railroad company. The president's offices will be on the third floor, as will also the directors' rooms, together with dining rooms, bathrooms, law office, library, &c. The fourth floor will be devoted to the offices of the first vice-president, the manager of passenger and freight traffic and some other departments of the railroad. The upper floors will be rented for office purposes.

The wood work in all the offices will be of mahogany, with plaster painted walls. The floors will be of cement and the exterior windows are to be of triple sash, one sash to be glazed with American plate and the other two with wire glass. The trim of the windows inside and outside will be of metal. The building will be equipped with ten elevators; a refrigerating plant for cooling water, which will be supplied to every principal room in the building, and a complete system of vacuum cleaning for removing dust from the floors, walls, rugs, &c.

## Compulsory School House Ventilation in Pennsylvania.

All interested in the betterment of the conditions of living as exhibited by the growing realization of the importance of light, ventilation and general sanitation in work shops, schools and homes, and especially those who have made some effort toward arousing wider interest in the subject, will derive satisfaction from the final passage by the Legislature and approval by the Governor of Pennsylvania of the law governing school house ventilation. Now that Pennsylvania has followed the example of New York and that Massachusetts is already regarded as in line owing to the very general compliance in school house design in that State with the recommendations of the Massachusetts State Board of Police, it ought to be somewhat easier to induce other States to enact compulsory ventilation laws. A copy of the bill, received from B. H. Carpenter, Wilkes-Barre, who spent much of his time as a member of the committee in visiting Harrisburg during sessions of the Legislature, is presented herewith:

Whereas it is of great importance to the people of this Commonwealth that public school buildings hereafter erected by any board of education, school trustees or school directors shall be properly heated, lighted and ventilated.

Section 1. Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met and it is hereby enacted by the authority of the same that in order that due care may be exercised in the heating, lighting and ventilating of public school buildings hereafter erected, no school house shall be erected by any board of education or school district in this State, the cost of which shall exceed $4000, until the plans and specifications for the same shall show in detail the proper heating, lighting and ventilating of such building.

Sec. 2. Light shall be admitted from the left or from the left and rear of class rooms and the total light area must, unless strengthened by the use of reflecting lenses, equal at least 25 per centum of the floor space.

Sec. 3. School houses shall have in each class room at least 15 square feet of floor space and not less than 200 cubic feet of air space per pupil, and shall provide for an approved system of heating and ventilation by means of which each class room shall be supplied with fresh air at the rate of not less than 30 cubic feet per minute for each pupil, and warmed to maintain an average temperature of 70 degrees F. during the coldest weather.

Sec. 4. All acts or parts of acts inconsistent herewith are hereby repealed.

The general contract for the new eight-story brick, stone and steel Netcher Building, to be erected at State, Madison and Dearborn streets, Chicago, Ill., at a cost of $3,000,000, has been secured by the Fuller Construction Company.

# FRAME COTTAGE AT PLAINFIELD, N. J.

*(With Supplemental Plate.)*

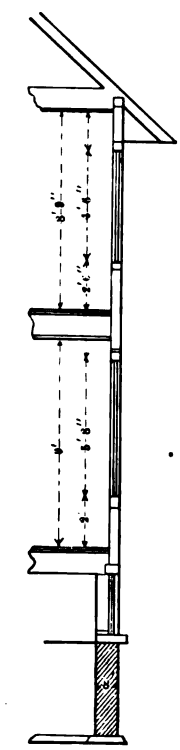
We have taken for the subject of our half-tone supplemental plate this month a frame cottage treated in the semicolonial style of architecture, of compact arrangement and of a character to interest many of those who are contemplating the building of a home of their own. An inspection of the picture shows that the outside covering of the house at the first story is siding, with columns at each corner of the building, while the second story and gables are shingled, the dividing line between the first and second stories being emphasized by a wide belt course. The porch is octagonal in shape, with a low spreading roof supported by series of clustered columns resting on shingled pedestals. The main body of the house is of buff color, the rest silver gray and the trimmings cream white.

The floor plans show a compact arrangement of rooms, there being upon the first or main floor a parlor, library, dining room and kitchen. The front door may be reached directly from the kitchen, and each of the principal rooms is readily accessible from the main hall. On the second floor are four sleeping rooms and bathroom, with stairways leading to the front hall, to the kitchen and also to the attic. The position of the main stairway is such as to give a landing near the center of the house, which is handy for all the sleeping rooms and bathroom on the second floor.

The timber used in the frame of the building is spruce, the girders being 6 x 8 inches; the sills and posts 4 x 6 inches; the plates are made of two 2 x 4's spiked together; the window and door studs, 2 x 4 inches; the hip and valley rafters, 2 x 10 inches, and the common rafters, 2 x 6 inches, placed 20 inches on centers. The first and second floor beams are 2 x 10 inches and the third floor beams 2 x 8 inches, all placed 16 inches on centers. The ridges are 1 x 10 inches and the ribbon pieces 1 x 5 inches. The frame work is covered with hemlock sheathing boards put on diagonally, these in turn being covered with siding and shingles, as shown in the picture, and also on the elevations. The roofs are covered with 18-inch cedar shingles, laid 5½ inches to the weather, finishing at hips and ridges with what is known as "Boston" hip.

The first and second story floors are double, the rough ones being ⅞ x 8 inch stuff, laid diagonally, and the finishing floors of ⅞ x 3½ inch tongued and grooved Georgia pine. The third-story floor is of strips of ⅞ x 4 inch North Carolina pine. The jambs of doors, openings, base and trim are of chestnut. All windows on the first floor have paneled backs and the rest have molded stools and aprons.

The wood work of the first and second stories is finished natural, and has one coat of filler stain in colors and well rubbed in, then two coats of varnish. The kitchen, bathroom and butler's pantry are wainscoted in hard finished plaster, and covered with three coats of best enamel paint ruled off into blocks to imitate tile. The main stairs to the second floor are of chestnut, with treads and risers housed into the wall strings. The bathroom is equipped with standard ware bathtub and wash basin and a Kenney deep seal siphon hopper closet. The kitchen is fitted with a brick set Thatcher range, a 40-gallon galvanized boiler, a galvanized sink and a two-part Alberene stone tub. The plumbing was installed in accordance with the rules of the Health Department of Plainfield, in which city the house is located. The heating is done by steam. The house is wired throughout for electric lights and bell service.



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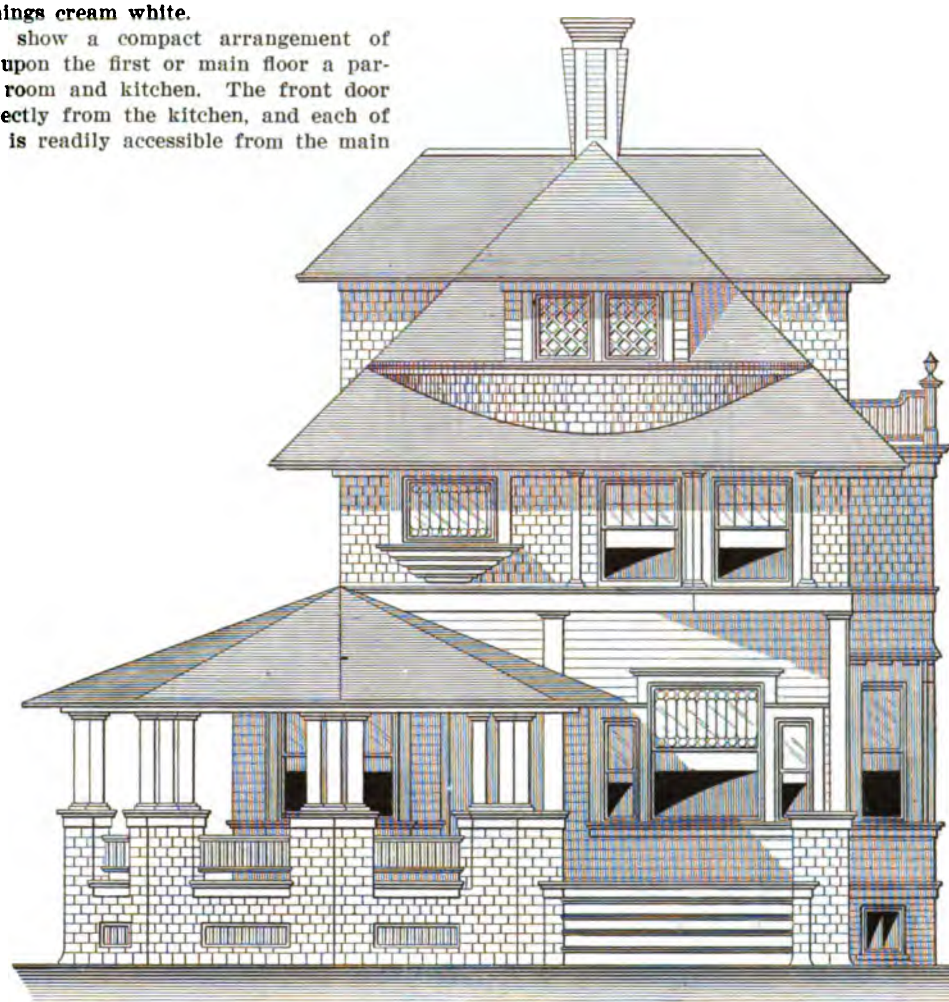


Front Elevation.—Scale, ⅛ Inch to the Foot.

*Frame Cottage at Plainfield, N. J.—A. F. Leicht, Architect, New York City.*

The dwelling here shown was erected for Mrs. J. H.

Knapp, Sixth street, Plainfield, N. J., in accordance with drawings prepared by A. F. Leicht, architect, with offices at 9 East Forty-second street, New York City.

## Lockouts Declared as Legal as Strikes.

A decision has recently been given by Justice Clarke of the Supreme Court touching the question of the legality of lockouts which is of special interest not only to contractors engaged in the building business, but also to all employers of labor. The decision was given in the case of the City Trust Safe Deposit & Security Company of Philadelphia against one Waldhauer, which was the outcome of the general lockout ordered by the Building Trades Employers' Association in that city in 1903. Two members of this association had locked out their men in accordance with the order from the Board of Governors but afterward re-employed the locked out men. The two members were expelled from the Employers' Association and the Security Company paid their bonds of $500 each. The refusal of the two men to pay their bonds caused the Security Company to enter suit against them and the case of Waldhauer was tried as a test.

The defense of Waldhauer was that employers had no authority to order a lockout and that it was in restraint of trade. In his decision, Justice Clarke says:

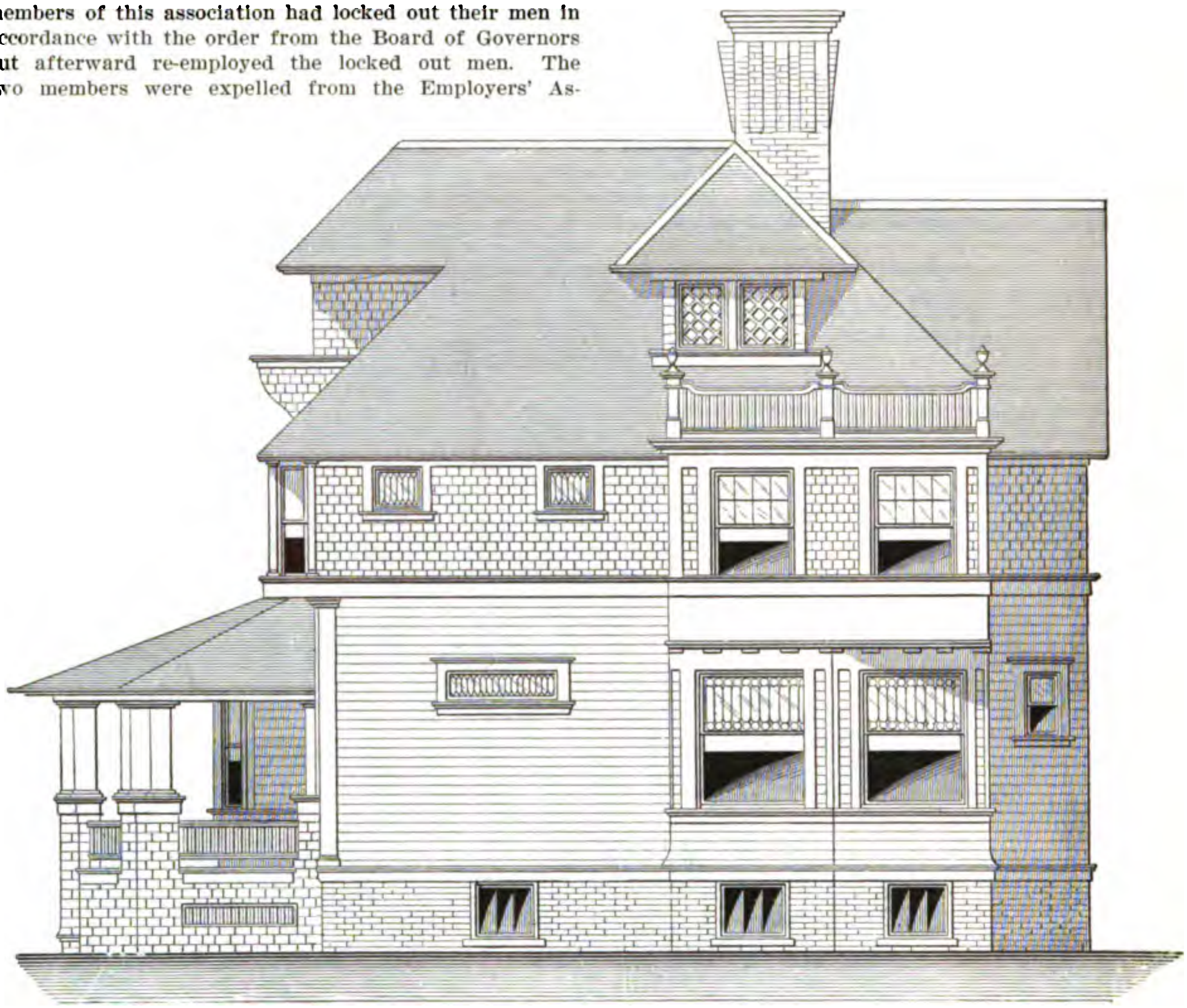
"If the workmen may organize and conduct a peaceable strike to improve their condition it seems a natural corollary that masters may organize and conduct a peaceable lockout for the same purpose. It is conceded in this case that there was no malice either toward the defendant or toward the employers in the lockout order. The sole object and intent were to secure peace and stability in this great industry by obtaining an agreement for the settlement of differences by peaceable arbitration. I find, therefore, nothing unlawful in the combination of the employers in the association, nor in the order issued by the governing board which the defendant violated.

"So far as restraint of trade is concerned, a lockout is no greater restraint of trade than a strike, and yet a strike is not unlawful."

## Legal Decision Affecting Building Contractors.

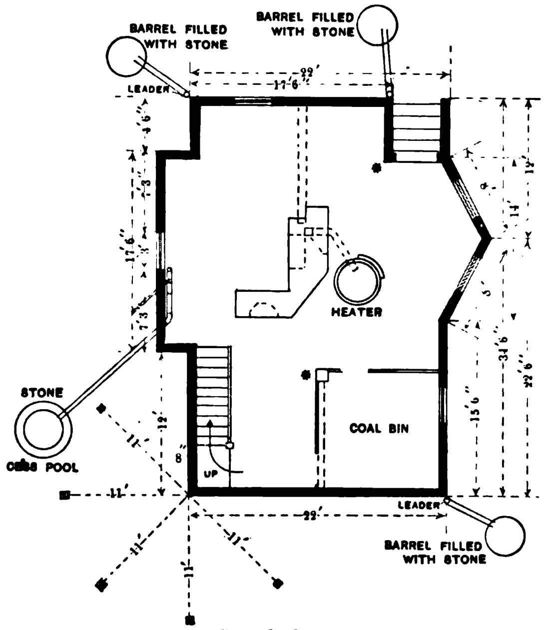
A decision has recently been rendered by Judge Tuley of the Circuit Court of Cook County, Ill., which cannot fail to prove of great interest to builders all over the country, as its opposes the idea that after a building has been erected in compliance with the building laws prevailing at the time of its construction it cannot be interfered with and made to conform with the requirements which may be found necessary at a later date. The court held that the Masonic Temple must be remodeled so as to comply with the present building ordinance of the city, and the decision, in fact, has a bearing upon the status of nearly every building in Chicago in its relation to the building department. If the present decision is sustained in the upper courts it means that the owners of the Masonic Temple Building will be forced to tear out the present marble staircases extending from the ground to the roof and rebuild them at considerable expense, otherwise the 11 halls on the upper floors must be abandoned for meeting places and lodges and other bodies will be forced to seek quarters elsewhere. Perhaps the most striking feature of the decision is that it repudiates and destroys the contention of building owners that their structures are immune from interference after once they have been built according to plans which conform with the city code and have been approved by the Building Department. In a paragraph that affords a precedent for dealing with any building in Chicago, Judge Tuley says: "It is within the province of the city council to require any change that tends to increase public safety so long as the change is not unreasonable."

The ordinance has been under attack since last May, when the association owning the Masonic Temple went into court and obtained an injunction forbidding the police from closing the halls on the top stories. This injunction has now been dissolved, but there will be no fur-

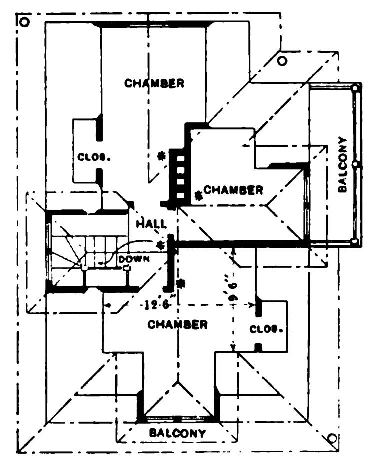


*Frame Cottage at Plainfield, N. J.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.*

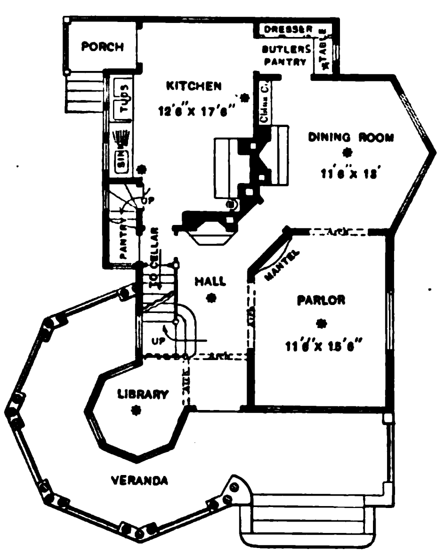
ther action contemplating a shut down until a decision in the Appellate or Supreme Court is obtained. The section of the ordinance that was made the basis of the fight between the city and the owners of the Masonic Temple provides that no hall of more than 1000 capacity may be higher than 10 feet above the sidewalk; halls of 500 and 200 capacity may have limits, respectively, of 20 and 45 feet above the level of the sidewalk. The section gives permission for the use of halls not in excess of 500 capacity in the aggregate when the halls are small and two sets of staircases are provided for egress. In the 11 halls in the Masonic Temple the aggregate capacity is 1300. The halls are all on the upper floors, hundreds of feet above the point mentioned as the maximum hight by the ordinance. The present system of staircase is considered by the officials as only one set and to bring them within the approval of the authorities they will have to be reconstructed so as to give two clear flights to the bottom floor.



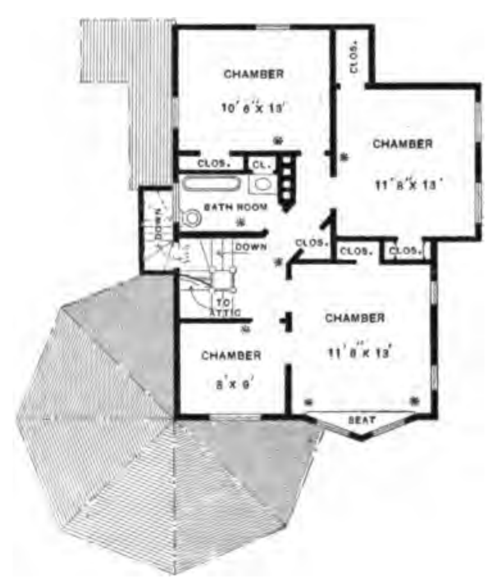

Foundation.




Attic with Roof Outlines.




First Floor.




Second Floor.

*Frame Cottage at Plainfield, N. J.—Floor Plans.—Scale, 1-16 Inch to the Foot.*

## San Francisco's "Toothpick" Building.

William H. Deming of San Francisco has had plans drawn for a 16-story building, to occupy a lot at the corner of Grant avenue and Tillman alley, the ground dimensions of which are only 30 x 25 feet. The ground floor will be chiefly occupied by a storeroom. The other floors will be occupied by offices; each story will contain three offices and will be a duplicate of the other upper stories. The building will be provided with two electric elevators, will be of fire proof steel construction, and the walls will be of California sandstone. The entire cost of the building will be $75,000.

## The Registration of Architects.

One of the building papers published in England has taken the trouble to collect data concerning the practice of architects in the United States and European countries for the Royal Institute of British Architects, which recently took up the question of registration. Summarizing the results obtained from this inquiry, we find the following:

The practice of the profession is absolutely free in Austria, Holland, Belgium, Switzerland, Great Britain, Sweden, Norway, France, Turkey, Portugal and the United States save in three States.

The practice of the profession is free but Government officials require a diploma in Germany, Hungary and Greece.

A diploma is required in Italy, Spain, Russia and in the United States in Illinois, New Jersey and California.

SHEET METAL WINDOW FRAMES AND SASHES are now used to a great extent and possess many advantages over the old style window frames. They are light, durable and fire proof, and it seems that many cornice shops might profitably add machinery suitable for their manufacture and thus add a profitable department to their business.

# CORRESPONDENCE.

### A Veteran Reader's Appreciation of Carpentry and Building.

We have from time to time received many letters from our practical friends in the trade testifying to the high esteem in which they hold *Carpentry and Building* and the benefit it has been to them during the years their names have been upon our lists, but in no instance has this feeling of appreciation been more strikingly typified than in a letter just received from a Kansas reader, who, being notified of the expiration of his subscription, sent us the following lines, which we feel sure will be read with interest by every friend of the paper:

"I assure you that the matter of renewal of my subscription to *Carpentry and Building* has not been overlooked, but I have been financially unable to attend to it on account of having lost all of my personal effects in the flood of the Kansas River in May and June, 1903, and the repetition of the flood in July, 1904, when my real estate was rendered practically valueless, thus placing me in the unenviable position of having to start life anew at the age of 72 years, with my bare hands and a ruined business as my stock in trade However, in appreciation of the value of an old associate in *Carpentry and Building* I herewith forward $1 for renewal. I am sorry to say that with the balance of my library I lost all the numbers of *Carpentry and Building* from the very beginning in 1879 and which I prized very much."

### Comments on the Prize Designs.

*From* C. A. W., *Port Jervis, N. Y.*—I am somewhat disposed to briefly comment upon the first and second prize designs published in the April and May issues of the paper in the hope that what I may have to say will draw out an expression of opinion from the authors of the plans referred to. My remarks are not made in the spirit of fault finding, but I do think the features to which I shall call attention should have been considered by the committee in charge of the contests. In the first place, I find that neither the first nor the second prize design makes provision for a refrigerator—an important item in my estimation, and one which should carry weight with those awarding the prizes. Just consider the ceiling hights for the chamber closets in the case of the first-prize plans. They are very slight and in this locality would not answer at all. In the case of the second-prize plans, there is neither front nor rear vestibule, which to my mind is an important omission. The front chamber has no closet, which is a very bad fault for a house of such a cost. I do not understand how a committee could award a decision on such estimating as was made on the second-prize plans—making an allowance from the surplus of certain items to balance an apparent shortage in others. I should consider this a serious fault, and as I have made several attempts in other competitions and have won out I do think that the two awards could have been better plans. I am not saying this from any ill-feeling, but am simply stating the real facts as I see them. The editor can publish these remarks if he sees fit, as I think it no more than right to express my views as to the bad points in this competition as I see them.

### Is the Truss Construction Safe ?

*From* S. C. P., *Caribou, Maine.*—I need a truss over a hall with as little elevation as possible and perfectly safe. The sketch, Fig. 1, which I send will help to make my meaning clear. My idea is to bore through the truss rafters and posts for the 1½-inch rods, the upper chord being built up with a space between the planks for the rods. I could bore through the upper chord and have it solid if that would be the better plan. Under the washers for the ¾-inch rods I would use a 2-inch plank across the girders and plate for the eye bolts would be 4 x 9 inches. The span of the truss is 45 feet and the rise is 4 feet. The top girders are made of three pieces of 2 x 14 inch spruce bolted together with 20 bolts, ⅝-inch, with cast washers. There are two rods for each truss 1¼ inches in diameter. The bottom girder is 4 x 9 inches solid, the inside truss rafters 4 x 9 inches and the wrought iron washers on the nuts are 4 x 9 inches. The estimated weight the truss will support is 10,530 pounds for roof and ceiling and 19,975 pounds with snow distributed over the surface, 13 x 45 feet. In order to make it plainer I would state we have a roof and ceiling 45 x 52 feet, with three trusses to hold the same, with the outside walls solid. We often have snow falls of 15 to 20 inches depth and as the roof in question is flat most of the snow may lay on it until melted. Will the truss shown in Fig. 1 safely hold the load mentioned, or will Mr. Kidder give the design of a similar and safer one that does not require over 4 feet rise?

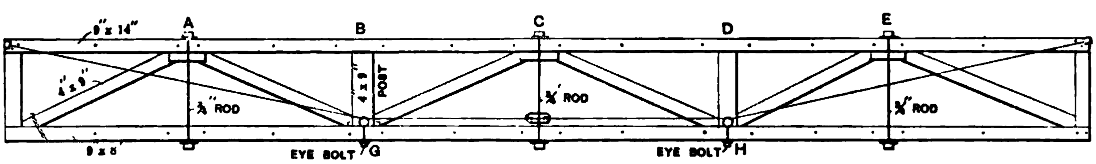



Fig. 1.—Construction Shown by " S. C. P."

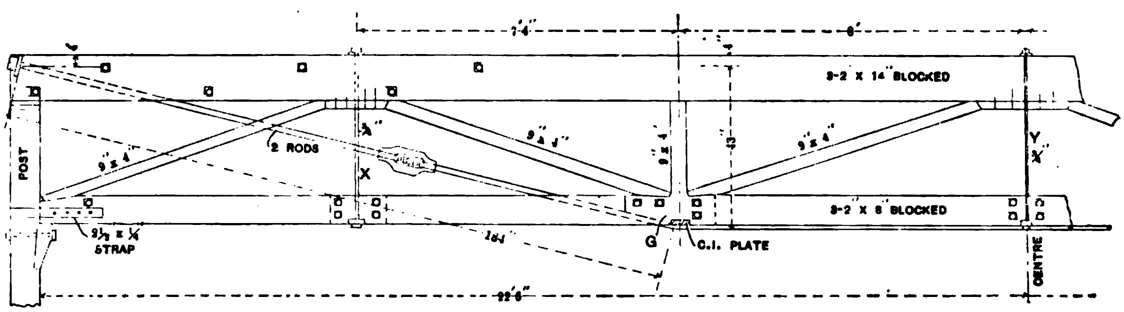



Fig. 2.—The Truss as Modified by Mr. Kidder.

*Is the Truss Construction Safe?*

*Answer.*—The communication with sketch of our correspondent was referred to Mr. Kidder, the well-known consulting architect, who furnishes the following comments in reply:

The construction shown by " S. C. P." in Fig. 1 is, in the main, in accordance with scientific principles, and the truss would probably support the roof and ceiling with a light fall of snow, but under a heavy snow load the truss would sag excessively and possibly break the belly rods. By dropping the belly rods entirely below the wooden tie beam, as in Fig. 2, the stress in these rods will be greatly reduced, but even then it will require two 1⅝-

inch rods if not upset or two 1½-inch rods if the ends are upset.

The construction shown in Figs. 1 and 2 consists essentially of a belly rod truss, with the top chord or straining beam braced from the points G and H, and with a wooden tie beam to support the ceiling joists. The stress or strain in the belly rods at the ends is found by dividing the length of the rods on the slant by the rise and multiplying the quotient by the load, which is concentrated at the point G or H of Fig. 1.

In measuring the rise the distance from the center of the rods to the center of compression in the top chord should be taken. Thus in Fig. 2 an 8 x 8 inch strut would resist the compression in the straining beam, and as this beam is also reinforced to some extent by the roof, we can figure that the center of compression may be within 4 inches of the top. As the hight of the truss is not to exceed 48 inches, the distance from center of compression to center of rod cannot be over 43 inches. In Fig. 2 the writer has moved the post at G 6 inches nearer the end, so as to shorten the length of rod on the slant. The length of the belly rod on the slant is 184 inches. Dividing this by the rise (43), we have 4.28 for the quotient. Taking the load given by "S C. P." we find that it

rod will be preferable if it can be obtained. Fig. 3 is a true truss.

Fig. 4 is the stress diagram for Fig 3, the lines in Fig. 4 being drawn parallel to the dotted lines in Fig. 3, which represent the center lines. The length of the lines in Fig. 4 measured by the scale to which the load line is drawn gives the stress in the corresponding member of the truss; thus the line *a* represents the stress in A, *b* the stress in B, *f* the stress in F, *i* the stress in the brace I, &c.

The rod M has no stress except the weight of the ceiling. The construction shown in Fig. 3 requires a solid stick of timber 8 x 8 inches and 34 feet long for the tie beam. In the trusses Figs. 1 and 2 the tie beam can be jointed at the points G and H.

The top chord in each of the three trusses can be jointed over any one of the supports, the planks breaking joint, and all bolted together.

"S. C. P." does not show what supports the wall. If supported by frame construction the scheme shown in Fig. 2 should be used. If supported by brick walls the main bearing should be under the end of the straining beam, as in Fig. 3. The cast iron plate at G in Fig 2, on which the belly rods bear, should be rounded to fit the

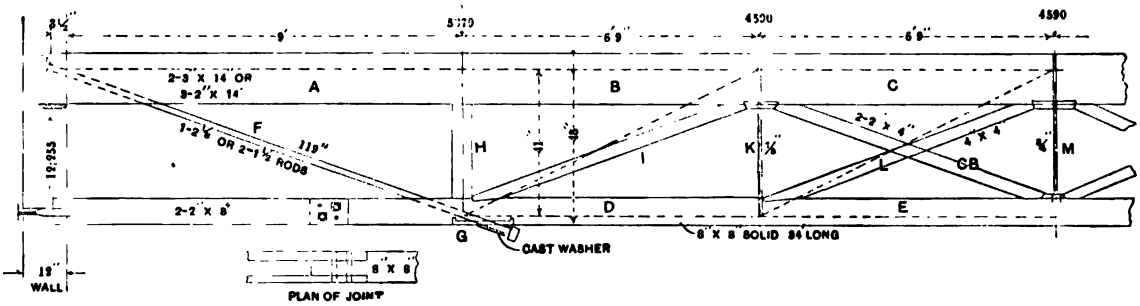



Fig. 3.—Details of a True Truss.

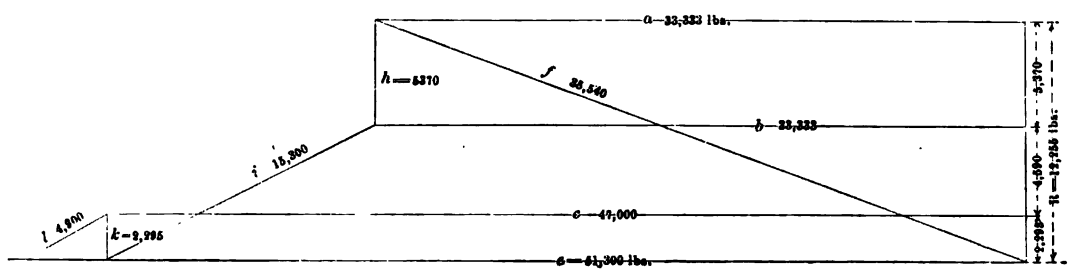


Fig. 4.—The Stress Diagram for the Truss Shown in the Previous Figure.

*Is the Truss Construction Safe?*

amounts to 677 pounds per lineal foot of truss, or say 680 pounds. The load which must be supported by the belly rods at G is that portion between rods X and Y, which is 15 1-3 x 680 = 10,426 pounds. Multiplying this load by 4.28 we have 44,623 pounds as the stress in the belly rods, or 22,311 pounds on each rod. This stress will require 1⅝-inch rods if the threads are cut out of the rod or 1½-inch if the screw ends are upset.

The balance of the truss is strong enough for the loads given by "C. P. S."; 10,530 pounds for weight of roof and ceiling, however, would require a tin roof and metal or wood ceiling. If the ceiling is plastered and the roof is to be of gravel the actual weight would be about 28 pounds per square foot, or 16,380 pounds for the entire truss. The allowance for snow is equivalent to 34 pounds per square foot, which is probably ample.

In the truss shown by Fig. 1 the length of the rods on the slant is about the same is in Fig. 2, while the rise measured from center of rods is some 8 or 9 inches less; consequently the stress in the rods is increased some 25 per cent.

Fig. 3 shows another method of building a truss of the same span and hight, but in which the wooden tie beam and the braces are made to form a part of the truss. By shortening the length of the main tension rod E the ratio of length to rise is reduced to 2.9 and the stress to 35,549 pounds (2.9 x 12,255), which can be carried by one 2⅛-inch rod or two 1½-inch rods. The single

bend in the rods, and the tie beam should be blocked solid at this point, also under end of rods X and Y.

### Finding Cut for Purlins.

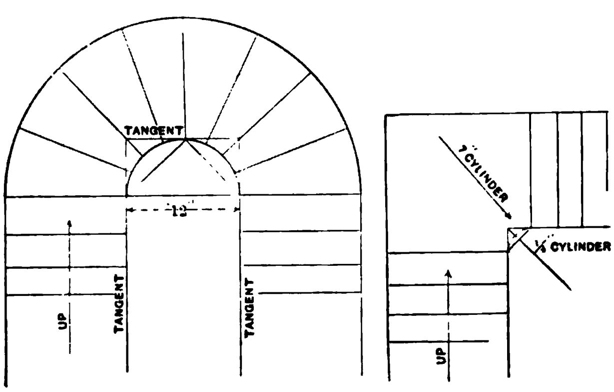
*From* HEE H. SEE, *Brockville, Ont.*—Referring to the letter of "J. E. N.," Leland, Ill., which appears on page 141 of the May issue, I would say that I have carefully read my letter in the April number and fail to find any mention of the "upper side of purlin." However, the upper side or the side on which the rafters rest is the second space from the top in Fig. 2. The numbers in each drawing represent the same line or corner. I do not know how I can make this any plainer to "J. E. N.," but I firmly believe that if he will do as I advised "J. C. W."—that is, make a model of it—he will find that it is not at all difficult. Of course in actual practice the drawing, Fig. 2, is not necessary, as the distances will be transferred directly to the corner of the timber about to be formed. I believe it will pay "J. E. N." or any one else not familiar with it to learn the principle of this little problem, as it can be applied to many things besides cutting purlins. It will with little alteration enable one to get the cuts for purlins in a roof of two different pitches, as asked for by "J. E. N." I hope to be able to show very shortly how this can be done. If "J. E. N." will closely examine the sketches he will notice that the distances 1 2 and 4 5 give the ordinary miter cut over the valley rafter. As to his further question, I believe it is the cut for which "J. C. W." asked, but "J. C. W." is in the best position to set him right on that point. It certainly will cut a sort of a bird's mouth joint that will fit anywhere on the old purlin, I know, because since getting the May issue of *Carpentry and Building* I have tried it on a piece of 4 x 4 inch stuff in order to make sure.

### Cutting Circles of Glass.

*From* C. A. W., *Port Jervis, N. Y.*—Cutting circles of glass or any plate glass requires that after the cut is made the glass should be slightly tapped on the opposite side from the cut, either with the cutter or a small hammer, and the break will in most cases follow the cut. After a proper cut is made it will be found that there will be very few cases of broken glass. This is for the benefit of "H. K.," Wheaton, Minn., whose inquiry appeared in a recent issue.

### A Question in Hand Railing.

*From* J. M. D., *Lansing, Mich.*—I have been a reader of *Carpentry and Building* for a number of years and now come to the Correspondence department for a little




*A Question in Hand Railing.—Sketches Accompanying Letter of "J. M. D."*

information pertaining to hand railing. I would like to have some of the old stair builders give a clear, concise method of carrying the lines over the wreath from the mold at one end to the other when the square cut system is used for a quarter turn; also for section of wreath on a 12-inch cylinder where there are eight winders in the turn. I inclose a rough sketch, which may render my meaning more clear.

### Laying Out Saw Kerfs.

*From* A. B., *Proctor, Vt.*—Referring to some of the articles in the Correspondence columns, I would like to ask "U. S. K." of Harlin, Iowa, why he uses one-half the radius in the saw kerfing problem which he presented some time ago.

### Bearing of Floor Timbers in a 12-Inch Brick Wall.

*From* H. J. A., *Spring Valley, Minn.*—In answer to "W. A. E.," East Waterford, Maine, whose question appears in the March issue of the paper, I would say that the proper way to determine how far a joist or timber should bear on a wall is first to calculate the safe strength of the joist, the load being evenly distributed. The formula is to multiply twice the breadth by the square of the depth and then by 60 for white pine or timber of equal strength and divide by the span in feet, which in this case, taking the span at 19 feet, would equal 2728 pounds. The end must then reach in far enough so that the wood will not crush and may be determined as follows: The safe crushing strength of white pine may be taken at 200 pounds per square inch. Divide the load on the beam, 2728 pounds, by the constant for crushing sidewise of that material, 200 pounds, which equals 13.6 square inches for the bearing. This would mean that the ends should bear on the brick wall about 4¼ inches. In the case of a joist this size, 3 x 12, it should bear only half the span, or 9½ feet, and the end would have to run in on the brick wall twice as far, or 8½ inches.

### Finding the Capacity of Tapering Tanks.

*From* A. P., *Victoria, B. C., Canada.*—I should like it if "T. W. L." of Texas would give us a key to the last two formulæ for finding the capacity of tapering tanks, as presented in a recent issue. The first is stiff enough, but the other two have kept me guessing. When submitting an answer to a question of this kind why not put it in the plainest form possible, as it would be much more satisfactory to the general run of readers. The formulæ would be all right in a professional journal, but I really think they are above the heads of the average carpenter. I would suggest to "B. W." that if he had a tank as submitted by "T. W. L." he could solve his problem by finding the mean diameter, then square it, multiply it by the depth, all in inches, and then multiply by 0.0034, which will give him the answer in gallons. I should like to hear from some of the others on this question.

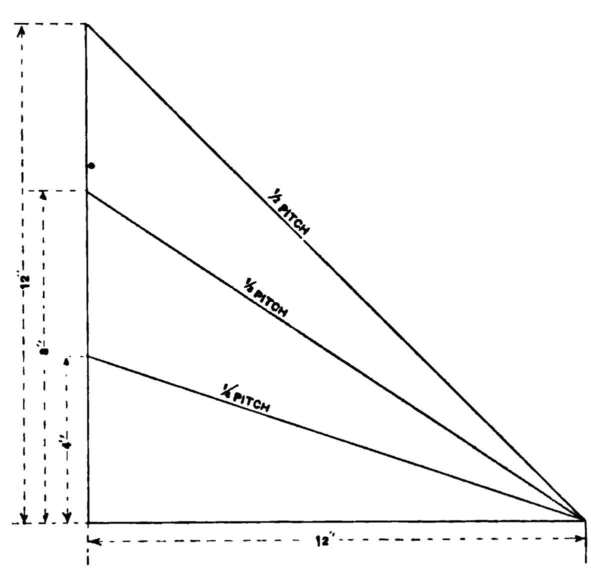
### An Overground Cellar or Fruit House.

*From* H. C., *Hillsboro, Ohio.*—Will some reader kindly tell me through the Correspondence department how I can build an overground cellar or fruit house? I want something that will keep cool in summer and warm in winter. I would like it to be about 12 x 12 feet.

### The Pitch of Roofs.

*From* SUBSCRIBER, *Joliet, Ill.*—Inclosed find a diagram indicating various pitches as applied to roof construction. It represents the method some in the trade say is correct, while others claim that the pitches indicated are not correct. If not, I wish some one would tell me through the Correspondence columns which is right.

*Note.*—There seems to be a diversity of opinion in the trade regarding the question of the proper designation of the pitch of a roof, and in back numbers of the paper




*The Pitch of Roofs.*

the subject has been ventilated to a considerable extent. It is generally recognized that the pitch of a roof is measured in parts of the span. For example, if a building is 24 feet wide and the rise of the rafters is 4 feet, the pitch would be one-sixth; if the rise was 8 feet the pitch would be one-third; if the rise was 12 feet the pitch would be one-half, and if the rise was 16 feet the pitch would be two-thirds. In some sections it is customary to indicate the pitch in degrees of a circle. We shall be glad to have our readers express their views on the subject and state the practice which prevails in their respective localities.

### Fastening Cornices to Buildings.

*From* G. & S., *Kansas City, Kan.*—Will some reader kindly advise us through the columns of the Correspondence department how sheet metal cornices are fastened to a building? This class of work is new to us and we want information suitable for beginners.

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### Framing Roofs of Equal and Unequal Pitch.

*From* W. F. P., *Berea, Ohio.*—I notice in the April number that "H. F. H." of London is referred to Morris Williams' articles on roofs of varying pitches, which are very good, but I think there are a few errors in them which ought to be corrected. On page 13 of the January number for 1903, where the valley rafter No. 1 intersects the hip No. 3, he says, "the cut across the back is shown at *z*, in Fig. 5." Now it seems to me this valley cuts square across the back.

In the February number, page 37, he says, "For the length and cuts of rafter No. 2 take 12 and 18 on the square for the cuts and multiply the bridge measurement by 8 for the length." Now this would make the rafter altogether too long, but two-thirds of that bridge measure would give the length of the rafter, or 8 and 12 would give the same cuts, and those figures by taking the bridge measurement and multiplying by 8 would give the length of the rafter, as 8 is the run and 12 the rise.

*Answer.*—The letter of our correspondent above having come to hand too late for use in the last issue of the paper we forwarded his comments to Morris Williams so that he might reply and thus enable us to give both communications at the same time. Mr. Williams in Fig. 5, page 13, January, 1903, and is the bevel to apply to the short valley to fit it against the side of the long valley when both valleys are "backed." The bevel X, in Fig. 1, is the one to apply to the short valley to butt against the side of the long valley, but, as shown, it is a square cut across the top edge of the short valley. In this figure the shaded lines express the thickness of the valley timbers at A and G, the top edge being shown square and not "backed. The line A M represents the horizontal trace of the plan that contains the top edge of the valley when left square.

In roofs of unequal pitch the bevel to apply to the short valley to butt against the side of the long valley, when the valley is left square on top, is shown at C in Fig. 2, and the method to find it is as follows: Extend the plan line of the short valley A B to C; make A C equal the exact length of the short valley shown at A K. From A draw a line A M square to the plan line A B of the short valley. Continue the plan line of the long valley W O to M, where, as shown, it intersects the line drawn from A. Now connect M C and the bevel will be found at C. As already stated, this bevel is the one to apply to the short valley when not "backed."

Regarding the length of rafter No. 2, on page 37 of the February number, it is plain that the figures to

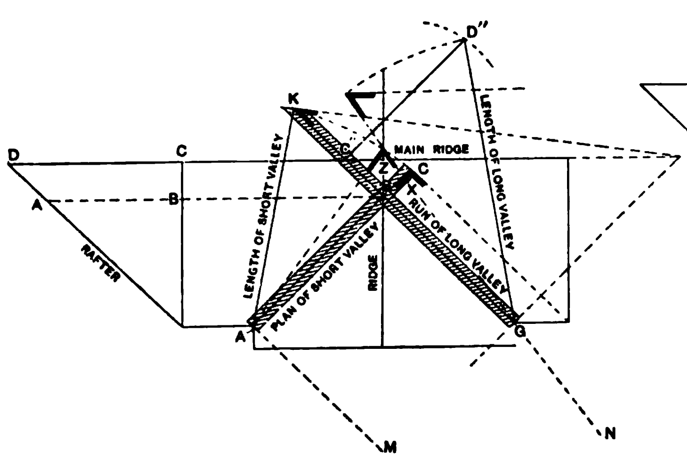


Fig. 1.

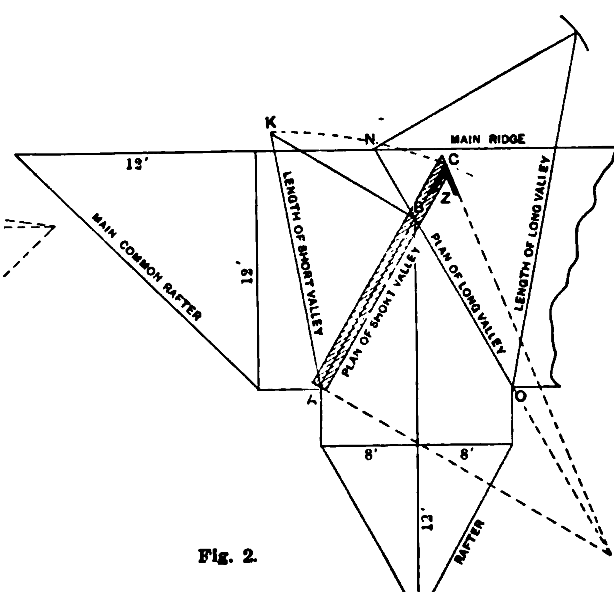


Fig. 2.

*Framing Roofs of Equal and Unequal Pitch.—Diagrams Accompanying Comments by Morris Williams.*

commenting upon the questions raised by "W. F. P.," says:

I wish to state in reference to the remarks of the correspondent regarding the bevel *z*, in Fig. 5, of the January number of the paper for 1903, that it represents the angle between two oblique lines lying in an oblique plane, and that the bevel is correct to cut the end of the valley rafter No. 1 to intersect the side of the hip No. 3, when applied to the valley rafter after its upper face is backed to conform with the slope of the two intersecting roofs. If the valleys are not "backed" but left square on top, as happens in the case of rough hemlock construction, the correspondent is correct in saying "now it seems to me this valley cuts square across the back," but it should be remembered that it cuts square only where the plan lines are at an angle of 45 degrees with the intersecting plates—namely, in equal pitch roofs and where applied to the top edge of the valley when the top edge is square with the side of the valley and not "backed" to conform with the intersecting roofs.

I have prepared two diagrams with a view to explaining these bevels so that no mistake may occur in determining the correct one to use in either case. Fig. 1 represents the plan lines of a roof of equal pitch, where the line A B represents the plan of the short valley and the line G C" the plan line of the long valley. The long valley G C" is shown extending from the plate to the main ridge and the short valley from the plate to B intersecting the long valley. The correspondent will notice that bevel Z in this figure is the same as bevel *z* in find the length are 8 and 12. Multiply the bridge measure of 8 and 12 by 8, the run, and we get the length. In the February issue the figures 12 and 8 on the square were selected for the cuts, and that because the pitch of the roof is designated by the number of inches it rises to the foot run; hence the cuts for a rafter are always 12 for the foot cut and for the top cut the rise of the roof to the foot run. The run of the rafter shown in Fig. 6, February number, is 8 feet and the rise 12 feet, the pitch of this roof therefore rises 18 inches to the foot run; hence we take these figures on the square—namely, 12 on the tongue and 18 on the blade for the foot and top cuts. When, however, we are to determine the length we take the bridge measure of 8 and 12, which represent the run and rise; multiplying by 8, the run, gives the length. The principle of this method of finding the length is in every case to multiply the bridge measure of the run and rise by the run, and not the bridge measure of the figure used on the square to obtain the cuts.

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### Joining New Roof to Old Building.

*From* HEE H. SEE, *Brockville, Ont.*—There is a slight error in the reproduction of the sketch accompanying my letter on "Joining New Roof to Old Building," which appears on page 142 of the May number. The small valley at the left end of the old house should of course run out to the corner of the roof of the old structure instead of occupying the position shown in the engraving. As it appears there, it joins the new roof at the line of the ridge. I also think, but am not quite sure, that there is an error in the letterpress. I certainly did not mean to say that this was the best way to do the job, but that it was the easiest way out of the difficulty.

*Note.*—Our correspondent is correct with regard to the sketch which he forwarded, as the engraving should show the valley running out to the corner of the roof of the old building. His letter, however, printed in the May issue is word for word as he sent it to us, and in this connection we would remark that it is always our endeavor to follow as closely as possible the phraseology of our correspondents so as to maintain the individuality of their communications and at the same time convey the exact meaning intended.

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### Trouble with a Chimney.

*From* BAY STATE, *Methuen, Mass.*—I should like to know if any of the readers could suggest a remedy for a cranky chimney, which is on the north end of an ell having a flat roof, and is 10 feet from the main building The range is on the second floor and is connected with the chimney. The chimney is 7 feet above the roof and is topped out with an 8-inch galvanized sheet iron stack with a Fenn ventilator on the top. I tried a plain stack with cap, but it seemed to permit a back draft. The trouble is that there seems to be a lack of draft. It takes an hour and a quarter for hard coal to burn up and then it sometimes goes out. The chimney flue is 8 x 8 inches in area. The first-floor range and the basement range work all right, and the upstairs range works better when there is a fire down stairs. The second-floor range is connected with a drum and 18 inches of 6-inch stove pipe. There is no damper in the pipe and the 6-inch hole in the chimney is 6 inches higher than the range. The top of the chimney is higher than the main roof of the house. There are no trees within 35 feet of the chimney, but at that point there are a few trees that may be a few feet higher. I will be glad to have some one give me some light on the cause of this trouble and how to remedy it.

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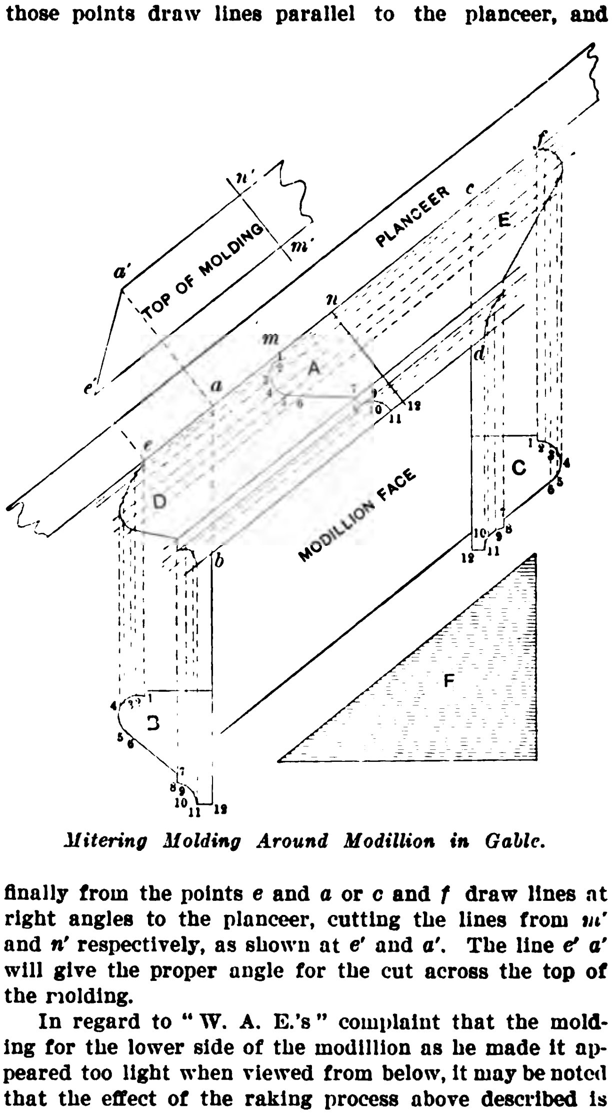
### Mitering Bed Molding Around Modillion in Gable.

*From* G. W. K., *Passaic, N. J.*—In reply to the request of "W. A. E.," in the March number of *Carpentry and Building*, for information regarding the moldings for the sides of a modillion head in a gable, let me say that the proper as well as the simplest method of obtaining the correct profiles of those moldings is to first make a draft on paper of the modillion front, as in the accompanying diagram, except that it must be drawn full size. Immediately below the planceer draw the normal profile of the molding so placed that its back or plumb surfaces shall be at right angles to the planceer, as shown at A. The simplest way to do this is to saw off squarely at both ends a short section of the molding to be used on the work, and, placing one end of it against the paper in the desired position, mark around the profile with a finely sharpened pencil. This operation can be repeated, placing a profile at each side, with its back plumb and against the side of the bracket or modillion, remembering to place them below where the final profiles are to be drawn, as shown at B and C.

Now with a pair of dividers capable of accurate adjustment divide the curved portions of the three profiles into the same number of equal spaces, and number the points in the same order in each, all as shown by the small figures in the diagram. From the numbered points in profile A draw lines parallel to the lines of the planceer, extending them into the spaces above the profiles B and C. In the absence of proper drawing instruments this can be done by placing the blade of a steel square in line with the planceer and then placing a straight edge or the blade of another square against the tongue of the first, fastening the same in position by means of weights so that the square may be slid along the straight edge to the position required for drawing the lines. Having completed this operation, shift the square so that its blade shall coincide with the vertical sides of the modillion, and, bringing its edge to the several points in the profiles in B and C, draw lines from each vertically to intersect with the line of corresponding number drawn from A, as shown. A line traced through the successive intersections in each will give the required profiles for the side moldings, as shown at D and E.

This operation does not result in profiles which are particularly graceful, but they are necessary to insure perfect miters. Moldings worked out to these profiles may have their miters cut in the miter box in the usual way if they are held with their backs, *a b* and *c d*, against the sides of the miter box while being sawed. The molding for the face, however, if sawed in the miter box, must be held at the angle of the planceer, which can be done by first cutting a block to the pitch, as shown at F, and placing the same under the molding in the miter box. If this is inconvenient, as it might be in the case of a roof of very steep pitch, the plumb cuts on the back of the face molding are shown by *a b* and *c d*, while the cut across the top may be obtained, as shown above the elevation, in the following manner: Set off the width *m n* of the top of the normal profile A on any line drawn at right angles to the planceer, as shown by *m' n'*, and through those points draw lines parallel to the planceer, and




*Mitering Molding Around Modillion in Gable.*

finally from the points *e* and *a* or *c* and *f* draw lines at right angles to the planceer, cutting the lines from *m'* and *n'* respectively, as shown at *e'* and *a'*. The line *e' a'* will give the proper angle for the cut across the top of the molding.

In regard to "W. A. E.'s" complaint that the molding for the lower side of the modillion as he made it appeared too light when viewed from below, it may be noted that the effect of the raking process above described is to increase the fullness of the rounding or convex parts as well as the hollowness of the coves or concave parts in the profile of the molding for the lower side, while in the profile for the upper side those parts are much flatter than in the normal profile, as will be apparent from an inspection of profiles D and E. This helps naturally to increase the apparent size of the lower and decrease the apparent size of the upper molding. A raking bracket is in itself an unsymmetrical element of a cornice, but as every gable or pediment has two sides, perfect symmetry is attained only when such a bracket is compared with one belonging to the other side. As a rule architects prefer to avoid when possible using brackets in gables of very steep pitch.

# ST. PAUL MECHANIC ARTS HIGH SCHOOL.

THE value of educating hand and head simultaneously is becoming more and more appreciated and the principals of manual training schools testify that proficiency in mental work increases with manual dexterity, and *vice versa*. An institution in which this dual training is applied is the Mechanic Arts High School in St. Paul, Minn. Here boys and girls are taught to do practical work with their hands while they are studying the usual high school subjects from text books.

Instead of substituting a certain number of hours of manual work for a corresponding number of purely class work, as is ordinarily done in the schools that have manual training departments, the St. Paul School, working on the theory that the hand work should increase the efficiency of the brain work by affording an exhilarating mental rest, adopted the plan of adding the shop work to the usual number of hours of study in academic branches carried on in other high schools. In other words, 32 periods in academic studies—the ordinary high school requirement—are supplemented by 8 in shop work and 8 in drawing, or 16 in addition to the ordinary academic work. It is held by the principal and his coadjutors that both academic and manual studies are necessary to the development of the mind, and that each makes the other easier and more tasteful to the young student; that what the world wants is not men who are more acute mentally or more dextrous mechanically, but men both mentally acute and mechanically dextrous, and the character of work done in the school and the enthusiastic alertness of the boys and girls enrolled in it testify to the correctness of the proposition. This system of adding manual work to academic work instead of substituting it hour for hour has been in operation for ten years and has demonstrated that the more strongly the academic side of the student is developed the more efficient he becomes also in mechanics, and *vice versa*.

The school is housed in a building that is insufficiently lighted, inadequate in size and not properly arranged for the work that is to be done. Eight times in its existence the school has been suppressed by political influence, but each time it has found champions sufficient to bring about its re-establishment. Notwithstanding these handicaps remarkable work has been turned out and is being produced to-day by the several hundred students enrolled.

The whole purpose of the manual training department as it is outlined and followed by George Weitbrecht, the principal, is to give the young people under his charge the means of making useful things outright, instead of merely teaching them to work with their hands to illustrate a principle, as was the custom in the earlier days of manual training. In mechanical drawing, for instance, the work from start to finish is that of making practical working drawings from real objects, and not from pictures of objects; and step by step the mathematical problems involved in mechanical drawings are developed by an analytical method, instead of being put before the student as a bewildering and distasteful task. About two hours a week are devoted to drawing, and drawing is a part of the course through the whole four years, the graduates being as a rule sufficiently proficient to take positions as mechanical draftsmen. Free hand drawing is taught in the same practical way, and this work includes drawing not only on paper but on wood, leather, textiles, &c., including designing of hangings, portières, cushions, designs for wood carving, furniture, &c., the purpose being to develop the latent talent of the student in creative work. One such piece, illustrated in Fig. 2, was made complete in this school, including the upholstery and cushion work, and was given a prize at the World's Fair recently held in St. Louis. Four periods are devoted to modeling in clay. The electrical course is in the hands of a practical electrician, and the young men and women are taught not only the theory but the practice as well, including laboratory and shop work and elementary electrical engineering. Students are required to measure resistance, electromotive force and currents, to determine efficiency of motors, to take cards from and determine horse-power of engines, to calibrate volt meters, ammeters and other electrical machines and to make life and efficiency tests of electric lamps. The Northern Pacific Railway, for instance, intrusts the tests of its lamps to this school, and from them places orders for very large equipments. The students are also taught to do wiring, and are given a practical course in electrical shop work, including the making of apparatus for carrying on the work of the department, installing switchboards, storage batteries, electrical lamps, rheostats, &c.

Fig. 1.—View in the Wood Working Department.

*The St. Paul Mechanic Arts High School.*

A course in chemistry is also provided, and one in surveying. The boys are taught the use of lathes, drills, planers and machine tools for working in both wood and metals. The instructor of the department is a practical mechanic, and he states that the work turned out by his boys is fully up to the average standard of machine shop practice. The boys in this department, for instance, built a 10 horse-power engine complete, except its fly wheel, and have also assembled and erected most of the machine tools used in the plant. Many wood turning lathes used in the school have been built by the boys in the machine shop. Throughout this work the utmost efforts are made to develop the inventive and creative powers of the students rather than to encourage them to become clever copyists of other men's work. In Fig. 3 is a view of the wood turning shop.

In the forge shop the boys are taught practical blacksmithing, including the tempering and forging of lathe tools, and make their own tools for use in the shops of the school. During their pattern making course they produce complete patterns for dynamos, lathes, small engines and the like.

The wood working department, a view of which is presented in Fig. 1, is in many ways the most interesting because of the enthusiasm with which the boys take up this work. The head of the department is a practical carpenter and cabinet maker. Beginning with first principles the students are gradually led up to designing and creating original work, and the art furniture built by students ranging in age from 13 to 16 years is of exceptional merit.

Fig. 2.—A Piece of Furniture Made by the Pupils.

Fig. 3.—View in the Wood Turning Shop.

*The St. Paul Mechanic Arts High School.*

Mr. Weitbrecht, the principal, when leading one through the school unconsciously indicates the secret of the school's success—namely, his own enthusiasm and energy. Another element of the success of the school, and one which leads to the immediate employment of most of the graduates at good wages in useful crafts, is the fact that instructors in each department have been taken not from other schools and academies but from workshops. The theory is that the instructors in the mechanical departments are there to teach mechanics and that the academic departments can take care of the niceties of grammar and rhetoric.

The illustrations accompanying this article were made from photographs furnished through the courtesy of Carl F. Bohn, one of the instructors of the school, who is head of the drafting department and who also gives instruction in photography to his students.

NEW YORK builders and architects condemn the use of wood which has been treated to a fire proofing process. They assert that it makes the wood subject to decay, that the fire proof qualities evaporate with time, and that in buildings which have been finished with such wood it will be necessary before many years to replace all the trim and doors.

## Present Basis of Architectural Practice.

One of the "signs of the times" is the rapid advance made by the architectural profession in gaining recognition of its professional status by the public, and particularly the Government, says a recent issue of the *Inland Architect and News Record*, in commenting upon the present basis of architectural practice. While it is a long period between Thornton and the supervising architect and others in active practice at present, the period is marked by a dark age in which the architect became a house carpenter and his art known to the public as that of a picture maker. In the last two decades this has been changed. The spark kept alive by Bullfinch and Walter suddenly burst into flame in that grand galaxy of artists led by Hunt, Richardson and Root, whose work, with those phenomenal creations, the tall office buildings of the commercial world, and the Columbian Exposition, representing the art in all its glories, has impressed on the public's slow imagination the province of the architect, and given him a place in the councils of the nation whenever an important work is projected. The profession has not been slow to take advantage of this recognition and we find that its members not only work out but plan those projects which tend toward the betterment of civilized life. It not only designs Government buildings, but has a voice which directs the administration of their design and construction. It is listened to in the administration as well as the designing of schools and is to-day most powerful in urging and obtaining the support of the people in beautifying and rebuilding of cities upon more artistic, convenient and sanitary lines.

## Put a Roof on the Wrong House.

A story comes from Louisville, Ky., of a contractor who received a contract for a new roof on a church in that city, and who in his haste to get the work done roofed the wrong structure. This has been equaled in New York by a German builder who erected an apartment house on the wrong lot. It was in the suburbs and in a semidetached character, so the thrifty Teuton thought he would save the surveyor's fee, as his house kept well away from the lot line and there was no danger of encroaching upon his neighbor. When he got his roof on he applied to a well-known financial institution for a loan. The bank promptly sent a surveyor, who surprised the old builder by telling him that he had built on the wrong side of the street. Fortunately the owner of the lot was a reasonable individual, so he swapped with the builder, who paid several hundred dollars bonus for the privilege. Hereafter he will employ a surveyor.

# WHAT BUILDERS ARE DOING.

THE quarterly meeting of the Builders' Exchange of Baltimore, Md., held in March was notable for the interest manifested in the progress which is being made by that organization and also by the presence and speech of Edward A. Roberts, the genial secretary of the Builders' Exchange of Cleveland. Secretary Hering of the local organization attaches a great deal of importance to the "'Change Hour," and has constantly urged upon the members the absolute need of its observance as a means of facilitating the business between builders and subcontractors and for the promotion of a healthier tone of business communication and dealing. As a result of his continued efforts the cherished ideal of the Baltimore organization has taken on new life and vigor, and "'Change Hour" is regularly observed to the great advantage of all connected with the membership.

One of the notable events of the meeting was the banquet and the speeches, doubtless the most important being that of Mr. Roberts, who had been invited to express his views upon "The Ways and Means for Promoting the Utility of an Organization Among the Building Trades Employers." The speech making, however, did not commence until a well served *menu*, including many Maryland delicacies, had been thoroughly considered. Then President Kelly made a few remarks, in which he expressed gratification at being again in possession of the rooms after the great fire of a year ago and enabling the Exchange to resume its daily business meetings. He spoke of the advantages the Exchange held out to members to visit the rooms daily from 11 a.m. until 1 p.m., when they could meet each other and discuss labor or business affairs or other matters having a bearing upon the building situation. In conclusion President Kelly introduced the guest of the evening.

Mr. Roberts commented interestingly upon the city of Baltimore and the rebuilding in the burned area, and then gradually led up to the relations existing between employer and employed, and to the causes of many of the present industrial woes. According to his idea the closer they keep together the better they will get along. He referred to the fact that the character and tone of an Exchange is directly determined by the individual aims of each member and that any custom or practice that militates against the prosperity of one operates against the prosperity of another, and that which conserves the best interests of one affects likewise the best interests of another. A few men may keep the institution going, but unless all join hands and strive for high ideals and mutual benefit it does not attain a full measure of its best success. After generalizing on the purposes and benefits of the Exchange the speaker gave a more specific illustration by directing attention to the organization in Cleveland, of which he was secretary and which is the largest in point of membership of any in the United States. He pointed out that while quantity was not so important an element as quality in an organization, he felt that the advancement of the last five years could not have been possible had it not been for a liberal supply of the latter essential. "In some respects," he said, "the Cleveland Exchange is unique and for this reason has attracted more than ordinary attention. It has successfully promoted a novel exhibition department, and has proceeded upon the broad basis of embracing in its membership all branches of the building industry, save the architect, and of keeping the latter in as close and friendly relationship as possible. The dealer in material and the subcontractor have the same rigths and privileges as the master builder or general contractor, and each appears to manifest the same interest in the prosperity and upbuilding of the institution. One of the principles of the Exchange is to have the subcontractor and the dealer on equal terms with the master." Mr. Roberts then gave some interesting statistics relative to expense and income of the Cleveland Exchange, of the regular office force and of the method for keeping track of the visits of members to the rooms during the day. At 11.30 each morning a "'Change Hour" session is held, at which some member is called upon to preside and a typewritten budget of information is read, such as notices of contracts awarded, invitations sent to the Exchange for proposals, &c. At these hour sessions discussions spring up on some timely topic and suggestions given to the directors for the correction of some abuse or the improvement of some condition. Daily bulletins are posted for the use of members, and it was stated that information of the sort indicated is given on more than a thousand separate jobs a year. In conclusion Mr. Roberts stated that the Builders' Exchanges of the country have demonstrated their usefulness by years of successful existence. "They should," he said, "be regarded as valuable aids to business, but cannot be expected to take the place of individual effort, enterprise and genius. Rather do they serve as a medium through which these forces may the more easily and successfully operate."

Following the address of Mr. Roberts the president invited an expression of views from some of the members and in response Frank G. Boyd, one of the most enthusiastic workers, in behalf of the Exchange, urged the members to carefully consider what the previous speaker had told them and to foster methods which would tend to bring the membership into closer relations one with another.

We are advised by Secretary Hering that great pride is taken in the fact that the treasurer, Charles H. Classen, and vice-president, Addison H. Clark, of the National Builders' Supply Association, are members of the Baltimore Builders' Exchange, and that the new president of the National Wholesale Lumber Dealers' Association, Lewis Dill, is a Baltimorean and a warm friend of the Exchange.

### Denver, Col.

An investigation of the local situation reveals the fact that more building is being done in the city at the present time than for several years past. A review of the building permits and real estate transfers recorded since the beginning of the new year shows that more money is being invested in this particular line than has heretofore been the case, and with this general awakening of activity the city may be said to be in the midst of a situation which very closely aproximates a "boom." The present prosperous condition in Denver and the State at large has inspired capitalists with a feeling of confidence, and there is a large investment in real estate. During the last few months contracts have been awarded for the erection of six large office buildings in the business districts, and projects are under way looking to the construction of other buildings designed to be used for business purposes. A large number of dwellings are in contemplation and much improvement of suburban property is likely to result.

### Fargo, N. D.

For some time past a movement has been on foot among the leading building contractors, as well as prominent dealers in builders' supplies, to organize a Builders' Exchange, something on the line of those existing in other cities of the West and Northwest. A few weeks ago a meeting was held at which George Rusk was elected temporary chairman and Thomas F. Powers acted as temporary secretary. The credit of the meeting was largely due to the enterprise of W. J. Price, who read the constitution and by-laws of the Builders' and Traders' Exchange of Minneapolis, and as the session proceeded Mr. Price was appointed a committee of one to codify the constitution and by-laws according to which architects may be admitted to membership in the Exchange in an honorary relation with the privilege of participating in the business meetings but having no vote. The object of the Exchange is to secure a just and equitable system of dealing, uniformity of commercial usages and the preserving and disseminating of valuable information regarding important matters connected with the building trades.

A committee on permanent organization, which was appointed, made its report and the following officers and directors were elected, the secretary to serve temporarily or until a suitable man has been found to perform the duties of permanent secretary, as it is the intention to secure one who shall devote all of his time to the interests of the Exchange:

President, Geo. Rusk.
First Vice-President, W. J. Price.
Second Vice-President, T. Ostbye.
Secretary, Tom Powers.
Treasurer, Harry T. Alsop.
Sergeant-at-Arms, John Schlanser.

Board of Directors: To hold office until first Monday in December, 1905: Stewart Wilson, E. J. Harrington, Geo. Sweetland; term expires first Monday in December, 1906: B. J. Howland, H. Johnson, J. H. Bowers; term expires first Monday in December, 1907: T. L. Sykes, T. C. Canniff, C. Johnson.

A Committee on Membership was appointed to consider applications and make nominations, consisting of C. H. Johnson, W. J. Price and Herman Boerth.

Quarters secured in the building with the Commercial Club were formally opened May 1, and a "'Change Hour" inaugurated. One of the rooms is used for the exhibition of samples of building materials and supplies.

### Houston, Texas.

The annual meeting of the Houston Builders' Exchange was held on the evening of April 24, when officers were chosen for the ensuing year as follows:

President, C. C. Wenzel.
Vice-President, B. A. Reisner.
Treasurer, E. Y. Hartwell.
Secretary, F. F. Arnim.

Other than the election of officers and a Board of Directors no business of importance was transacted at this meeting.

### Lowell, Mass.

The annual meeting of the Builders' Exchange occurred on the afternoon of Thursday, April 20, there being various reports presented, and officers were elected for the ensuing year. The organization was shown to be in a most flourishing condition, a good balance of cash in the treasury and the membership roll marking an increase. The officers elected were:

President, Charles F. Varnum.

Vice-President, Cyrus Barton.

Secretary, Herbert R. White.

The directors elected were Joseph B. Varnum, Thomas F. Costello, E. A. Wilson, J. Adams Bartlett, Charles M. Forrest and Patrick O'Hearn. The treasurer is to be chosen by the Board of Directors.

At 7 o'clock the members marched to the dining room of the St. Charles Hotel, where the eighteenth annual banquet of the organization was held. After the many good things provided had been properly considered, President Varnum rapped for order and introduced Frank L. Weaver as toastmaster. Mr. Weaver paid a handsome tribute to the exchange, and pointed out that the first president was afterward Mayor of the city and that among the honorary members was ex-Mayor Charles E. Howe. Mayor Casey was introduced, and made some remarks, in which he stated that the Builders' Exchange was an institution of great benefit not only to those who composed it but to the business and other interests of the city. By associating in the Builders' Exchange, he said, "there is offered opportunity for an exchange of ideas, for a discussion of methods of doing things, for consideration of problems peculiar to the business and for union in matters of policy." He pointed out that an organization like this eliminates many of the petty jealousies and rivalries which often lead to unwise and bitter business conflicts, the final result of which may be disastrous to the parties involved. The builder, he continued, plays an important part in every community, our mills, our workshops, our business blocks, the beautiful dwellings of our people are monuments to his energy and skill. Out of the rough unfinished mass of various materials the builder takes each article, fashions it in the proper way, places it in its correct position, and when he concludes his labor a completed structure is the result. Hon. Charles A. Stott was next introduced, and he entertained the members with numerous dissertations which kept them in a constant roar. He was followed by Major Robert J. Crowley, the last speaker of the evening being W. H. I. Hayes.

### New York City.

During the past month the building situation in the city has been materially improved by the signing of an arbitration agreement which will tend to prevent strikes and lockouts. Through this arrangement employment will be given to thousands of mechanics, and it is expected that building operations will take on a new lease of life and afford opportunity for making up in some measure for the time which has been lost during the past two years. It is well known that there is a dearth of flats and apartment houses in the city, the result of which has been seen in constantly advancing rents, and if a fresh impetus can be given to the construction of buildings of this kind it will largely tend to restore the equilibrium. Thus far the present year the amount of building projected is largely in excess of the corresponding period of 1904, and all indications point to an immense amount of work before the season is closed. Since January 1 there were issued in the boroughs of Manhattan and the Bronx 1556 permits for building improvements, estimated to cost $54,686,000, as against 962 permits for buildings calling for an estimated outlay of $30,475,000 in the same time last year. These figures do not include the amount spent for alterations and additions, which are respectively $5,368,000 and $3,715,000 for the two periods.

Notwithstanding the record breaking volume of building in Brooklyn last year, the figures covering the period since January 1 show a handsome increase as compared with a year ago. From January 1 up to the time of going to press 2645 permits had been issued for buildings estimated to cost $18,989,000, which compare with 1887 permits for buildings costing $11,771,500 in the same time last year.

The Superintendent of Buildings has just issued his report for the year ending December 31, 1904, from which it is learned that plans and specifications for new buildings filed and acted upon in the Borough of Manhattan during the period named were 1005, covering 1423 building operations estimated to cost $75,267,780. Of this total $43,607,750 was for tenement houses costing over $15,000 each and $2,600,000 was for dwelling houses. The estimated cost of the office buildings projected was $5,061,750, for stores $6,000,000, for hotels and boarding houses $4,365,000, for manufactories and workshops $4,249,000 and for school houses $3,285,000.

At the recent meeting of the new General Arbitration Board of the Building Trades Employers' Associations and the various unions an Executive Committee was elected, as follows: For the employers—James R. Strong, electrical contractors; D. W. O'Neill, manufacturing wood workers; Frederick Usher, mason builders; R. F. Tucker, cement workers; C. G. Norman, metal covered door and window manufacturers, and Charles Kelly, mosaic employers. For the unions—D. J. O'Mahony, steam fitters; William Mason, marble cutters; John Issing, modelers; Charles Dinsmore, cement masons; G. H. Reed, metal lathers, and William A. Parsons, journeymen plasterers.

Otto M. Eidlitz was re-elected chairman of the Arbitration Board, and D. J. O'Mahony of the Steam Fitters' Union was elected vice-chairman. The headquarters of the General Arbitration Board, hitherto in the Building Trades' Club, will hereafter be on the sixth floor of the Townsend Building.

As a result of continued efforts in that direction, a union of the Brooklyn Association of Dealers in Masons' Building Materials with the New York Association was brought about on May 2. The officers of the association are Francis N. Howland, president; John A. Philbrick, vice-president; J. D. Crary, secretary, and Nathan Peck, treasurer.

At the recent annual election of the Architectural League, held in its rooms in the Fine Arts Building in West Fifty-seventh street, the following officers were elected for the ensuing year: President, Richard H. Hunt; first vice-president, Karl Bitter; second vice-president, Joseph Lauber.

### Pittsburgh, Pa.

The differences which for over ten weeks existed between the building contractors and the carpenters' unions in Pittsburgh were amicably adjusted early in May, and announcement was duly made of the suspension of the lockout which went into effect on February 1. The trouble grew out of a difference as to when the annual contract should expire, the union men asking for the agreement to terminate May 1, while the contractors wanted it to expire the first of the year. A compromise was reached, as a result of which the contract will expire March 1.

The uniform working rules of the Master Builders' Association, which were adopted, are similar to those which have been recently published in these columns, with the exception of some minor changes. In regard to wages it is stated that the minimum for journeymen carpenters shall be 43¾ cents per hour and the minimum rate of wages for foremen shall be 50 cents per hour.

The Master Builders' Association held its annual meeting in the Herron Building, Seventh street and Penn avenue, on the evening of Wednesday, April 12, when officers were elected for the ensuing year, as follows: President, J. Charls Wilson; vice-president, R. J. Graham; secretary, R. K. Cochrane, and treasurer, John S. Elliott.

### Rochester, N. Y.

According to the figures compiled by the Bureau of Building and Combustibles in the city of Rochester all records for building operations were broken in April, and the "boom," as it may be termed, which began several months ago shows little or no signs of abatement. The figures show that 228 permits were issued in April of the current year for building improvements, estimated to cost $955,412, as against 149 permits for improvements, costing $764,112, in April of last year. Taking the record for the first four months of the year there is an increase over 1904 of $621,282. The most important structure for which a permit was issued in April is the new building of the Buffalo, Rochester & Pittsburgh Railroad Company, which will cost $200,000. Some of the other buildings for which permits were issued include a section of the Sibley, Lindsay & Curr Building, to cost $125,000; a scientific building on the campus of the University of Rochester, to cost $75,000; remodeling the Alliance Bank, $15,000; a private dwelling for William E. Stone, to cost $20,000; two others, to cost $12,000 each, while there are numbers ranging in cost from $4000 upward.

The carpenters and contractors of the city have agreed on the plan arranged by the Arbitration Committee of the Carpenters' and Joiners' unions and the arbitrators of the Carpenter Contractors' Association, by which the 2½ cents an hour advance offered by the contractors went into effect May 1 instead of on June 1, the date originally fixed upon by the contractors.

### Notes.

The amount of building which is in progress in Muncie, Ind., is such as to create an unusual demand for bricklayers, carpenters, painters, hod carriers, lathers, sheet metal workers, plumbers and other craftsmen. It is estimated that buildings aggregating in value more than $500,000 are to be erected at once and there are few idle men in the city.

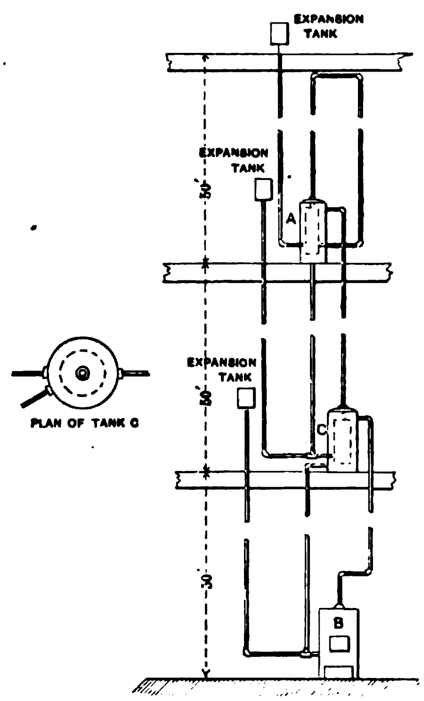
Paterson, N. J., is enjoying an unusual degree of activity in the building line, the permits issued during the month of April calling for an estimated outlay of $128,669. This is a large increase over the preceding month, when the total was $88,222. Henry Kimball, Building Inspector, regards the outlook as most encouraging.

Building operations are being conducted upon such a scale in Springfield, Mass., as to create a sharp demand for competent mechanics. Houses and blocks of dwellings are being erected in all the growing districts, and the city promises to make a record for buildings this year unequalled in recent history.

## Hot Water Heating in High Buildings.

The heating of buildings when the hight exceeds 50 to 75 feet is usually accomplished by the means of steam rather than water. This is wholly on account of the increased pressure on boiler and valves for greater hights, though there are buildings at present heated by hot water where the hight exceeds 150 feet. However, a method proposed at a meeting of the American Society of Heating and Ventilating Engineers by William C. Vrooman, Schenectady, N. Y., gives the advantages of hot water heating with no danger of bursting either the valves or the boiler. This method, which is shown in the accompanying illustration, consists of an ordinary boiler in the basement having radiation of two or three floors connected to it.

It will be noted that the system comprehends practically a series of hot water systems, each of which is warmed by the water of the system immediately below it. In other words, the lowest section of the system comprises an ordinary installation of hot water heating apparatus, with the heater or boiler marked B and the expansion tank at the highest point. The radiation connected to the hot water mains is not shown. The essential feature of the system is, however, indicated in the illustration and consists of a double tank, with one compartment inside of the other. As shown in the drawing the outer compartment contains water of the system below it, while the inner chamber receives water from the section of the system above it. It will thus be seen that the water passed through the inner chamber is warmed by the water circulated through the outer chamber. In this way the heat absorbed in the main heater B is transmitted through the medium of the hot water in circulation to the secondary or auxiliary heater, as the concentric construction tank may be called, and from this heater by the second circulating system to the next auxiliary heater, and so on.




Hot Water Heating in High Buildings.

This division of the heating system can clearly be continued indefinitely, but if the intervals between tanks are made, say, about 50 feet the conditions will coincide in respect to pressures with ordinary practice in hot water heating. There will, of course, be a slight drop in the temperature from system to system, but it is not felt that this decrease in temperature will be so great as to necessitate any additional radiation other than that required in the ordinary case. It is probable that in very cold weather the water in the main boiler could be heated to a relatively high degree, as the water is under a pressure, under the conditions stated, of between 20 and 30 pounds, and this pressure requires the water to be at a temperature of over 250 degrees F. before it can be converted into steam.

This subject is offered largely as a possible method of treating the problem of heating high buildings by hot water without high static pressures, although such have been tried. There are, of course, installations in use in lofty structures where hot water radiation is employed with provision for warming the hot water by means of steam supplied at points relatively near the hot water radiation. The mains of this class of heating plant conduct the steam to tanks or chambers on every floor, from which in turn are taken the branch heating pipes to the radiation surface. Usually in these systems the water of condensation formed from the steam is allowed to collect in these chambers and to serve to keep up the supply of hot water, so that the heat of the steam as well as that of the condensation is utilized so far as possible.

## Graduation Exercises at the Massachusetts Charitable Mechanic Association Trade School.

The closing exercises of the Massachusetts Charitable Mechanic Association Trade School were held in the building on Huntington avenue, Boston, Mass., on the evening of Thursday, March 30, and constituted a most interesting affair. The speakers of the evening were introduced by Mr. Wood, the principal of the school. Mr. Morse of the Rindge Manual Training School, Cambridge, made the claim that it was their old organized association, founded 110 years ago, that introduced the first trade school in America. In 1828 a school was started to advance the apprentice, but at that time more attention was given to developing the mind than to manual training. The employer had more time to devote to his apprentice or beginner, as he came more closely under his observation; but in the present day of specialization all of the employer's time is given to the larger details of the business, and he has no time to watch the boys, who, if they acquire a trade, must do so by association with the different journeymen they help. This method has proven unsatisfactory, and the trade school is the natural result, and in the opinion of Mr. Morse it will eventually become as much a part of the public school as the elementary schools for reading and writing.

William H. Sayward, secretary of the Master Builders' Association, made some interesting remarks in the course of which he impressed upon his young hearers the necessity of putting forward the best foot and trying to become a better mechanic than his fellow workmen. He said that if a boy came to the trade school with the idea of gaining as little knowledge as possible to get along, his time was wasted and he had better remain away. There is plenty of room for the skilled mechanic, and never in the history of the country, he said, was there a greater demand for the skilled mechanic in every trade.

Ira G. Hersey, president of the association, expressed the hope that the boys who were leaving the school would realize that there were still some things to learn from the journeymen with whom they were to be associated in their work, and not give the impression that they knew it all. The school had done its best to help them, but there still remained many things for them to learn.

After concluding his remarks he presented the boys of the different classes with their diplomas. As indicating the desire and earnestness of some of the pupils to acquire a knowledge of a practical trade, it may be stated that two of them had a distance of 25 miles to travel each way to the school, and one from Ashland had a round trip of 60 miles to make three evenings a week.

THE Massachusetts Legislature has deferred until 1906 the revision of the building laws of the State, which was embodied in a report of a special commission. The report came up for some preliminary hearing before the Committee on Mercantile Affairs, but no discussion of the details was reached. The postponement of analytical consideration of the matter until another year was decided upon at the request of the parties most vitally interested, who wished more time for study of the questions involved.

## A Model Retail Hardware Store.

Architects and builders all over the country are interested in the arrangement and construction of what may be regarded as model buildings, whether designed for dwelling or business purposes, and the plan which we present herewith of a convenient retail hardware store may not be without suggestive value. It represents the new store which has just been occupied by Hammacher, Schlemmer & Co., at 127 to 133 Fourth avenue, corner of Thirteenth street, New York City. The building, of which the lower portion of the front is presented in the first engraving, is seven stories in hight, exclusive of the basement, the frontage on Fourth avenue being 62 feet, and there is a 40-foot L facing on Thirteenth street. In the illustration a good idea is conveyed of the appearance and extent of show windows, with prism glass above; also of the entrance, which is modest, yet inviting, with two pairs of swinging glass doors and vestibule between. The general arrangement of the first floor of the main building, used for the retail department, is shown on the plan on the page which follows, the location of the shelving, counters, showcases, with lines of goods, rooms and offices being clearly indicated.

The first floor, as stated, is devoted to the retail department, the second floor to general offices and sample room, the third floor to receiving and shipping rooms and offices used in connection with these departments, while the fourth, fifth, sixth and seventh floors, together with the basement, are used as stockrooms. The L portion of the establishment is devoted to private offices, cloakrooms, lavatory, electric passenger elevator, &c. Metallic lockers are provided for employees, and there is a room which the female employees make use of as a lunchroom. The building is thoroughly up to date in all its appointments, being specially designed to meet the requirements of the business indicated. Among the modern improvements may be mentioned the pneumatic tube service, operated by an electric motor in the basement, having tubes extending to all floors; dumb waiters on the north and south sides of the building, with a freight elevator connecting the basement with all floors; a telephone service connecting all floors, electric clocks, gas and electric lights, hot and cold water, rolling store ladders, &c. In the general arrangement and in all its details the store embodies the result of experience and expert knowledge, as well as great care to secure for each kind of goods the special accommodations and treatment which, all things considered, will be found in actual practice the most convenient and desirable. While great care has been taken in determining the general arrangement, much attention has been given to the accommodation of each separate line, as well as to the smallest details. This is shown in the various methods, for example, in which samples of goods are displayed and in the various ways in which they are attached.

Among the lines of goods carried are cabinet, piano and builders' hardware; bolts, nuts and screws; general factory supplies and tools for all trades. The principal business is supplying manufacturers and dealers direct and for this reason salesmen travel throughout the United States east of the Mississippi and through a large portion of Canada.

In this connection it may not be without interest to make some reference to the history of the concern. The founders of the firm of Hammacher, Schlemmer & Co. were engaged in business on the Bowery as early as 1848, but just how much earlier is not definitely known. The location was at first 221 Bowery, but in 1857 the business was moved to 209 Bowery, where it continued until October, 1904. In 1893 the business was incorporated under the laws in the State of New Jersey but the name of the concern was not changed.

A number of changes have, however, occurred in the personnel and style of the firm since 1848. In the year 1859 A. Hammacher entered the firm and in 1867 William Schlemmer was admitted to partnership, but it was not until 1883 that the firm name was changed to its present style. In 1892, Mr. Hammacher ceasing to take an active interest, the charge of the business was left to William Schlemmer, who is now president, treasurer and general manager. Mr. Schlemmer was born of German Lutheran parents in Westphalia, Germany, April 20, 1841. He came to American in 1853 and began his commercial life with the business with which he has since been identified, nor has he been engaged in any other enterprise. The business has grown so that from time to time additional space has been required for storing surplus stock, and when the corporation moved to its present location at the corner of Fourth avenue and Thirteenth street it was occupying an equivalent of 12 rooms 24 x 100 feet in the vicinity of the Bowery store.

**Fig. 1.—Show Windows and Front of Store Building.**

*A Model Retail Hardware Store.*

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THE nineteenth report of the Baron de Hirsch Trade School, 224 East Sixty-fourth street, New York City, has been compiled by the superintendent, J. Ernest G. Yalden, and contains much that is of unusual interest. In this school manual training covers the trades of carpenter, pattern maker, plumber, electrician and house and sign painter. The report contains a number of tables showing the occupation of the students before and after graduation, and shows that 85 per cent. are working at their trades, while the increase in wages as the result of their graduation from the school is from 20 per cent.

upward, in many instances graduates more than doubling their weekly income. This shows not only a substantial increase in the prosperity of the students, but also the high character of the instruction received, and is only a fair representation of the benefits which attend the instruction given at a trade school.

## School of Architecture.

The School of Architecture of Columbia University has just issued its new programme of studies for 1905, from which we learn that beginning with the academic year 1906-7 four classes of students will be accepted. These four classes will be in existence during the academic year 1905-6, except that the requirement for candidacy for the degree of B. S. in architecture will be the same as for the Schools of Applied Science. One class will consist of graduate students who have already obtained the Bachelor's degree in architecture or its equivalent, either in Columbia University or elsewhere and who wish to

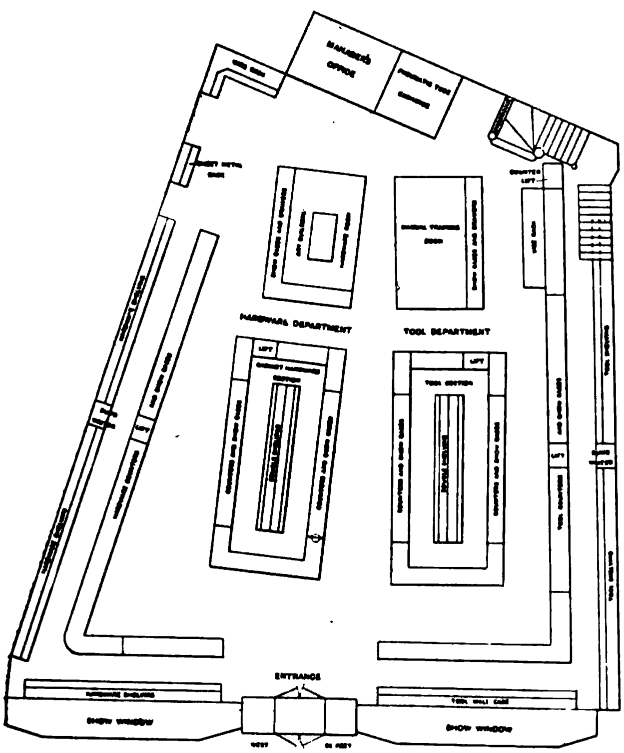

Fig. 2.—Main Floor Plan, Showing Arrangement of Retail Department.

*A Model Retail Hardware Store.*

pursue advanced studies in architecture, whether as candidates for the higher degrees or not. Those eligible to the second class will be candidates for the degree of Bachelor of Science in Architecture who have completed at least two years of study in a college or scientific school, or who have had an equivalent training. The third class will consist of candidates for the Certificate in Architecture, who must offer evidence by examination, or otherwise, of a good general secondary education, and the fourth class will be made up of special students not candidates for a degree or certificate who have had at least two years of professional office experience or other equivalent training, and who may select their own courses of study, subject to approval by the faculty.

The School of Architecture offers a curriculum of professional study leading to the degree of Bachelor of Science in Architecture and a curriculum leading to a Certificate in Architecture which covers the greater part of the course for the degree and entitles the holder to register for practice, without examination, under the Architects' License laws of New Jersey, Illinois and California. The curriculums are indeterminate in length, the degrees and certificates being granted when their respective requirements have been satisfactorily fulfilled. Ordinarily the curriculum for the degree will require four and a half or five years and that for the certificate a somewhat shorter time. Draftsmen who have had not less than two years' experience in architecture or in the allied arts and sciences and others who may be found qualified will be admitted without examination as special students—not candidates for a degree or certificate. The instruction in design which constitutes the course of the professional training offered by the school begins in the first year.

The courses of instruction of the School of Architecture are in large measure given by lectures, accompanied by original work in the library and drafting rooms. The subjects treated include the history of architecture and of ornament, covering three years the theory of design including color, composition and the decorative arts, covering three years; the mathematics and engineering of architecture, covering two to three years according to the proficiency of the student; construction and practice including specifications and building materials; also graphics including descriptive geometry, stereotomy, advanced shades and shadows and allied subjects. Freehand drawing and modeling occupy from four to six hours a week throughout the course, covering work with the pencil, pen, crayon, charcoal and brush in black and white and in color, from the copy, the object and from life. In addition thorough practice in decorative modelling is given.

Detailed information relative to graduate fellowships, equipment, official and private studios, fees and student employment, can be obtained through correspondence with the executive head of the school, Prof. A. D. F. Hamlin, 607 Havemeyer Hall, Columbia University, New York City.

# New Publications.

**How to Manufacture Concrete Hollow Blocks.** By Paul Wilkes; 16 pages; pamphlet form; paper covers: published by the author. Price 50 cents.

This little pamphlet by a well-known architect and civil engineer is intended as a text book for all who manufacture hollow blocks or use concrete in any form. The rapidly increasing use of cement in connection with building construction and more especially in the form of hollow blocks, machines for the manufacture of which are now being turned out by numerous concerns scattered over the country, renders especially timely and appropriate the information presented in the pamphlet in question. Not only does the little work tell how to make concrete hollow blocks but it also describes several methods of manufacturing water proof stone, together with proper mixing proportions of concrete, etc. Tables are given showing the material required under varied conditions, while more or less data relative to weights and measures of cement are among the concluding features of interest.

**Elementary Practical Building Construction.** By Frank W. Booker. 280 pages. Size, 5 x 7½ inches. 727 illustrations. Bound in board covers with side and back titles. Published by Longmans, Green & Co. Price, 90 cents postpaid.

The matter contained within the covers of this little work is based upon notes for the author's lectures to students at University College, Nottingham, the syllabus of the Board of Education having been kept in mind throughout, although the author states he has not limited himself to it. The work is made up of 18 chapters and four appendices followed by a comprehensive index alphabetically arranged. After a short introduction the subject of brick work is taken up, illustrations being presented showing various styles of walls, bonding, footings, piers, tools, &c., after which the prevention of dampness striking through to the interior of walls is considered. This is a phase of building which is constantly meeting with attention, as problems are all the time confronting the builder as to the best means of keeping the dampness out, rather than allowing it to come into a building. Brick arches and chimneys constitute another chapter, after which stone work is considered, beams and cantilevers, carpentry, covering materials and joints, floors, roofs, partitions, &c., then plastering, slating and tiling, plumbing and joinery. This brings the reader to the fifteenth chapter, which is devoted to iron and steel work, after which the subject of drainage is considered, then ventilation and warming, and finally painting, distempering and papering.

In the appendices we find a short chapter on mensuration, another on building materials, while the remaining pages are given up to questions selected for the most part from papers in the science and art department examinations of the college referred to. While the book has been written from the English standpoint, there is within its covers much that will prove of interest to American readers.

## Ownership of Plans.

The question is constantly coming up for satisfactory answer as to the right of possession of plans prepared by an architect—whether they remain his property or ultimately belong to the owner of the building for which they were drawn. No little discussion of the subject has appeared in the trade press, but without reaching a conclusion which could heretofore be regarded as altogether satisfactory. A case was recently tried in the English Courts which would now seem to pretty well settle the vexed question, as least abroad. The action was to recover from an architect possession of plans, specifications and papers, and the defense set up was that there was a custom in the profession which entitled the defendant to retain the plans, &c. Justice Ridley refused to accept any evidence of the alleged custom and, holding himself bound by a previous decision, he ruled that the plans belonged to the building owner. From this decision the defendant appealed. His counsel argued that, notwithstanding the decision on the previous case (Ebdy *vs.* McGowan), the appellant was entitled to retain the plans unless there was an express stipulation to the contrary. His point was that the essence of this contract between the building owner and the architect was that certain work should be done, and not that certain things —*i. e.*, the plans, specifications, &c.—should be sold. The contract was that the work should be properly completed and properly supervised. He contended that the building owner had the use of the plans, but that the property in them remained with the architect. He also submitted that the learned judge should have admitted the evidence as to custom.

The Master of the Rolls was, however, of opinion that the judge was right in excluding this evidence, observing that it was no evidence of custom to tell the court what the architects thought they ought to be. His lordship went on to say that this case was clearly governed by Ebdy *vs.* McGowan. The architect was employed under a written contract. To his mind there was no real, adequate ground for assuming that a custom did exist as to the possession of plans by the architect. But if such a custom did exist, he held that it was so unreasonable after the decision in Ebdy *vs.* McGowan that it could not be maintained. This was the view he took, and he thought the building owner was entitled to everything incident to the contract. The true effect of the contract was that the property passed to the owner who made the contract. He thought Justice Ridley was right in the conclusion at which he had arrived. He had decided the case on the authority of Ebdy *vs.* McGowan, which was decided many years ago, and that decision had never been questioned. It was perfectly good law and, in his opinion, ought to be followed. The appeal would, therefore, be dismissed. The other judges concurred.

After this strong expression of opinion by the Court of Appeal the point may now be considered to be definitely settled. In view of the importance of the subject to both architects and building owners, it is, perhaps, satisfactory to have a definitive ruling, as there have been several cases recently.

In a lecture on lightning rods recently delivered by Sir Oliver Lodge he called attention to a very common error, which is to make the rods of too great conductivity. He stated that a small cross section should be used, and the rod be made of iron rather than copper, as the rod of less resistance passes the current too quickly and produces a shock, due to the inductive effect, besides being liable to side flashes, while a light iron wire causes the current to leak down more gradually, and perhaps to fuse the wire in so doing, with little perceptible disturbance. A number of conductors are better than one, and may be readily renewed.

## Forestry Building at Portland, Ore.

The Forestry Building, which will be the most unique structure shown at the Lewis and Clark Exposition at Portland, Ore., this year, has been completed. The building is constructed of logs of large proportions bearing the mother bark. Ninety-two giant firs, a number of them over 6 feet in diameter, support the roof of this building. It contains two miles of 5 and 6 foot fir logs, eight miles of poles, 43,000 fir shakes and 30,000 fir bark shingles. The largest log is 7 feet 9 inches in diameter and it required 112 horse-power to raise it into place.

## Charles Gittus.

We are in receipt of advices from Auckland, New Zealand, making inquiry in regard to Charles Gittus or Gittos, a carpenter, who left New Zealand for America about the year 1893. Friends are desirous of learning his whereabouts or of any member of his family, and would be glad to have any one possessing information correspond with P. Cotton, 1371 Stevenson street, San Francisco, Cal.

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COTTAGE ERECTED FOR MRS. J. H. KNAPP ON SIXTH STREET, PLAINFIELD, N. J.

A. F. LEICHT, ARCHITECT.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

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JULY, 1905.

## Night Schools for Young Men.

Although the extension of the trade school movement in this country has not been as rapid or as general as those interested in the industrial advancement of American youths could desire, nevertheless more facilities than ever before are offered to-day to employees to make up, by study out of working hours, for any deficiency in their education. The various correspondence schools are doing excellent work along this line, but the instruction furnished by these agencies is not within the reach of many young tradesmen, whose limited means make the fees prohibitory to them. In most of the larger cities, however, as New York, Philadelphia, Chicago and Boston, night schools are maintained by the Boards of Education at the public expense which provide splendid opportunities to such young men. By devoting a couple of hours to study on two or three evenings of each week any young man who is desirous of advancing himself in his trade or business can add materially to his mental equipment. Some of these night school courses include a very wide field of instruction, embracing in addition to the ordinary educational lines a number of special subjects, an acquaintance with which will help the ordinary young mechanic incalculably on his road to success. Not a few of the public night schools, for instance, furnish instruction in mechanical, architectural and free hand drawing, while courses in chemistry and physics are a feature of some of them. These courses are designed chiefly for young men engaged in the mechanical trades. Bookkeeping and commercial arithmetic are other useful subjects which are taught in almost all of the night schools, some giving an advanced course of instruction, including the handling of a complete set of books of entry and business forms of all kinds, and the conduct of actual transactions in various departments of business. Typewriting is also largely taught in such schools in recognition of the fact that familiarity with the use of the typewriter, irrespective of stenographic knowledge, is a useful and even valuable asset in nearly all lines of business. Thus the young man in a city who by force of circumstances has been obliged to go out into the world to earn his living at too early an age to have been able to secure even a moderately complete education is given the opportunity to supplement what general and trade knowledge he possesses by acquirements that will add marvelously to his capacity to forge ahead in his chosen line of work. The public night schools in our large cities are second to none in value as an elevating influence in our modern American life.

## Technical and Theoretical Training.

There seems to be no limit to the demands that are made upon the people of the present day, and those who would fit themselves properly for their life work must use the short time for preparation to better advantage than their predecessors. It is unreasonable, however, to expect those who are thus preparing to provide means for securing the character of instruction which the modern demand requires. It would seem to be the duty of institutions of learning to recognize practical requirements and take steps to supply them. A few colleges are taking the necessary action to supply the new demand of providing a partial practical training while the theoretical instruction is being given. There is, however, a great need that this shall be more widely done and that all of the larger colleges shall include work shops as well as libraries, where the practical side of the theories taught may be demonstrated and their application understood by the students. Some go so far as to claim that the time and energy now spent in football, rowing, baseball and other field sports are wasted and all of the advantages derived from this exercise in the fresh air would be attained by profitable employment in well ventilated and well equipped practical manual training shops under the instruction of capable advisers. The young man who is to be an architect, a superintendent of construction, a sanitary engineer, a heating engineer, or who is to help his father in conducting a long established building or other business, should not be put to the expense in time and money of acquiring a theoretical college training, then several years later learn that still other years are needed to make his theoretical training of practical value. It is the experience of all graduates that considerable energy must be expended in the endeavor to reconcile their theoretical information with the practical experience that develops in a business career. It is an opinion that needs no further support that institutions of learning should not turn out their graduates half qualified for their life work when the provisions of proper equipment would enable the instruction given to equip the graduates more perfectly for useful work in any line they might take up. The most enthusiastic supporters of the demand for a departure from the old system of college training thoroughly appreciate that experience in contact with actual business is the only way in which experience on some points can be gained, but they are equally positive that the young man entering his business career can be infinitely better prepared for his life work if college professors and college management would listen to the crying needs of the hour and make arrangements to satisfy them. Common sense seems to indicate that the college curriculum should be so changed that the three or four years now spent on the course in securing a degree would be sufficient also to get a perfect practical knowledge through the application of the information gained from study under expert supervision and instruction in the college shops.

## An Important Labor Decision.

The recent decision of the United States Supreme Court declaring invalid the New York law limiting the hours of labor in the bakeries of the State will probably have a wide influence, though no one can tell precisely in what direction the influence will work. So far as the decision will directly affect existing conditions in the building and allied industries its results would seem to be without serious import, but the indirect results in all employments of labor can be only conjectural. In this particular case the law provided that no proprietor of a bakery should permit an employee to work more than 60 hours a week. An employer was fined on the charge of violating this law, and appealed, the Appellate Court of the State upholding the decision of the lower court, whereupon the case was taken to the United States Supreme Court, which held that the law interfered with the free exercise of the right of contract between individuals. The decision may have the tendency to discourage future State legislation to restrict hours of labor. While such legislation is sometimes in the interest of common humanity, it is usually a part of the plan of trade unionism, under a mistaken impression that what is best for the employer cannot be for the best interest of the workman. If one State could establish an eight-hour limit of work while other States had no such restrictive laws industries would either be driven out of the State or out of business, because competition would not permit of such a handicap. Possibly the result of the decision will be a renewal of the attempt to influence Congress to enact a constitutional amendment to permit of national legislation restricting hours of labor. It would probably be better to leave the whole question, so far as certain lines are concerned, to the natural evolution which has changed business sentiment into the present none too arduous condition as to the hours of labor. It is to be hoped that the Supreme Court's decision may not prove to be as much of a menace as it is a logical rendering of the laws.

## Mason Material Dealers' Association of Connecticut.

For some time past leading dealers in mason builders' materials in Connecticut have been considering the formation of an association along lines which would tend to the better promotion and protection of mutual interests. Various conferences were held with this object in view, and on May 6 the Mason Material Dealers' Association of Connecticut was formed, the organization being perfected and a constitution and by-laws adopted at a meeting held at Hartford on Friday, May 26. There were 21 cities of the State represented, and it was decided that the headquarters should be in Middletown.

The principal object of the association, as laid down in the constitution, is "the protection of its members against unjust competition by manufacturers and wholesalers for the trade of the consumer by the diffusion of all legal and proper information which may be of value to any member or members as to the nature of such competition." It is also the aim to correct trade abuses, afford protection against unjust exactions and procure uniformity in trade usages.

The officers elected for the ensuing year are:

President, W. H. R. Du Bois, Bridgeport.
First Vice-President, E. S. Davis, Middletown.
Second Vice-President, A. A. Jackson, Hartford.
Secretary, W. C. Robinson, Middletown.
Treasurer, E. B. Robinson, Winsted.

The directors elected are as follows: W. L. Damon, G. W. Hill, A. H. Chappell, F. H. Johnson, E. P. Pelton, E. I. Atwater, T. F. Bailey, O. E. Swift and H. C. Godfrey.

The organization starts out with a membership of 30, and brilliant prospects of many additions at the next meeting which will be held on June 28.

## Model of the New Columbia University.

In a frame building covered with corrugated iron which has just been completed on the Columbia campus in front of Havemeyer Hall, there will be placed an elaborate model of the Columbia University grounds as they will appear with all the new buildings now being erected in a completed state. The model will show the University grounds from 114th street to 121st street, with the 21 structures that will then comprise the University buildings. On South Field will be shown Hamilton Hall, the new Fine Arts Building not yet commenced, the two dormitories, Hartley and Livingston halls, now nearly finished, and a plan of the athletic field. The lot between 116th and 120th streets will have on it Havemeyer, Fayerweather, Schermerhorn and Engineering halls and the Low Memorial Library, all of which are finished: St. Paul's chapel, the School of Mines Building and University Hall, all of which are partially completed, and the School of Journalism Building, not yet started. Barnard College, Teachers' College, Horace Mann School, Thompson Gymnasium for Women and the three women's dormitories will make up the rest of the plan. It is expected that the model will be finished within a year.

## Heating by Electricity in Switzerland.

The patriotic American citizen is reluctant to think that any other country has surpassed our achievements. This is especially true in connection with the applications of electricity. We use it chiefly because it is a convenient agent for supplying power to machines and is easily controlled when used for lighting purposes. In Switzerland, where there are no coal mines but where there is an abundance of water power, the application of electricity has reached a very high state of development. It is not strange, therefore, that in Switzerland heating by electricity has received more attention than has been given to it in the United States. In the little town of Davos, situated among the Swiss Alps, two immense sanitariums are heated entirely by electricity. The use of electricity is not only an advertisement for the sanitariums, but it has the merit of keeping the air free from the contaminating influences of soot and smoke, an important consideration where the health of patients is concerned.

The power, which is furnished at a reasonable cost, is obtained by harnessing two mountain streams, the Landwasser and the Albula, which have a fall of about 1300 feet. The town covers a district of about 2 miles long and ½ mile wide, and in this space the large hotels and sanitariums are grouped. A central station, containing five units of 3000 horse-power each, was originally built with the expectation of furnishing all the electricity needed, but provision was soon made for extensions. Each turbine is direct coupled to two three-phase alternators giving 8000 volts each, the two being coupled in series to furnish 16,000 volts to the lines.

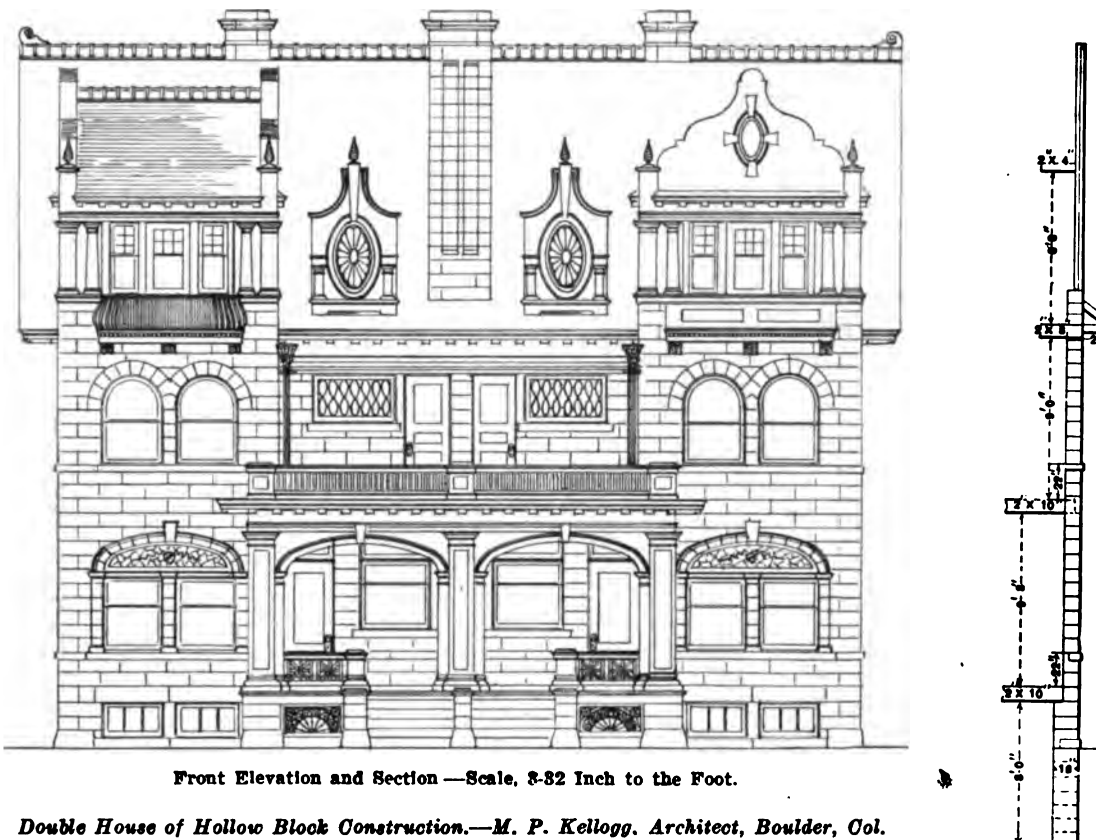
The radiating surface in the houses consists of resistance coils, covered with enameled sheet iron, placed near the outside walls of the room to be heated. This heating was based on the assumption that 253 watt-hours would be needed per day to heat 12 cubic feet of space, which would correspond to 866 heat units, where American practice would allow 1200 heat units. This is stated to be insufficient on the coldest days, so that the American method is likely to be followed. The expense of this method of heating, even with a low cost for power, is much higher than when coal is used. The same is true regarding the electric cooking appliances used in Switzerland.

IT will be recalled that a short time ago special legislation was enacted by which the hight of buildings in Copley square, Boston, was to be limited to 90 feet, for the avowed purpose of promoting the beauty and attractiveness of the square and of protecting the light and air of buildings fronting it. The new law particularly affected the Hotel Westminster and the owners were compelled to reduce the hight of the structure from ten stories to eight, as the result of which suit was brought against the city for damages. The Superior Court has decided that the city must pay $481,970.40, which is one of the biggest verdicts found by a Suffolk jury in many years. Of this amount Woodbury & Leighton, the builders, were awarded $71,127.36 for loss on materials contracted for but not used, materials wasted and the expense of rearranging the design or plan of the building, which was being constructed when the act was passed, in order to make it conform to the 90-foot limit. This means the city of Boston must now pay unless the Supreme Court, to which the case will probably be carried, reverses the verdict.

A 16-STORY AND BASEMENT fire proof office building is about being erected on the southwest corner of Nassau and John streets, New York, at a cost estimated at $500,000. It will have a frontage of 51 feet on Nassau street and 101½ feet on John street.

# DOUBLE HOUSE OF HOLLOW BLOCK CONSTRUCTION.

For the past few years the use of hollow blocks, either of cement or concrete, has been growing rapidly in popular favor in connection with the erection of dwelling houses and other buildings, the advantages claimed for this form of construction being such as to command widespread attention. The hollow concrete building blocks are light, strong and durable, and can be made in any color desired. They are good nonconductors of heat and cold; are so made as to afford opportunity for good ventilation, and at the same time tend to keep a house warm in winter and cool in summer. As being of general interest in this connection we present herewith the elevations, floor plans and details of a "double" or "twin" house intended to be erected of hollow blocks. The author states that he has selected a quiet gray for the material, with white for the sill courses and the arches over the doors and windows, this trimming calling for all exterior wood work, except the roofs, to be painted white, with the roofs a light green shade of shingle stain.




Front Elevation and Section —Scale, 3-32 Inch to the Foot.

*Double House of Hollow Block Construction.—M. P. Kellogg, Architect, Boulder, Col.*

The elevations afford an idea of the exterior appearance of the building, the illustrations being direct reproductions from the architect's drawings. Reference to the floor plans shows the apartments for each family to have an attractive front entrance hall, with a little nook at one side opposite the large opening to the sitting room. This nook is 6 x 10 feet in size, has wide built-in seats on each side, and an ornamental brick fire place constructed of buff colored brick. On each side of the fire place is a bookcase fitted with art glass doors. The floor of the nook is of cream colored tile. The sitting room, which opens off the hall, has large windows with art glass transoms and sliding doors, which communicate with the dining room. The wood finish is of golden oak. The dining room also has large windows with art glass transoms, and fire place of ornamental brick and tile hearth. The brick and tile are of oxblood color. The dining room has a beam ceiling, and is equipped with a buffet or china closet with art glass doors. The pantry communicating with the dining room and kitchen is fitted with a sink, two large cupboards with doors, and tilting flour bins. The doors opening from the pantry into the dining room and kitchen are double acting. The dining room at the rear opens into a short hall or passage leading to a toilet room provided with wash basin and closet.

The finish of the dining room is in red cherry, matching in color the fire place brick, tile and mantel. The kitchen is provided with sink and steel range. The stairs are of the combination type and join the main flight at the first landing. Under the main stairs is a flight to the cellar, the whole arrangement being such as to occupy a minimum of space. The wood finish of the kitchen is in white ash natural, the walls being painted two coats in a light yellow.

On the second floor of each house are three sleeping rooms opening off the hall, the bathroom being in such a position as to be readily accessible from any one of them. It will be noticed that the closet is separate from the bathroom and is lighted by an inside window between the two spaces. It is reached directly from the hall, and also communicates with the bathroom. There is a linen closet off the hall, fitted with three large drawers, above which are two doors. There is also a stairway leading from this hall to the attic. At the front of the house and directly over the nook on the main floor is a "den," with two wide built-in seats, a bookcase fitted with art glass doors and a brick fire place with a 3-foot opening. The ornamental brick of which the fire place is built is of a light gray color with a gray colored tile floor. The den opens into the front bedroom through an arch flanked with Corinthian columns. The finish of the room is of white pine finished in white enamel. The walls are covered with a light green colored burlap, with ceiling paper to match. All the rooms on the second floor, as well as in the attic, are finished in white soft pine painted in light colors, while the walls are covered with paper to match. In the attic of each house is a large bedroom, a servant's room and servant's bathroom, while at the rear is a balcony for airing clothing. The large bedroom at the front can be used as a billiard room if desired.

The first floor has one coat of hard wood filler and two coats of Pratt & Lambert's hard wood varnish.

rubbed down with pumice stone and oiled to a furniture gloss finish. The second floor has four coats of interior paint rubbed down with pumice stone and oiled, while the attic is finished with three coats of interior paint. The plastering is of three-coat drawn-up work—two coats of hard plaster and the finish coat of plaster of Paris lime.

The first, second and third story floors have a lining of ⅞ x 6 inch No. 2 flooring laid diagonally, with Cabot's sheathing quilt between the floors of the first and second stories. The first floor of the main hall, sitting room and dining room is of quarter sawed white oak, while that of the kitchen, pantry and toilet room is quarter sawed white ash. The second floor is of quarter sawed Texas ⅞ x 2 inch flooring.

The hardware of the main floor is of solid copper, colonial pattern, while that of the second floor is nickel plated to match the light color painted wood work. The perspective views presented in connection with the details give an excellent idea of the finish of the dining room, main staircase, hall and den.

The building is wired for electric lighting. All the rooms have combination electric and gas fixtures finished to match the hardware. The plumbing is of the open type, with nickel plated pipes, bibs, &c., low-down all-porcelain closets, cabinet oak finished wood work. The bathtubs are porcelain finished, while the basins as well as the pantry and kitchen sinks are porcelain ware. In the basement of each apartment or house is a steam plant for a direct-indirect system of heating and ventilation, installed in accordance with the best modern practice. There is also located in the basement a laundry room with tubs, cellar room, fuel room, outside and inside stairs, servants' lavatory, children's playroom, storeroom, &c.

The house of hollow block construction here illustrated was designed by M. P. Kellogg of Boulder, Col., and accompanying the brief specifications above outlined the architect furnishes the following figures of cost:

| | |
|---|---|
| Excavation | $320.00 |
| Basement or foundation walls of concrete hollow building blocks | 770.00 |
| Main exterior walls and division wall of hollow concrete building blocks to represent range ashlar stone building | 1,208.00 |
| Concrete footing under foundation walls | 186.00 |
| Chimneys | 408.00 |
| Concrete cellar floors for the entire building | 228.00 |
| FRAME LUMBER, JOISTS, STUDDING AND RAFTERS: | |
| 18,276 feet of frame lumber, $22 per M | 466.00 |
| 4,080 feet surfaced sheathing No. 2 | 90.00 |
| 3,650 shingles, cedar No. 1, $3 per M | 116.50 |
| 600 feet 6-inch No. 2 flooring for basement partition walls | 15.50 |
| 2,800 feet hard wood floors, $65 per M | 146.00 |
| 2,000 feet 6-inch common flooring for floor lining | 44.00 |
| 8,696 feet quarter sawed Texas flooring for second and third floors, $37 per M | 99.70 |
| Exterior finish lumber | 620.00 |
| Mill work and materials, including all interior and exterior doors, windows, stairs, seats, bookcases, china closets and cupboards, also porches | 2,019.00 |
| Carpenter work outside of this | 320.00 |
| Plastering and material for 2416 yards, 30 cents per yard | 728.80 |
| Painting and materials | 480.00 |
| Hardware | 320.00 |
| Steam Heating Plant | 1,000.00 |
| Electric and gas lighting | 230.00 |
| Plumbing | 1,020.00 |
| Six grates and mantels | 240.00 |
| Window and door screens | 127.00 |
| Wall papering and decorations | 500.00 |
| Incidentals | 200.00 |
| Architect's 5 per cent | 600.00 |
| Total | $12,502.50 |

Side (Right) Elevation.—Scale, 3-32 Inch to the Foot.

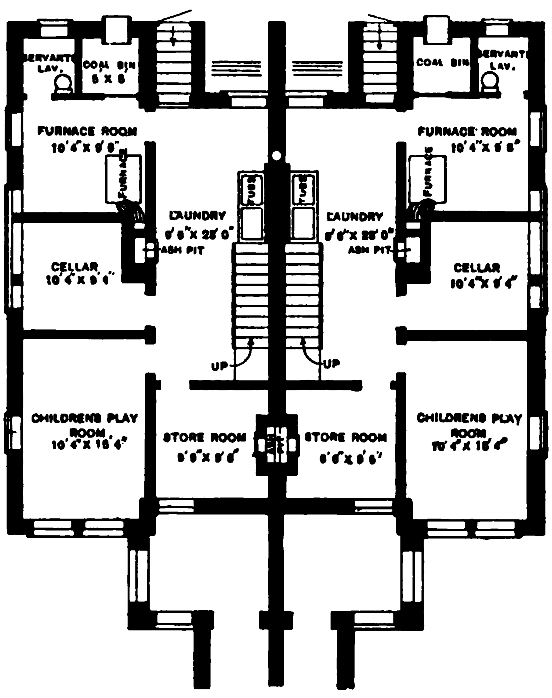
*Double House of Hollow Block Construction.*

The author points out that "there is in all estimates a possible chance of error, but in this instance the prices are based on actual proposals and consequently include the builder's profit." In presenting this design to the attention of the readers the author states that the house is so designed as to produce in his opinion the best ventilation on account of the walls being hollow, with vertical flues every 3 inches apart, running from the basement to the top of the wall. The hollow concrete building blocks are light, strong and hygienic, and make a building having the appearance of a solid stone structure and equally as durable. The hollow concrete blocks used in the construction of the chimneys provide extra flues, affording an excellent means of ventilation of all the rooms.

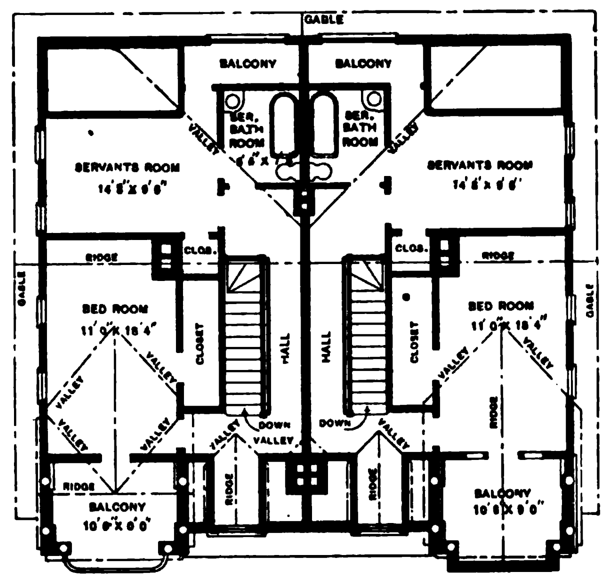
IT is stated that more than 12,500 tons of cement were needed in the construction of the new *Times* Building at Broadway and Forty-second street, New York City; about 3,300,000 red brick and more than 28 tons of plate glass, of which the revolving doors alone carry more than ½ ton.

## Architectural Features of Toilet Rooms.

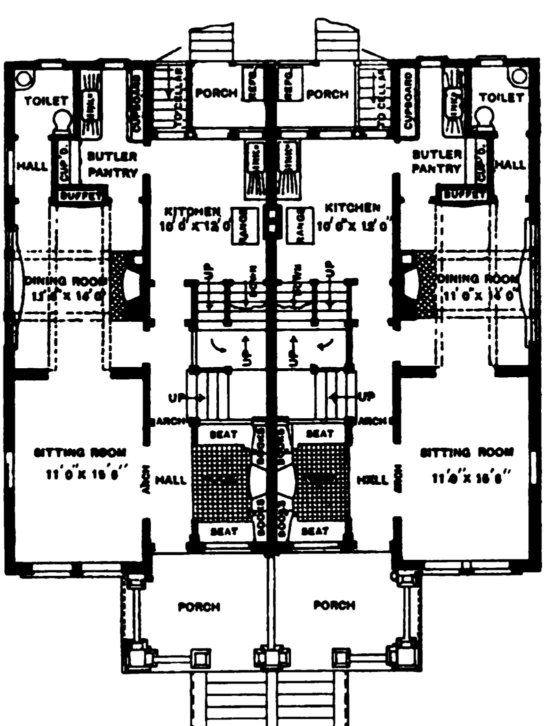
At the present time, when a vast amount of money is being expended on architectural and engineering enterprises, it is natural that the architectural features of toilet rooms, both public and private, should be found



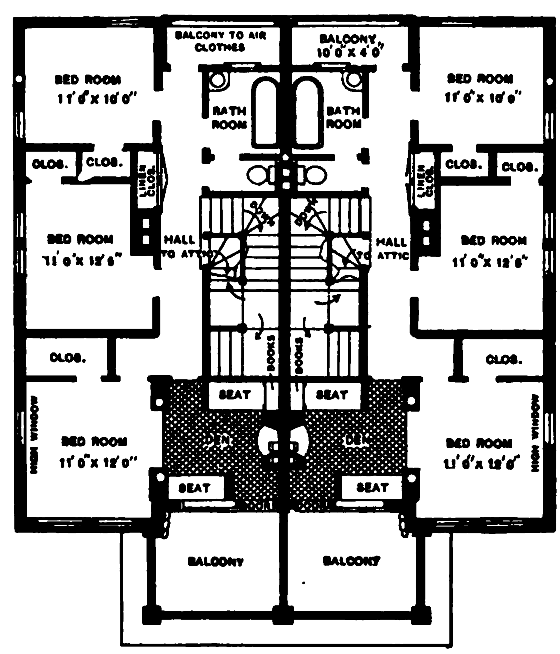

Foundation.




Attic, with Outline of Roof.




Main Floor.




Second Floor.

*Double House of Hollow Block Construction.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

of importance and that especial attention should be given to these features in private houses and in large apartment hotels, as well as in railway depots and public comfort stations. The details of arrangement in private dwellings are so much more simple than they are in larger buildings of a public character that more space will be devoted in this article to the latter type, says a writer in a recent issue of *The Metal Worker, Plumber and Steam Fitter.* These toilet rooms may be divided into two general classes, those which are purely public, such as railroad depots and public comfort stations, and others which are semi-private, being subject to more restrictions and limited as to the class of people frequenting them. This class of toilet rooms includes those in large hotels, dry goods stores and schools.

In any case the designer of the toilet rooms must exercise more than ordinary care to see that there is no place where dirt or dust can collect, and that all parts of the room are readily accessible for cleaning purposes. Whenever possible, it is desirable to have the closets, urinals and basins in the same room, as this insures more direct supervision over all the fixtures by those in charge. In cases where the funds available will not warrant the keeping of an attendant constantly in the room, this expenditure can be offset by having a bootblack in the men's toilet or a manicurist in the women's toilet. By having some one in constant attendance in the toilet room there is less liability of any disorder and an assurance of more cleanliness. In many railroad depots and municipal public comfort stations a system of pay toilet rooms has been inaugurated which solves the problem of keeping the room clean at a minimum expense. These pay toilets are small rooms about 6 x 7 feet, with marble partitions extending 8 feet high. Each has a closet and wash basin, and is furnished with a mirror, soap, clean towels and brushes, for which people as a rule are willing to pay the small fee charged, usually a nickel. These fees not only pay for soap and towels, but also go a long way toward paying for the services of an attendant.

To most of the craft it will be needless to suggest that every precaution should be taken to so arrange all parts of the room that there will be no waste space, yet ample room be provided for all people using the toilet. The floors should be laid with a dull white tile. These tiles can be readily flushed with a hose and are not slippery, while the color denotes cleanliness. A wainscot of glazed tile should be used, these walls extending up about 7 feet and being joined to the floor tiling by a quarter round tile, so that no corners are left for the lodgment of dirt. There should be no elaborate decorations on the side walls. Simple mirrors, set in metal frames and securely attached to the side wall, will be sufficient for decorative purposes. The mirrors are also both useful and ornamental when placed at the back of wash stands, and where a double row is placed down the center of a room two mirrors, set back to back between the wash stands, are very attractive and make use of space which would otherwise be wasted.

The fixtures in public comfort stations and other places of similar character should be of the automatic flushing type. In hotels, dry goods stores, &c., their use is attended by too great a waste of water, and as most of the people using the conveniences will properly flush them automatic devices can be dispensed with and the usual type of apparatus can be substituted. The urinals should preferably be of one piece of earthen ware, with a trough outlet. If the expense of these is too great they can be made of slate or marble, with a continuous water sheet flowing over the back. All of these are perfectly sanitary, although the first is preferable. The basin should be of a simple design, preferably in one piece, and either of enameled iron or pottery, as the exigencies of the case may demand. All the supply pipes should come from the back, and the basin wastes should also be carried to the back to avoid cutting the flooring and to obviate the danger of breaking the pipes through carelessness.

To leave out adequate means of ventilation would be to neglect one of the important features of the work. This in most cases is best accomplished by exhausting the air from the room with an exhaust fan. In case a blower system of heating is in use a separate system of fans must be designed for the toilet rooms, so that none of the vitiated air is returned to other portions of the building through the heating system.

The same general features are applicable to schools, but while the fixtures will not be so elaborate more care should be taken to use automatic apparatus to provide against stoppages and overflows. The same general remarks apply to office buildings, except that in some cases it may be more desirable to have but one toilet room on a floor, those for men on all floors of even numbers and for women on floors with odd numbers. This permits of using larger rooms, with a single soil stack serving the entire building, and warrants taking a larger space for the stack well.

Small or individual toilet rooms in all the classes of buildings mentioned, except public comfort stations, should be designed from the same standpoint as those in private houses. If possible, in every case there should be windows which permit the entrance of direct rays of the sun. If this cannot be done the place should always be kept well lighted. More money is being expended each year on bath and toilet rooms. It therefore behooves every one having to do with this branch of the building trade to note well each new improvement and try to bring before the public all ideas in this line that are meritorious.

Section and Side (Left) Elevation.—Scale, 3-32 Inch to the Foot.

*Double House of Hollow Block Construction.*

## A San Francisco Bank Building.

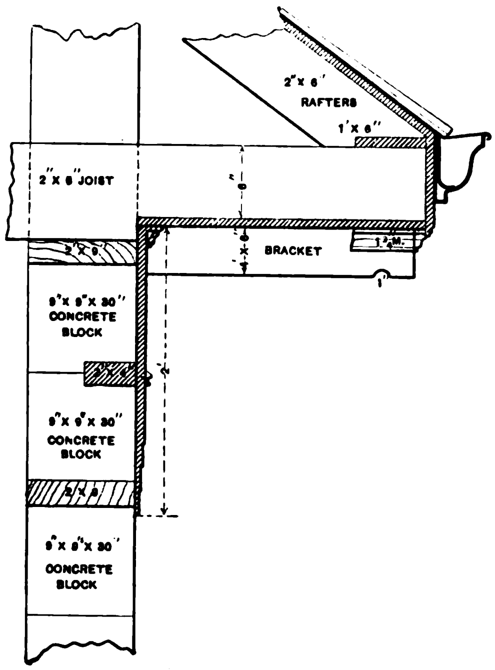
The new Security Savings Bank Building, which is just being completed on Montgomery street, San Francisco, is considered one of the finest bank buildings on the Pacific Coast. It is of steel construction, with concrete floor arches, terra cotta fire proofing, and with a street facing of white marble from Rutland, Vt. The exterior and interior architecture is of the Ionic order. In the interior the walls are broken at intervals with scagliola columns and with lintels dividing the ceiling into deeply recessed enriched stucco panels. Verde, Antique and Pavanazzo marbles are used in the wainscoting, pedestals and counter base. The counter screen is of bronze, with bronze wickets and plate glass enclosure. The backing and fitting of the counter is of enameled metal, with steel curtains and steel lockers. The desks, tables and cabinets are similar in design. The floors, lavatories and stairways are all of marble. The building is fitted with chrome steel burglar vault, electrically protected. The directors' room occupies the second story, and is fitted with furniture of Jenizero, designed in accordance with the finish of the room. The second story also contains rooms for special bank work.

## Housing Working People in Germany.

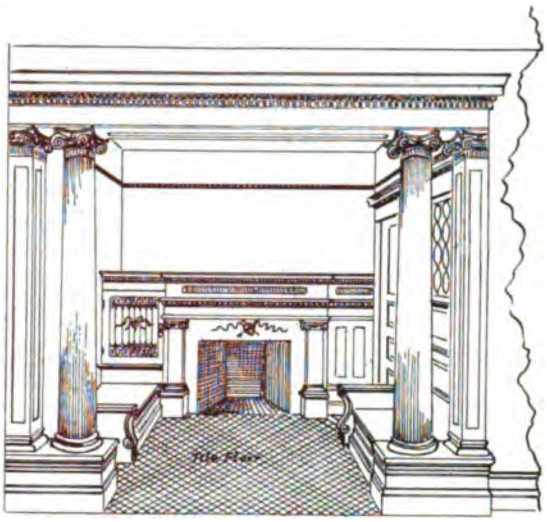
United States Commercial Agent Harris at Eibenstock, Germany, in a recent report to the State Department, says that a great deal is being done in Germany for the benefit of the working people. This is prominently shown in the efforts which are constantly being put forth to provide the laboring classes with suitable dwellings. The large manufacturing establishments, such as Krupp and others, municipal bodies, charitable organizations and private speculators, each and all have done much toward bettering the hygienic conditions and general welfare of the skilled workman and his family in every part of the Empire. Since 1842 the Prussian Government has expended in the mining district of Saarbrücken about $2,000,000 in favor of the coal miners resident in that region. It was intended at first that the money thus invested in dwelling houses should draw 4 per cent. interest, but later on a better method which enabled the miner to repay the loan by monthly installments, unencumbered by interest, was introduced. Similar methods were adopted with success by the Royal Munition Factory at Spandau. The building societies of Gladbach, Barmen, Dresden and other cities of the Empire have also proved to be a success in this regard.

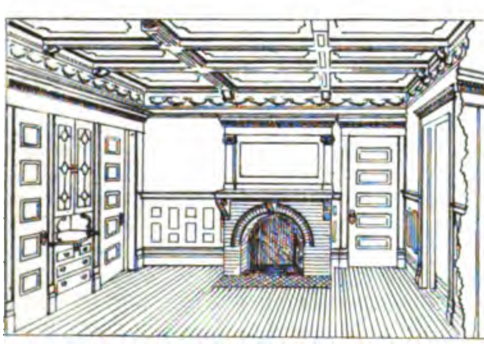
Without question the Krupp establishment at Essen takes the lead in providing comfortable houses and cottages for the laboring classes. In 1901 the value of the dwellings used exclusively by workmen was $3,875,000. There were 1660 houses of two rooms each, 1869 houses of three rooms each, 448 houses of four rooms each, 150 houses of five rooms each, 63 houses of six rooms each and 84 houses of seven rooms each, making a total of 4274 houses.

It is claimed by those in a position to know that the cottage system is superior to flats from nearly every point of view; but in Germany it is not always an easy matter to build cottages owing to the high price of lots, and the lack of rapid transit facilities is often against constructing such dwellings in the suburbs of a city, while the factory may by chance be situated in the center of the same. Another point against the cottage system which presupposes a yard or lawn in connection with it is the fact that there is a greater expense attendant upon keeping up a colony composed of such dwellings than is the case with compartment houses or flats. During the past ten years a great improvement has also taken place in the conditions surrounding the dwellings of those laborers who must depend upon themselves for securing suitable places to live in. The increased attentions on the part of municipal authorities to sanitary arrangements and the police laws against too many people occupying one room have had a salutary influence.

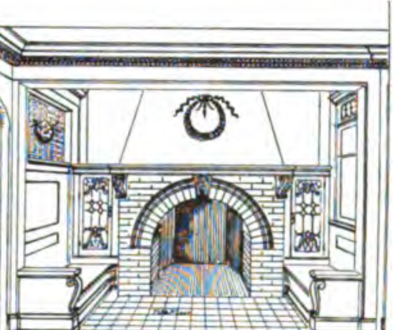


Details of Main Cornice.—Scale, ¾ Inch to the Foot.


Den on Second Floor.


View in Dining Room.

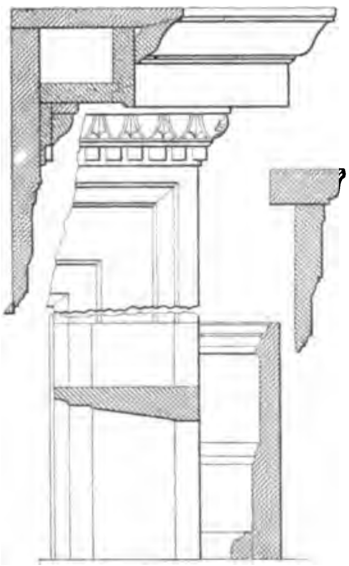

Finish of Main Staircase.


View in Main Hall.

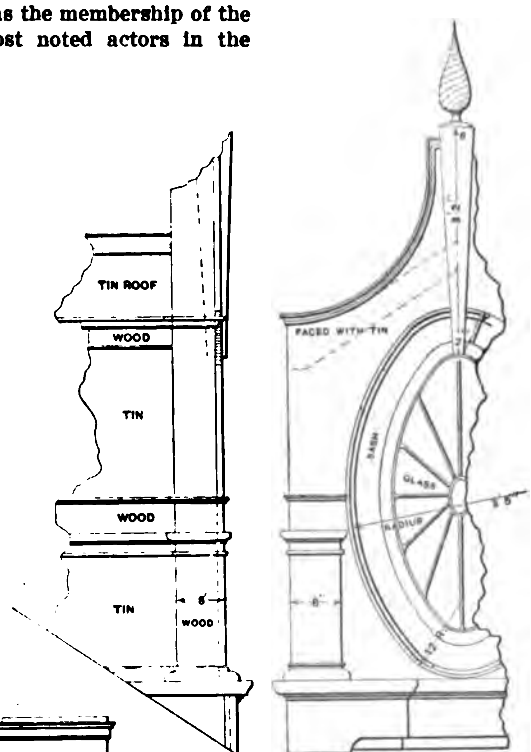
*Double House of Hollow Block Construction.—Miscellaneous Details and Interior Views.*

## New Home for Boston Lodge of Elks.

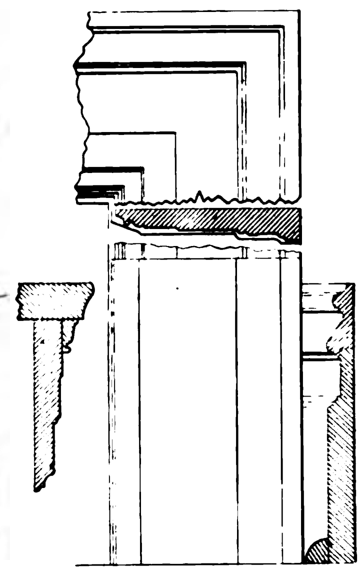
The Building Committee of the Boston Lodge of Elks has just secured a site on Columbus avenue, South End, Boston, on which it is intended to erect one of the finest structures of its kind in the country. The building will be six stories in hight, and the general style of its architecture will be French Renaissance. The first two stories will be entirely of limestone, while the four upper ones will be of brick, and over the entrance will be a huge elk's head, the symbol of the order. The floor at the street level will be devoted to four stores, while the basement will be taken up with Turkish bath, bowling alleys, billiard rooms, &c., as well as boiler and power plant, which will generate electricity for both lighting and elevator purposes. The second floor will be used for officers' quarters, café, general rooms, &c., while the third and fourth floors will be occupied by the committee rooms and a small hall. Probably one of the finest rooms in the building will be the lodge room on the sixth floor. There will be a large balcony and a complete stage with dressing rooms with every essential necessary for the production of a full fledged play, as the membership of the Elks comprises many of the most noted actors in the country. The new building will cost in the neighborhood of $250,000, and when completed the Boston Lodge of Elks will have a place of meeting worthy of the order.



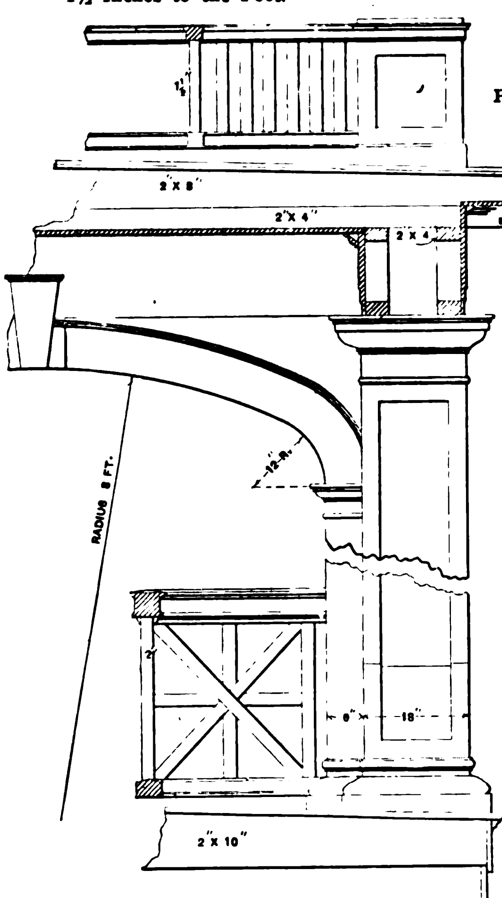
Details of First-Floor Finish.—Scale, 1½ Inches to the Foot.



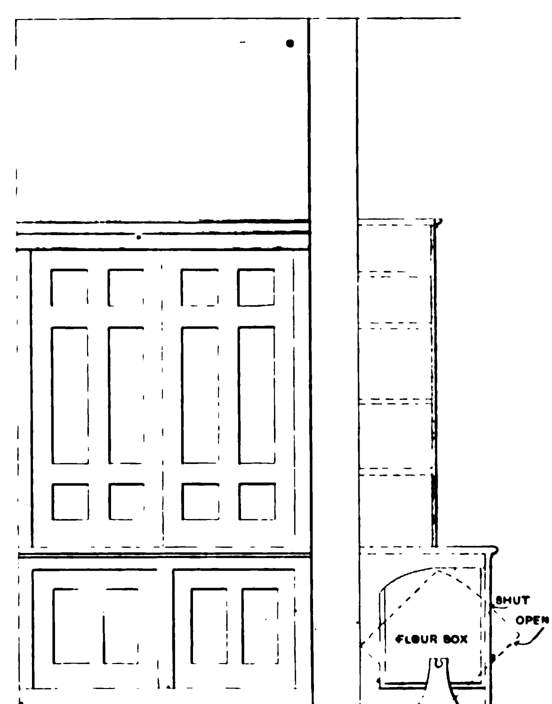

Partial Elevation and Section of Front Dormer.—Scale, ⅜ Inch to the Foot.



Finish on Second Floor, Also in Kitchen Closets, Bathroom and Pantry.—Scale, 1½ Inches to the Foot.




Details of Porch Construction.—Scale, ⅜ Inch to the Foot.




Front and End Views of Cupboard.—Scale, ⅜ Inch to the Foot.

*Miscellaneous Details of Double House of Hollow Block Construction.*

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PROBABLY the most novel theater in the world is that recently opened at Thale, in Germany. The theater is on the summit of a mountain, and is surrounded on all sides by steep rocks; the seats for the audience are hewn out of the rock and accommodate 1000 persons, and the stage, which is also hewn out of the rock, is 80 feet long and 54 feet wide. No artificial scenery is used, but the background is formed by the dense forest and by the outlines of the mountain in the distance. The dressing room for the actors is close at hand in the forest, but completely hidden from the audience. The theater is fully protected from the wind, and its acoustic properties are so excellent that every word is heard.

# THE SIXTY-NINTH REGIMENT ARMORY.

(*With Supplemental Plates.*)

WE have in the past presented some rather interesting examples of steel skeleton frame construction as now used in connection with towering office buildings, business blocks, churches, &c., all tending to show how important work of this particular kind is carried forward, but we now take pleasure in calling attention to still another example of the utilization of iron and steel in the construction of a building of an entirely different character from any which we have heretofore illustrated. The pictures shown on the two supplemental plates accompanying this issue are direct reproductions of photographs of the iron frame work of the drill hall of the Sixty-ninth Regiment Armory, now in course of erection on Lexington avenue, Twenty-fifth and Twenty-sixth streets, New York City, in accordance with plans prepared by Hunt & Hunt, the architects selected by the Armory Board.

The portion of the building fronting on Lexington avenue is four stories in hight, constructed with steel floor and roof beams and girders supported on brick walls. The building has a frontage on Lexington avenue of 197½ feet and a depth of something over 300 feet. Beyond the four-story structure is the drill hall, 187 feet wide, 202 feet long and nearly 130 feet in extreme hight above grade. It has an unobstructed interior with a hight of 99 feet 10 inches from the floor to the lower chords of the roof trusses at the crown. The floor is at the level of the first floor in the front part of the building and is supported in the center directly from the ground, which is not excavated at that place. At the sides of the hall is a basement story for rifle range, bowling alleys, &c. Up to the level of the second floor of the front part of the building the side walls are of brick and concrete masonry carried on brick arches below grade, which are sprung between the piers supporting the roof trusses.

### Drill Hall Roof.

The drill hall roof is carried by six pairs of three-hinge riveted arch trusses, shown in elevation on the supplemental plate carrying the picture indicating the method of erecting the work. Each truss has a span of 189 feet 8 inches and a rise of 103 feet 4½ inches. The lower chord is an elaborate curve carefully designed to produce the required architectural effect and composed of arcs drawn from three different centers for each side. The trusses were designed for 50 pounds dead load and 30 pounds live load per square foot of horizontal projection of the roof, and for 20 pounds per square foot dead load of the skylight and 20 pounds per square foot of vertical projection for wind pressure. The radial depths of the trusses vary from about 4 feet at the skewbacks and 5 feet at the crown to a maximum of about 9¼ feet over all at the haunches. Each chord has an I-shaped cross section made with two pairs of angles back to back, connected by double lattice bars and web connection plates at the panel points in the vertical plane. The ends of the trusses are nearly vertical and the lower panel is made with a solid web plate stiffened by pairs of diagonal angles convergent to the 4½-inch skewback pin. Each semitruss was shop riveted in four sections. In each section the bottom chord flange angles are continuous from end to end, but the top chord flange angles have milled butt joints at every alternate panel point where their direction changes and they are spliced by the web plate and by top and bottom flange cover plates.

The trusses are braced together in pairs 6 feet 8 inches apart by means of radial longitudinal horizontal struts and X-braces. The pairs of trusses are 38 feet 9½ inches apart on centers, and are connected by 14 longitudinal purlins exclusive of the skylight framing. The purlins carry on their top flanges five intermediate lines of 8-inch I-beam rafters, besides a line of 8-inch rafter channels adjacent to each arm truss. These members support the concrete roof slabs.

The skylight, by means of which the drill hall is lighted, extends its full length and has a width of about 40 feet each side of the center line, giving it total dimensions of about 80 x 202 feet. It is made with a double line of longitudinal purlins in the center and three lines of single longitudinal purlins on each side, making eight in all. The purlin at the monitor eaves is an 8-inch channel with a center support. At the eaves of the lantern the purlins carry riveted brackets with a light metal furring on which is formed a gutter of solid concrete. The floor and roof slabs are of the Roebling standard reinforced concrete fire proof construction, the roof slabs being covered with a special water proofing compound which is claimed to have the property of remaining soft in cold weather and hard in hot weather.

### Hoisting Apparatus.

In this connection it is interesting to describe the apparatus used for assembling the trusses, a general idea of the arrangement being clearly indicated in the picture on one of the half-tone supplemental plates. The work was done on the main floor of the drill hall, the trusses being lifted into position by four 60-foot booms mounted on the corner posts of two traveling towers 25 feet square and 116½ feet high. Each tower had four 10 x 10 inch vertical posts made in several sections and spliced with butt joints and steel connection plates, which also received the horizontal wooden struts and the pin connected diagonal rods in the panels, which were 19 feet high. The tower sills supported transverse steel beams carrying the platform for the hoisting engines, fuel, &c., the sills being made of pairs of channels, between which were four double flanged wheels on each of two rails 25 feet apart. Vertical wooden bearing timbers about 18 feet long were clamped to the posts in the third panels and their upper ends formed seats for horizontal steel beams across the longitudinal sides of the towers on which were seated the derrick booms. A stiff leg derrick was seated on top of the tower, with its foot supported by a pair of horizontal diagonal beams in the corner of the tower. Each traveler was equipped with two Lidgerwood double drum hoisting engines, and as the work progressed, receded from it on longitudinal tracks. The half-tone illustration clearly shows the general construction of the traveling towers and the manner in which the semi-arched trusses were put in place.

As there are no columns in the building, the floors are carried by the walls, which, up to the water table, a hight of about 12 feet, are built of concrete, faced where exposed with red brick, the concrete being laid in ordinary molds made of boards. About 4000 cubic yards of 1 : 2 : 5 concrete were used.

Beyond the drill hall, at the rear, is a small four-story hospital wing isolated from the other rooms of the armory.

### Large Brick Arch.

The gable wall of the drill hall toward the Lexington avenue front has a 90-foot arch, this being said to be among the largest brick arches in the country. It is 10 feet deep at the skewbacks, 8 feet deep at the crown and is 3 feet thick. It was supported during construction on 2-inch lagging on four lines of scarf boards, supported by vertical and inclined posts from a simple false work of vertical posts and X-bracing seated on the girders of the drill hall floor. The arch was built in six sections, arranged so that at the crown and haunches the intrados were first completed and carried the weight of the extrados without imposing the full dead load of the whole on the centering.

Many readers may be interested in knowing just how this piece of work was accomplished and for their benefit it may be stated that six masons at each end of the arch first built up the full depth of the arch ring, 28 courses, to a hight of about 20 feet and raked it off in a nearly horizontal line at the top. This brick work was built in three days and allowed to set for a week. A force of ten bricklayers on each side of the arch then built two more sections of the arch ring of about half the required thickness. These sections were also allowed to set for a week, and then as many men as could work to advantage were put on and completed the half thickness arch ring to the crown and keyed it in one day. Without further delay the arch ring was completed to its full depth and the wall built up about 8 feet above it.

The estimated cost of the new structures is placed at $600,000. The steel work was erected by Milliken Brothers, 11 Broadway, the general contractors being James D. Murphy Company, both of New York City.

## Charges for Central Station Heating Service.

Heating from a central station has been before the public for a long time, but since the use of electricity for illumination has become more general in towns and cities the number of central heating plants has increased very rapidly. This has been brought about mainly by the fact that electric companies have sought for some method of economically disposing of their exhaust steam. In this way the by-products, so to speak, of the large stations are used to heat dwellings in the vicinity of these stations. The question of an equitable charge to the consumer for the heat supplied has always been quite a problem, and a paper recently read by W. H. Shott before the Northwestern Electrical Association brings out new and valuable information on the subject. We give the following abstract of Mr. Shott's paper:

On the question of how to charge for heating a given space various methods are used, some basing their charges upon a cubical contents basis, varying the charges on account of the construction of the building. Others charge on a basis of so much per square foot of heating surface. Others charge upon a basis (and this applies to steam only) of the number of pounds of steam condensed. Certainly the cubical contents charge basis is entirely wrong. A building, due to its construction and exposures, may vary from 2 to 8 or 10 changes of air per hour. These changes govern the amount of heat required to heat the space in question. Necessarily, to heat properly, the radiation must be based upon the maximum number of changes of air that will take place per hour, and as the number of square feet of radiation set governs the operating expenses of a central station it must, in that case, be the basis of charge, either from a square foot basis or a meter basis.

The objections usually raised to a meter basis are the same objections that have been raised by consumers of electric light companies, namely, that when the current which they have used to supply their light and power is furnished through a meter, they are limited in service. In other words, they will take care of their light and power and use it only as their requirements call for it, while if they have a flat rate, they pay no attention to the same, thereby very materially increasing the cost of operation to the central station, in addition to requiring a much larger capacity to take care of the connected load than they would otherwise. This applies to the meter basis of measurement. The consumer will call upon the station for his maximum demand, which is represented by the connected amount of radiation, when we have our minimum outside temperatures, but during the milder periods will have a large amount of the radiation out of service, first, due to the fact that he does not need it; secondly, due to the fact that he is trying to save in heating bills and is very liable to cut them down to a point where it is below his actual requirements, resulting in a dissatisfied consumer. With the radiation furnished on a square foot basis and without regulation, a price that would justify the company in operating the same without any restrictions would seem prohibitive, but the application of regulation to the same acts practically in the same capacity as the meter does to the electric light plant, in not permitting the buildings to be overheated, yet furnishing to the consumer the necessary heat to maintain 70 or 72 degrees, the temperature usually agreed upon, and with the consumers securing their heat upon this basis, they are usually much better satisfied than upon a meter basis, and the income to the company per foot per season should average higher than where the same is on a meter basis.

Probably the ideal method of furnishing heat to the consumers from the station standpoint would be to furnish the same through a meter and at the same time give the consumer automatic regulation. The regulator would prevent the building being overheated, in addition to giving an even temperature line, and at the same time the company would be paid for all heat so supplied.

To give you an idea of what is actually being done in practice on the question of regulation, I will refer you to a building having a west and south exposure, front of glass, sides about two-thirds brick and one-third glass, in which the range for over two weeks was within two degrees. No manipulation of valves is made in the building at any time, but the circulation of the building is automatically controlled by a regulator at all times. There is no overheating or under heating, but a constant temperature is maintained at all times. The regulator (and this applies to both steam and water systems) closes off the circulation from 10 to 70 per cent. of the time in each 24 hours, this depending entirely on the outside temperature, and as an average during the heating season will keep the circulation closed over 40 per cent. of the time. From this you will see the extreme importance of automatic regulation to a central station, and regardless of any statements made against its use, it becomes an important factor in the successful operation of a heating station.

## A Notable Building Feat.

We have at different times in these columns referred to notable building operations, which have been conducted in the city of Chicago, ranging all the way from novel methods of sinking foundations for tall buildings to raising bodily the roof of a structure for the purpose of inserting additional stories. Another case of the latter kind has just occurred in the down town business section of that city, where the roof and cornice of the Fair Building was raised so as to increase the hight of the structure by two complete stories. The roof, with the terra cotta cornice, was carefully raised by powerful jack screws, the elevation being made in sections. As soon as one section was raised to the hight required the steel frame work was set in and the work of walling in with fire proofing commenced. The other section was then taken up and the work carried forward in the same way. The exterior finish is the same as the other stories, being dark brown brick and terra cotta. The 56,000 feet of ceiling and floor space of each story is lined with fire proof tile arching, and above the tile is a solid covering of concrete 2 inches in thickness. The supporting columns, 165 in number, are each surrounded by fire proof concrete and plaster. The work has been done by the William Grace Company, and while in progress attracted no little attention on the part of architects and builders of the city.

VENTILATION FOR PUBLIC BUILDINGS, especially public schools, has been given a prominent place in the report of Chief Inspector Daniel H. McAbee of the Department of Instruction of Indiana. Apropos of the laws for the compulsory ventilation of school buildings in the States of New York and Pennsylvania it is interesting to note, as evidence in this report, the growing realization of the importance of the subject. Mr. McAbee says: "I would suggest that all plans for theaters, churches, school houses and all public buildings be submitted to receive the approval of an architect appointed for that purpose, who has made the subject of heating and ventilation a study." He makes the further interesting statement that "Each year there are several churches and school houses destroyed by fire, the cost of any one of which would pay the salary of an expert in these lines. These fires are usually caused by an overheated furnace, which means a defectively constructed building."

THE best method of removing efflorescence from artificial stone is by the use of weak sulphuric or hydrochloric acid in the proportion of one part of acid to six to ten parts of water, with which the stone facing should be thoroughly scrubbed.

# CABINET WORK FOR THE CARPENTER.

## THE PARLOR.

BY PAUL D. OTTER.

THE familiar caption "the parlor" has been used in the present instance, although the room it designates has been outdone in recent years by the more formal "reception hall," which is still another forbidden Eden to the tired man who pays all the bills. Surmising that the readers will be more at home in the parlor, it will be the purpose of the writer to surround it with substantial comfort rather than conventional flimsiness. Why the parlor in years past was considered more as a museum —"free only on Sundays and holidays"—was due largely to the furniture being made along lines most frail and covered by upholstery fabrics most perishable, so that it was a foregone conclusion that no one but the minister and others not expected to tarry long was ever ushered therein.

The drawings accompanying this and the other articles relate to the modern plain style, but admit in many cases in Fig. 4, which has its purpose, however, in the general scheme of furnishing, and with the odd pillows about may, in a pinch, be made fairly comfortable. The size of the seat is 18 inches square, consisting of four 1⅝-inch square pieces mortised to the four 1¾-inch posts. The front edges are set back ⅛ inch from the face of the posts, allowing in this for thickness of leather or covering. There are many features which the individual worker may carry out with safety and after-satisfaction, but which, if carried out on a manufacturing basis, prove time using and expensive. The wide board used in the back represents stock expense and liability of many broken off corners before the member is held in its own construction by gluing. If there be any charm in this particular piece to redeem it from its crude clumsiness it is in this bold underline and the relieving open work. The covering in such a piece, without much doubt, de-

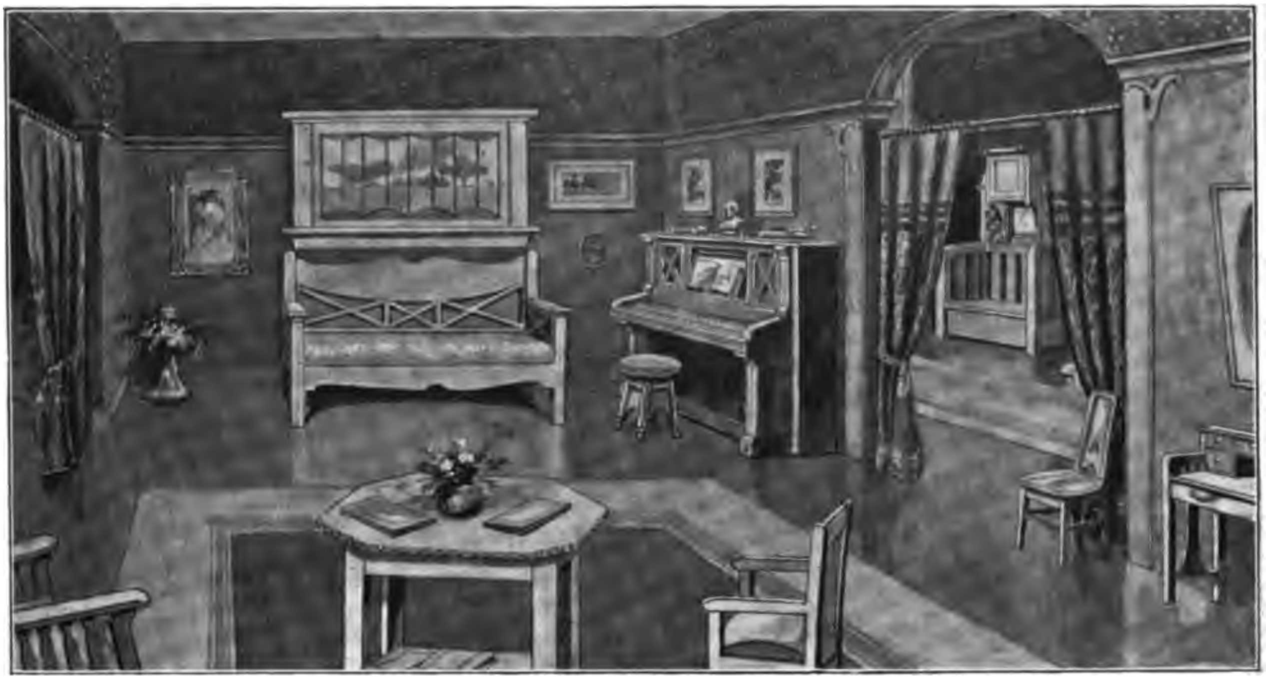


Fig. 1.—View in Parlor, Showing Articles of Furniture.

*Cabinet Work for the Carpenter.—The Parlor.*

of using the proportions for variation of details and added ornament. In Fig. 1 is shown a view of the parlor with some of the leading pieces of furniture. It is reasonable to believe that with the good influence of the modern style there will not be a sudden return to over ornamented, badly constructed work, for there is too much honesty of purpose.

**The Center Table,** Fig. 2, with the legs placed in a diagonal position at the corners, offers a subject for practice in varying the outline in case this particular pattern does not strike the fancy. What is wanted is a balusterlike pilaster. Six inches will be found to give ample width for many outlines on the drawing paper, rubbing out each effort until the proper combination of lines will appeal to you. The half plan of the top, Fig. 3, shows the disposition of the posts at A. Great care should be taken in jointing nothing but well seasoned stock for the top and undershelf and after it has been reduced to the proper thickness, stain and fill before warping ensues. A decided chamfer on all edges takes away the crude, factory made appearance.

**The Corner Chair.**—The parlor offers a greater excuse for pieces of furniture not classed among the most comfortable or back resting than probably any other room in the house. A creation which would come well within the category mentioned is the corner chair shown mands a good piece of Spanish leather. The upholstery webbing is nailed to the under edge of the frame and the five or six springs held down in a crowned form by twine while the top padding of burlap, hair and cotton padding is nicely molded to shape before the leather is pulled and formed over it. It is well to use no gimp in this, but double under the edges as they are tacked down. The conforming and holding the leather may be done with small tacks so placed that they will occupy spacing immediately under the fancy large headed nails used for the purpose.

**The Roman Chair.**—The Roman chair, so-called, Fig. 5, is another piece of furniture used as a sort of filling in rather than for comfort. It may, however, be elaborated by giving it a back fitting curve in the back slat and the appearance may be greatly improved with either a band saw, adze or in other ways. Shape the back from stock not less, and preferably more, than 3 inches in thickness, keeping the thickness of the curve or serpentine shape 13-16 inch. While the particular sketch is in the simple class, it is one of the forms of chairs which permits of varied treatment, and should any of the readers be given to carving as a pastime the proportions herewith indicated will offer a working guide for new shapes and opportunities for surface cutting. The drawing of the front elevation is within a space of 27½ x 36 inches wide, and the distance between front and back frame is

17 inches. The frames are dressed to 1⅛ inches in thickness. Corner blocks should be glued and screwed in each corner under the seat. After the chair is set up and glued, saw off the back legs ½ inch at the floor in order to give the proper "hang." A bag cushion as described in another article gives an added finish, or the seat may be made 1½ inches thick and be treated to a deeply cut saddle shape, as dealt with in previous articles.

## The Lewis and Clark Exposition.

The grounds of the Lewis and Clark Exposition at Portland, Ore., embrace 126 acres of woodland and a natural lake of 220 acres, in the center of which is a peninsula 60 acres in extent, where are located the five magnificent buildings of the United States Government. Five of the principal exhibit palaces—the forestry, Oriental exhibits, European exhibits, agriculture and varied industries buildings—occupy a slightly elevated plateau, with their short ends facing the water feature, Guild's Lake. The central feature of the Exposition, Columbia Court, which consists of two wide avenues with beautiful sunken gardens between, occupies the space between the Agricultural and European buildings, and a broad flight of steps, called the Grand Stairway, leads from the court to the music shell on the shore of the lake. The Auditorium, the Machinery, Electricity and Transportation Building and the Mines and Metallurgy Building occupy a court east of the main group, while the State buildings, manufacturers' pavilions, Fine Arts Museum and miscellaneous structures are grouped about the principal exhibits buildings. The Administration and Fire Department buildings flank the grounds, roughly parallel with the lake shore, being built like a bridge on piles over the water. The promenade is a mile long, and connects the group of State buildings on the east with the American Inn at the west, passing the music shell, and intersecting the Bridge of Nations.

This bridge, nearly half a mile long, is an ornate structure of wood and staff, built in imitation of solid masonry, which connects the mainland and the Government Peninsula. The landward end, which is built to

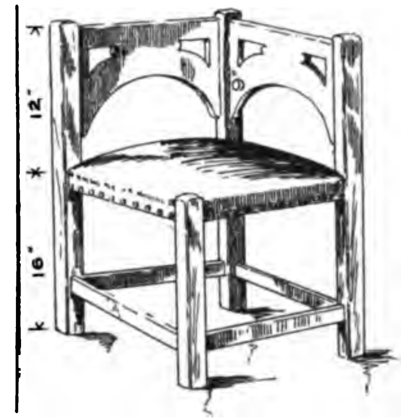
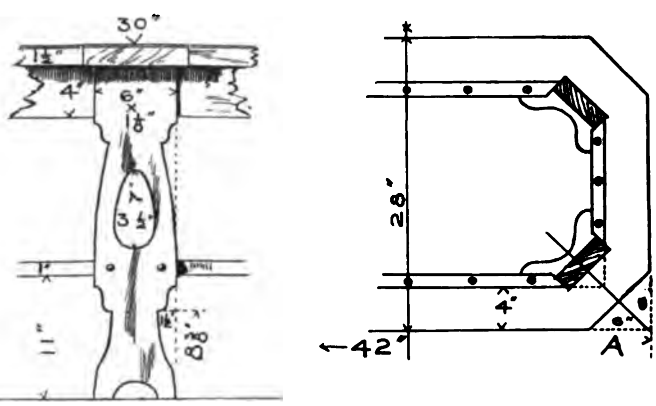



Fig. 4.—The Corner Chair.




Figs. 2 and 3.—Detail of Corner Post "A," and Half Plan of Top.

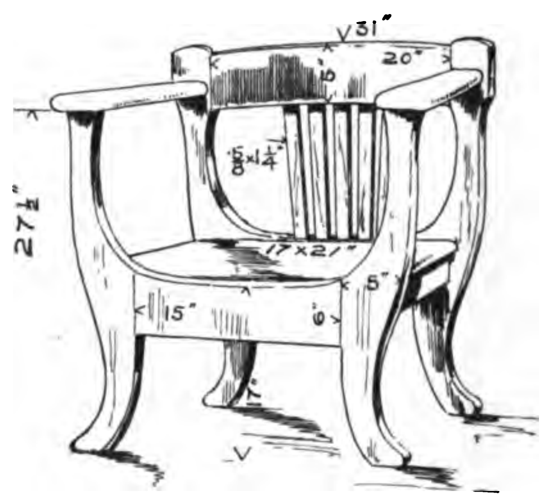



Fig. 5.—The Roman Chair.

*Cabinet Work for the Carpenter.—The Parlor.*

main entrance, and an ornate colonnade of Ionic columns forms a bow that connects these structures.

While the Fair in many respects is similar to former enterprises of a like nature, it has a number of distinctive features that rank as notable attractions. The site itself is one of unusual attractiveness, and the setting which nature has given it enhances its beauty. The foothills of the Cascade range reach down to the western edge of the grounds. From Lakeview Terrace, at the head of the Grand Stairway, the view embraces the shimmering lake, with the twin towers of the main Government building reflected in it; the Government Peninsula with its staff palaces clustering among the trees, the Willamette River in the near distance, and beyond, half a hundred miles away, four snow capped sentinels of the Cascade range—Mount Hood, Mount Adams, Mount St. Helens and Mount Rainier.

In the western part of the grounds a considerable portion of the site has been left almost in its natural state, forming Centennial Park, a charming piece of woodland intersected by winding graveled paths, and provided with numerous rustic benches, where weary sightseers may rest. Beyond the park in a small canyon are the Experimental Gardens, another unique feature, wherein all kinds of Western crops are seen as they actually grow. An ever popular promenade, called the Lake Shore Esplanade, extends the length of the a width of 150 feet for a distance of 800 feet, is called the Trail, and is the amusement street of the Western World's Fair. Here are situated the theatres and other amusement structures, and the entertainments are as a class superior to those which have been offered at earlier expositions.

Such are the principal distinctive features. The plan of segregating exhibits has proved extremely popular. All the European exhibits are displayed in one building and all the Oriental displays in another, while the States, which have separate pavilions, have gathered all their exhibits within their own buildings.

The Forestry Building is in itself an exhibit of the forest wealth of the country, which the Fair is designed to exploit. Built after the manner of an immense log house, which covers half a city block, of forest giants as thick as a man is tall, the building is an architectural triumph. It is a source of pride to Oregonians and of never ending admiration to Easterners, who would not have believed that such mighty trees grew outside of California, nor that so handsome a structure could be erected from the crude products of the forest.

A NEW BUILDING to be known as the Drown Memorial Hall is to be erected at South Bethlehem, Pa., for the Lehigh University in memory of its late president, Thomas Messenger Drown.

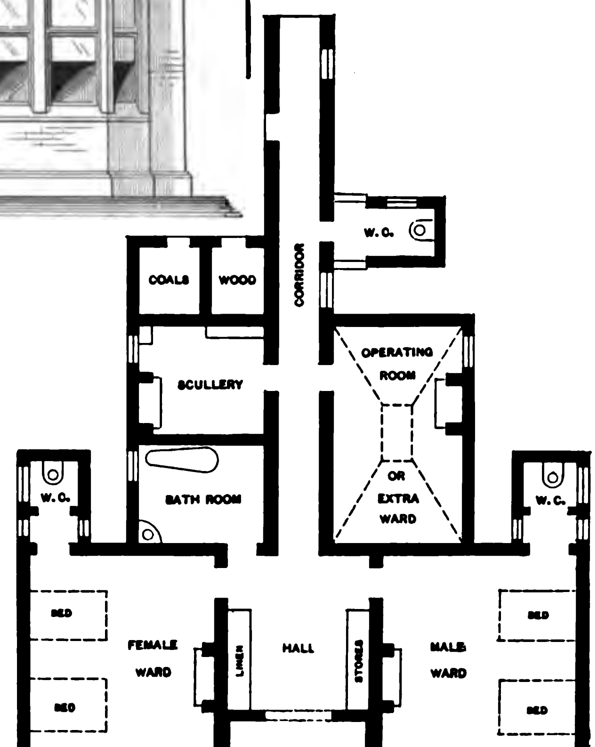
## Design for a Cottage Hospital.

We have at intervals in the past given designs of hospitals adapted to the needs of small towns and villages, and we take pleasure in supplementing what has already appeared by the elevation and floor plan of a cottage hospital adapted to meet the requirements of a country town, which we find in one of our English exchanges. The building is intended to be executed in red brick with tile roof and half timber gable ends for the wards.

An inspection of the plan shows that the two wards are placed at the right and left of the main entrance hall, there being space for two beds in each ward, although three could be placed should circumstances require. The operating room, or extra ward room, is lighted by means of skylights in the roof, while on the opposite side of the corridor are bathroom, kitchen, &c. The corridor extends entirely through the building, and is intended to communicate with an extension or whatever structure might be found necessary to erect at that end. The design here shown has been executed under the superintendence of E. G. Davis, an architect of Hereford, England.

Front Elevation.

*Design for a Cottage Hospital.*




Floor Plan.

## Structural Value of Hollow Tile for Buildings.

Some very interesting conclusions relative to the value of hollow tile in buildings are contained in a paper read at a recent meeting of the Chicago Architectural Club by E. V. Johnson. In the course of his remarks he said:

I believe that hollow tile made in suitable forms and of assorted colors, also hollow tile faced with brick or plastered on the exterior surface with ornamental stucco, is the material best adapted to take the place of wood, both for interior and exterior construction of buildings, and base this opinion upon the following claims:

1. Tile is the lightest and strongest material for building construction.

2. It furnishes a perfect surface for the receipt of plastering, both old style lime mortar and patent plaster.

3. Can be laid at any season of the year, regardless of rain, frost or extreme hot weather.

4. Can be plastered upon within 48 hours after being laid in place.

5. The tile, being hollow, serves as a nonconductor of heat, cold and sound, assuring a warm house in winter and cool in summer.

6. Does not shrink, thus causing disfigurement to plastering and decorations.

7. Being noncombustible, there is no necessity to carry insurance.

8. It is impervious to climatic influences, and time enduring, assuring a minimum outlay for annual repairs.

If there are any disadvantages in the use of hollow tile, other than first cost, they have not made themselves apparent to me in practice. Throughout the State of Ohio there are a great number of different classes of buildings that have been built of this material, using the standard 8 x 8 inch hollow building blocks, owners and occupants of which, when consulted, have in every case expressed themselves entirely satisfied with the material. There are large factories in almost every State of the Union engaged in the manufacture of clay products, and the selling price of this material is being decreased gradually every year. At the same time, the price of lumber is constantly on the advance, and it will only be a short time when the owners of buildings will find it to their interest, on the grounds of economy of first cost, to use hollow tile in preference to any other material. The demand for this class of construction is surely coming, and the young draftsman of to-day who will be the architect of the future, will be called upon to furnish the plans and designs for the buildings.

The practical examples of structures already erected and in use eliminate the objection that may be raised on the ground that this system of construction is new or untried. It is for this reason that I have dwelt so particularly upon the results of the tests that have been made, and are now being made, so that architects may be fully informed upon the actual unit values of this material and also the latest improvements being devised for its economic application to building construction.

SPRAYS OF WATER before the windows of a cotton mill, when ventilated by means of an exhaust fan creating an indraft of air through the windows, have given very satisfactory results, according to Eben C. Willey, Hope Mills, N. C., in a paper on "Mill Ventilation and Its Influence," before the New England Cotton Manufacturers' Association. He says that it has always been found that water freely used on the roof of a mill in summer while cooling the upper room also has a good effect on the air entering the windows on the lower floor; but in a mill of three or four stories in hight great advantage can be obtained, he feels, by inserting sets of spray nozzles extending beyond the jut of the roof and allowing the sprays of water to fall next to the open windows.

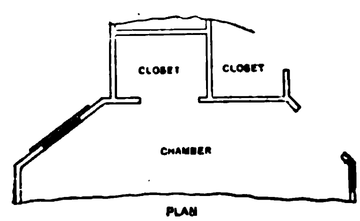
# CORRESPONDENCE.

### Comments on Prize Designs.

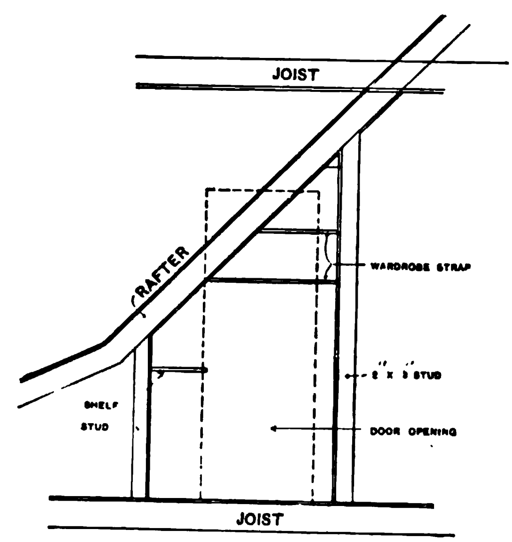
*From* JOHN P. KINGSTON, *Worcester, Mass.*—I am glad some one has said something about the prize designs so as to bring them more prominently to the attention of the readers. In regard to the question of providing space for a refrigerator in the plan which I submitted, I must say that I always consider that as one of the essentials of a good plan, and have left ample room in the rear entry for any refrigerator that a family would use in a house of this size. I did not mark a drip pan, as I usually do, and always have put them in my houses, for reasons not necessary to mention here.

In regard to closets off the chambers, I knew that the roof would show in them, but for all that they are quite good, with ample room to hang clothes at one side and part of the rear, with an opportunity to put one or more shelves at the other side. The doors are all full size, as the walls between rooms and closets are full hight of the story, so that the closet slant does not show in the rooms.

I am glad to make the acquaintance of the other prize winners in this competition and congratulate them on their success. I note with satisfaction that they have, like myself, worked from the bottom of the ladder up and know what it is to put in some good, solid work and study in order to gain the coveted goal. I have not taken the required time to look into the other prize designs sufficiently to afford a basis for comment on them at this time, but perhaps will do so later.




Plan of Chamber Closets.




Vertical Section through Roof and Chamber Closets.

*Criticism of Prize Design.—Sketches Accompanying Letter of Mr. Kingston.*

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*From* D. P. SLITOR, *Penn Yan, N. Y.*—With the editor's permission I would like to say a few words through the Correspondence columns in reply to the criticism of "C. A. W.," Port Jervis, N. Y., in the June issue. His comments it seems to me tend more toward a criticism of the committee who had the arduous task of making the awards according to their best judgment from the mass of material at hand. My reply will relate simply to the serious faults, as the correspondent describes them. My experience has taught me that as a rule the architect tries to give his client more in design than the amount he wishes to expend will permit, and the result is disastrous to all concerned. This is one of the conditions strictly provided against in the present case, and I am still of the opinion that I have omitted no rooms that could well be included in an eight-room house for the price stipulated, $3500, unless at a detriment to other rooms. I would agree with the "Brother Chip" that a front and rear vestibule, a refrigerator room (a laundry might be included with his list of omissions), are all very nice and are a necessity when you find a party with money enough who is willing to pay for them, but are not to be thought of here in this class of houses. As to the apparent shortages of which he speaks, if he refers to the comments of the committee, I would say that there is not an item in the list that cannot be furnished for the sum allowed and many for considerably less. This will apply to the plumbing, which has been done here several times under the same specifications for less than the amount allowed. The correspondent's remark that the first and second awards "could have been better plans" may be true, but possibly they were not in the hands of the committee. We have not yet reached the point of excellence where work is above criticism, but think judgment of the Committee of Award should be tempered with mercy.

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### How Shingles Should Be Laid.

*From* J. C. W., *Berlin, Pa.*—The many letters by various correspondents on what constitutes a day's work for a carpenter are certainly most interesting, but I would like to say at the very outset that I for one am not numbered among those 20 door fellows. It does seem, however, that the carpenters around this section can put on a good many more shingles in a day than is done in some other localities. Referring to the letter of "G. H. B." of Eliot, Maine, in the December issue, he states that ten bunches of shingles are considered a good day's work, but I would like to ask what he gets for putting on ten bunches. I must say that a man claiming to be a roofer who cannot put on more than ten bunches of shingles could not or would not need to put on any the next day if I was paying him by the day. It might do if he was putting them on by the bundle. We figure after the roof is ready for the shingles on $1 per 1000, and usually make more money on this than on anything in the way of carpentering. What I desire, however, to bring out is this: No one has as yet told how he does the work, and this, I think, is of prime importance. We always use for shingles 1 x 2 inch roofing lath, and never use a scantling nor scaffolding against which to butt the shingles. We space the lath, take 2 inches off the length of the shingles, and divide the remainder by three, which gives the lower edge of the lath, the 2 inches above being for underlap. Next we always line our rafters for the lath and then keep the butt end of the shingle to the lower end of the lath and the row is bound to be straight, if the line is struck straight for the lath. We sit right on the lath and follow one after the other lengthwise over the building and not up over the roof. This last summer we put on over 200,000 shingles and 70,000 were on one roof. We have averaged every year over 100,000; so I know a little about shingling. Last summer there were eight of us in the gang, and if we go on a straight roof each takes the same number of rows or courses, usually seven or eight, according as it holds out for one side. We never think of figuring less than 4000 to one man. Some, of course, will run 5000 and 6000 in ten hours, but the average will never run under 4000. We use fourpenny cut iron nails and always figure 4 pounds to 1000 shingles; so you can at once see that we do not save nails and never allow two and three shingles to be put on with one nail. I would say to "G. H. B.," "whoever he may be," to try the plan laid out, and if he cannot put on more than ten bundles in one day, let him come to Pennsylvania and we will show him how to do the trick. I will admit, however, that if he roofs over sheathing boards his ten bundles is very good and this is what I want to get at—how these apparent mysteries are wrought. In my estimation the telling each other of the different ways in which the work is done is far more beneficial to the craft than simply telling what each one can do.

In regard to the last portion of the letter of "G. H. B." I would say that about 18 years ago there was a steel cut nail on the market, and I found wherever those were used they soon rusted off right under the first shingle. Later on came the wire nail, but that is not much better. We have, however, passed the experimental stage and are now ready to go back to what the craft used years ago—the old iron nail. The way to tell the difference between steel cut or iron cut is simply to set the nail on its head and strike it on the point—with a hammer, of course, and not the fist—and if it bends it is steel, if it breaks it is iron. Usually the steel nail looks bluer or has a bluish tinge, which the iron nail does not possess. Let us hear from others of the craft telling how they do their work.

### Criticism Desired of Truss Construction.

*From* C. E. W., *Hagerstown, Ind.*—I have worked out a problem which I would like some of my brother workmen to criticise and tell me wherein I am wrong if such be the case. The diagrams accompanying my statement of the problem will more fully explain my meaning. In the first place I want to find the size of rafters required to carry a slate roof, the rafters to be about 14 feet long and spaced 16 inches on centers:

| | |
|---|---|
| Hemlock sheathing.................. | 2.5 lbs. per sq. ft. |
| Slate 3-16 inch thick, 3-inch lap....... | 6.75 lbs. per sq. ft. |
| Roofing felt, one layer................ | 0.5 lb. per sq. ft. |
| Wind pressure (third pitch).......... | 29.10 lbs. per sq. ft. |
| Total............................ | 38.60 lbs. per sq ft. |

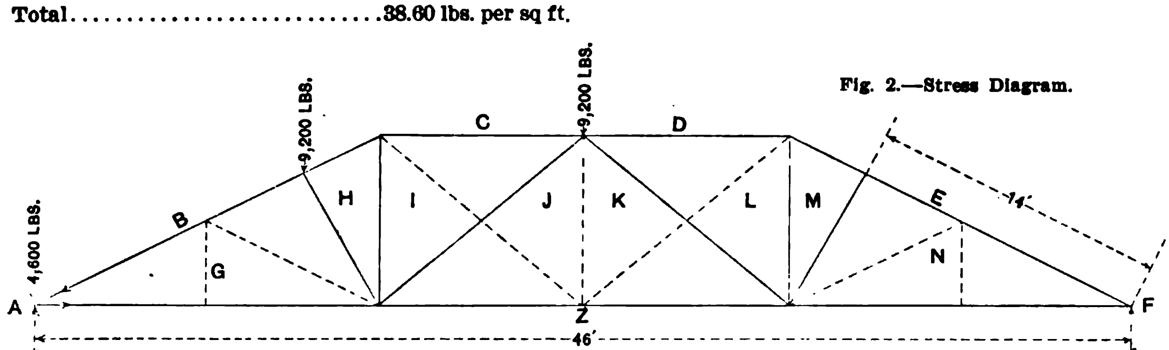



Fig. 1.—Diagram of Truss.—Scale, ⅛ Inch to the Foot.

*Criticism Desired of Truss Construction.—Contributed by "C. E. W."*

The number of square feet supported by one rafter is 14 x 1 1-3 = 18.67 square feet. Then the total load sustained by one rafter will be

$$18.67 \times 38.60 = 720.66 \text{ lbs.}$$

$$\text{Bending moment} = \frac{720.66 \times 14 \times 12}{8} = 15{,}133.86 \text{ inch-lbs.}$$

The modulus of rupture of yellow pine is 7300 pounds per square inch. Now, one-fourth of 7300 is 1825, the safe working stress of material used.

15,133.86 ÷ 1825 = 8.28 section modulus required.

Assuming that a 2 x 6 inch will be large enough,

$$b = \frac{8.28 \times 6}{6^2} = 1.38 = \text{thickness of timber.}$$

The number of square feet of roof carried by the truss is

$$2\ (28 \times 12) = 672.$$

Now, adding the weight of the rafter, which is about 5.33 pounds for every square foot of roof area, to the weight of the roof material, we have:

38.60 + 5.33 = 43.93 lbs. per square foot.

Assuming that the timber in the truss will be 4.1 pounds for every square foot of roof area, we have a total load per square foot of

43.93 + 4.1 = 48.03, and 672 x 48.03 = 32,276.16 lbs.

The weight of the ceiling carried by one truss will be 8 x 552 = 4416 lbs.

32,276.16 + 4416 = 36,692.16 lbs., the total load carried by one truss of 46 feet span placed 12 feet on centers.

If Figs. 1 and 2 represent the frame and stress diagrams, by means of the diagram, Fig. 2, we find that the stresses in the different members are as follows:

| | |
|---|---|
| B. G. | 31,000 lbs. compression. |
| C. I. | 28,500 lbs. compression. |
| G. Z. | 28,000 lbs. tension. |
| I. H. | 12,000 lbs. tension. |
| G. H. | 8,500 lbs. compression. |
| I. J. | 7,000 lbs. compression. |

Assuming that the wind stress on the principal members will be one-third of the dead load stress, the process will be:

| | |
|---|---|
| B. G. | 41,400 in round numbers. |
| G. Z. | 37,400 in round numbers. |
| I. H. | 16,000 in round numbers. |
| I. J. | 9,400 in round numbers. |

The tension member I. H. has a pull of 18,000 pounds. Assuming that a wrought iron rod has a tensile strength

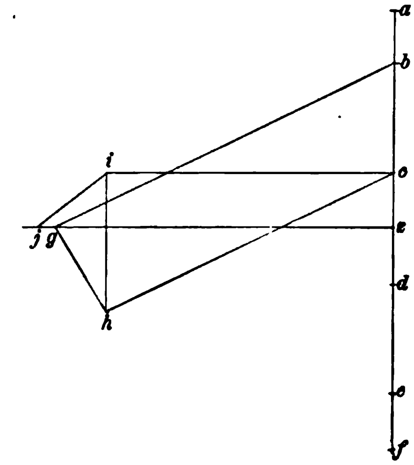



Fig. 2.—Stress Diagram.

of 52,000 pounds per square inch of section and using a factor of safety of 4, the safe load carried by the rod will be

$$\frac{52{,}000}{4} = 13{,}000 \text{ lbs.}$$

A 1½-inch rod which has at the root of the thread an area of 1.28 square inches will sustain a stress equal to

$$1.28 \times 13{,}000 = 16{,}640 \text{ lbs.,}$$

which is in excess of the strength required in the member I. H.

The member B. G. has the greatest stress, so we will calculate a yellow pine piece for this. The compression strength parallel to the grain of yellow pine is 4400 pounds per square inch, and the length in inches is 168. The ultimate compressive breaking strength of B. G. is

$$4400 - \left(\frac{4400 \times 168}{100 \times 8}\right) = 3476 \text{ lbs. per square inch.}$$

3476 ÷ 5 = 695.2, the safe bearing value.

The area of an 8 x 8 inch timber is 64 square inches and 64 x 695.2 = 44,492.8, which is in excess of that required by the stress diagram.

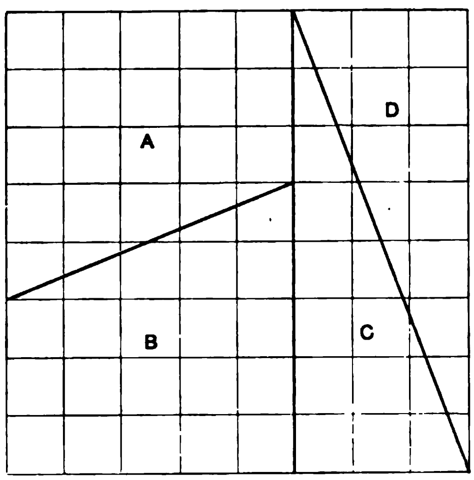
Next determine the size of the tie beam, G. Z., on which there is a tensile stress of 37,400 pounds. Using yellow pine, the tensile strength of which is 8000 pounds per square inch of section, and a factor of safety of 5, the safe stress will be one-fifth of 8000 = 1600 pounds.

The sectional area of a 6 x 8 inch timber is 48 square inches, and assuming that one-third of this is cut away for making the connections in joints, we have a net area of two-thirds of 48, which is 32 square inches. Then 32 × 1600 = 52,200 pounds, which is in excess of the stress required by the diagram, but for convenience of construction I would use an 8 x 8 inch timber, also a 6 x 8 inch for the member G. H.

Would it be advisable to use ¾-inch rods at G. and N.: also 1-inch rod at J. K.? Is it necessary to place braces where the dotted lines are shown in the diagram, Fig. 1? I trust the readers will express themselves freely on the subject.

### Does 64 Equal 65?

*From* J. T., *Brooklyn, N. Y.*—Being a reader of your valuable paper I wish to solicit aid in a problem in which I am greatly interested. Several years ago I saw a man take a piece of board 8 inches square, cut it into pieces and so place them as to make an area 65 square inches. I have forgotten now how it was done, but I have several friends who would like to see an explanation of it, as they claim it cannot be done. If you can help me in any way you will confer a favor.




*Does 64 Equal 65?—Fig. 1.—An 8-Inch Board Cut Into Four Pieces.*

*Answer.*—We have prepared an engraving representing a board 8 inches square to be cut into pieces, as shown by the heavy divisions. We have added a few lines to show how the confusion arises which makes the four pieces seem 1-64 part larger in one form than in the other. It will be seen that there is a diagonal line running directly from corner to corner, and this line in Fig. 2 is indicated by a dotted line. Arranging the four pieces as shown in Fig. 2 makes each of the pieces A, B C and D a little larger than they really are. By looking at Fig. 1 it will be seen that A and B are just 3 feet wide at their narrow ends and C and D measure exactly 3 feet at the wide ends. When we put them in the shape shown in Fig. 2 we find that the dotted diagonal line makes A and D just a trifle more than 3 feet wide at the line where they join, and it will be found that C and B are also a little more than 3 feet wide at this point of union. Now, if the lines are drawn accurately, as shown by the heavy lines in Fig. 2, we find that there is a spindle shaped space between the four pieces, which is just equal to the missing square. This is a very good illustration of the wild results which may often be obtained from slight inaccuracies in drawings from rules that "come near enough." In 19 cases they may answer very well with a little clipping here and there, but in the twentieth case they will make mischief that cannot be remedied except by beginning anew and doing all the work over again. While approximate rules answer very well sometimes, it is exceedingly important that the workman should understand their nature, so that in cases where great accuracy is needed he may not rely upon them.

The question which our correspondent has sent us is one which at one time made a good deal of stir among the correspondents of some of the English and American papers, and is a very common stumbling block, because the drawings are not usually made with sufficient accuracy, nor of a size large enough to show where the difference between the two figures lies.

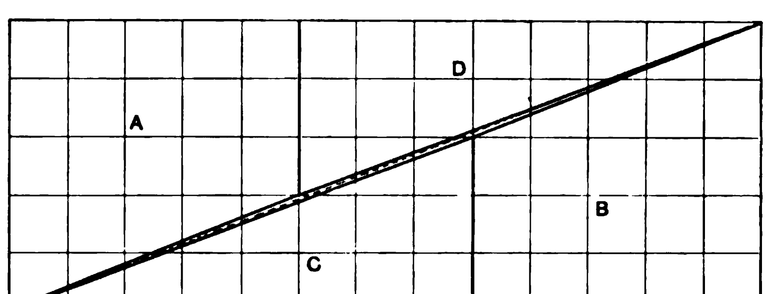



*Fig. 2.—The Four Pieces Rearranged to Make 65 Square Inches.*

### Making a Five-Pointed Star with the Steel Square.

*From* F. C. B., *St. Thomas, Ont.*—Referring to the recent letter of John L. Shawver in which he tells how to make a five-pointed star, permit me to inquire why he does not take his compasses and space the five points around the circle instead of monkeying with a protractor which 95 carpenters out of 100 do not carry in their "kit." I think it shows more ability on the part of a man to see him do good work with everyday tools than to see him make use of a lot of paraphernalia that is unnecessary.

### Some Comments on Saw Filing.

*From* G. F. E., *Los Angeles, Cal.*—I have read with no little interest the comments on saw filing by "N. A. R.," "S. F. B." and "S. A. T." in the issues of the paper for September and December, 1904, and January, 1905. Like "N. A. R." I have filed saws at intervals for more than 50 years, sometimes with the file pointing toward the saw handle, and sometimes the other way. Sometimes I have filed first one way in between each alternate tooth, and then the other way between the others, so that it would reduce the farthest row of teeth against which the file pressed and cut the most. I did this without turning the saw around with the other side toward me after filing one way. I never turn a rip saw around when filing. No one can entirely teach saw filing by vocal or written language. The dexterity of the hand and the judgment of the eye have to be acquired by continued practice and can be partially lost through lack of practice. Book instruction is useful, and I have received many good hints that helped me in manual training. Some of the cunning of the hand may be inherited and either increased or lost. No one can give the exact angle to hold the file because it depends upon the hardness of the substance to be sawed and the hardness of the saw; besides that even if the best angle for each substance to be sawed were given it would not be any help in learning the practice of saw filing because no two persons would hold the file at the same angle when told.

When I was an apprentice my boss told me one day to file my saw. I replied that I did not know how, and he said: "But you have to learn. Take this saw as a pattern to guide you," handing me his own. I remarked that I would be likely to waste files and time, but he concluded it would cost no more then than it would later, while both of us would get the benefit after I had learned. He was right. Although I was all the afternoon filing and the saw looked worse than when I began, yet it was improved in the last two hours. Although I did not inherit it nor had a hint either written or spoken, except what I have told you, I kept on trying to learn by practice and observation of other good filers until in a few weeks I was called the best saw filer. Since then I have lost my skill several times for want of practice. If the cutting edge of a saw tooth is filed at too sharp an angle and is too thin it will bend if the saw is soft, and "crip" (break) if the saw is hard, especially if the wood is hard and the grain crooked.

### Joining New Roof to Old Building.

*From* C. J. C., *Johnsonburg, Pa.*—In answer to the problem of "J. C. W.," Berlin, Pa., published in the March issue of the paper I inclose sketches showing three solutions, which may be of interest to the correspondent in question. Fig. 1 represents a very good solution and Fig. 2 an easy one, but hardly as good as the first. The dotted lines along the valley of the old roof and leading to the down spout indicate the tin flashings. Fig. 3 shows a fairly satisfactory solution.

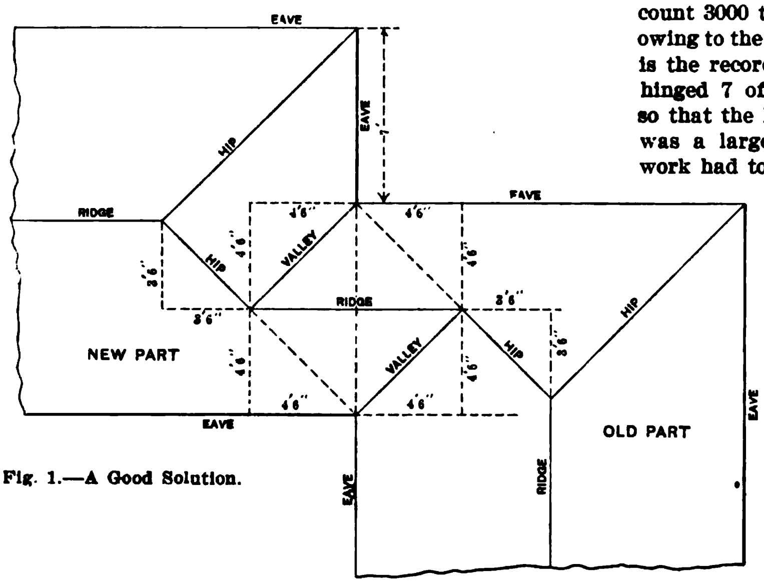



Fig. 1.—A Good Solution.

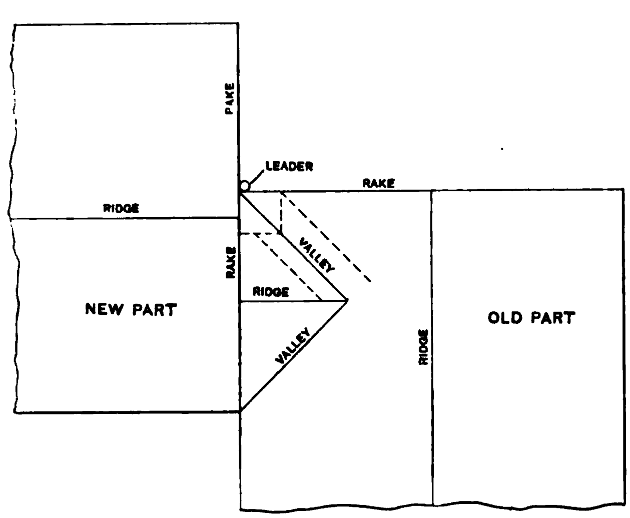



Fig. 2.—Easy but Less Satisfactory.

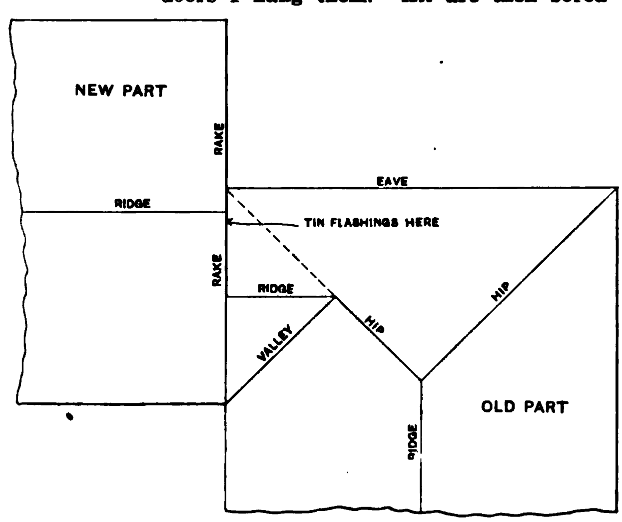



Fig. 3.—Still Another Method of Arranging the Roof.

*Joining New Roof to Old Building.—Various Solutions Contributed by "C. J. C."—Scale, ⅛ Inch to the Foot.*

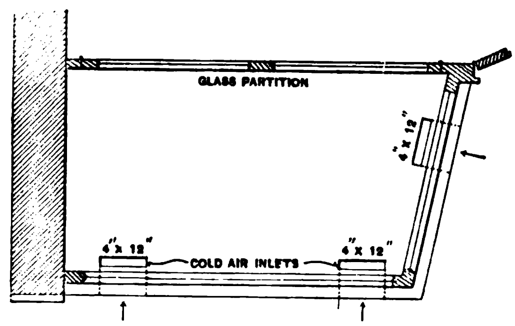
### Why Shingle Nails Rust.

*From* J. T. McC., *Orange, Cal.*—In reply to the inquiry of "C. E. B.," Judson, Ind., in the February issue I would say that I think he is yet in the dark regarding the cause of the rusting of nails. We charged it to the acid in the redwood shingles, but we are told that is not the cause. I think, however, "C. E. B." has helped to solve the problem when he says, "nails made and used 25 to 40 years ago did not rust off." I know they did not for I have torn off old roofs and the nails were all sound, but there was no paper sheathing on the roofs I removed. All kinds of wood—oak, elm, &c.—were used in my native State, Iowa. Now, Brother "C. E. B.," I think I can tell you the cause of the trouble as I have it from one of the best hardwaremen on the Pacific Coast. He, of course, may be wrong, but here is the cause as he describes it. All steel has not the same lasting qualities. Since the introduction of the Bessemer process of manufacture, my authority says, the lasting qualities of the metals are lost in the modern process of making the material. I think he is right, for I know the old nails used to last while the new ones do not. One cannot have failed to notice that in all branches of iron and steel goods we use they do not last, and out here on the Pacific Coast we have an endless amount of trouble.

Regarding the shingling question, I would say that we count 3000 to 5000 shingles a day's work of eight hours, owing to the amount of cutting or breaks in the roof. Here is the record for eight hours on doors: Fitted 12 doors; hinged 7 of them. Casings were set back only ⅛ inch so that the hinging was done under some difficulty. One was a large outside door and had three hinges. This work had to be done very carefully. I allow 20 minutes for completing a mortise lock. This is plenty of time, and frequently I have three to five minutes to spare. I work from a bench and work either right or left handed. The man who works with tools on the floor needs more time. I do one thing at a time. I first fit and mark for hinges all my doors in the house, and all the fitting is done in one room and by a gauge. When the door is taken to the opening where it belongs there is very little left to do in the way of fitting. Both door and jamb are then marked for hinges at the same time. The door is then set to one side until I am ready for hanging, and after fitting the doors I hang them. All are then bored for the locks, and finally these are put on. I do this to avoid carrying with me so many tools and besides it saves time. Never get down on your knees to put on a lock. Have a good seat and your tools on a nice little rest at your right hand. It is unnecessary to hunt for tools if you have things right where you want them. Learn to work both hands the same. Use your screw driver especially with both hands. A young man once said to me, "What shall I do to become a good mechanic?" I replied, "Learn to be quick and accurate; do the work well and do anything you are told to do, no matter what the work may be. Do not grumble if you do not get the best work on the job. The kicker generally gets it in the neck on my work." Again, I call "time."

**Preventing the Sweating of Show Windows.**

*From* C. F. S., *Ashtabula, Ohio.*—In the February number of the paper "W. A. K.," Garnavillo, asks how to prevent the sweating of show windows. If he will carry out the plan here suggested he will overcome the trouble, for the scheme is derived from experience. The window must have a light partition from the main storeroom, either of glass, as shown, or ceiling boards, preferably the former, and then in an ordinary sized window make three openings 4 or 5 x 12 inches and case them up tight with galvanized iron, or wood. A good way is to




*Preventing the Sweating of Show Windows.—Fig. 1.—Plan View.*

employ a tinsmith and put in galvanized iron, then on top of the floor on the inside over the whole tack a piece of ¼-inch mesh wire screen, making use of small staples. In the sketches which I send Fig. 1 represents a floor plan of the show window, while Fig. 2 is a sectional elevation. If the correspondent will follow the plan suggested he will have no trouble.

**Framing a Roof of Two Different Pitches.**

*From* W. S. W., *Sterling, Kan.*—As I have a house to build this season which will have a roof of two different pitches I thought I would post myself a little on the bevels required, so I began to study the articles published in *Carpentry and Building* in 1903, and contributed by Morris Williams, giving special attention to the one found in

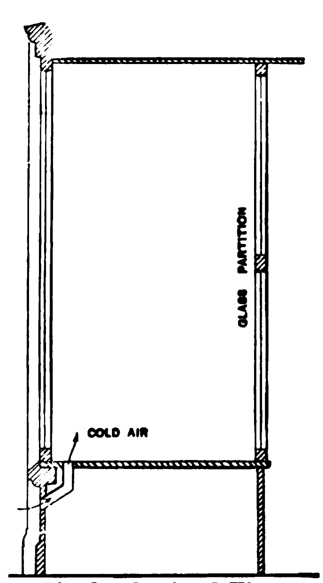



*Fig. 2.—Sectional View.*

the February issue. In order to be sure that I understood the articles, I went into my shop and tested the bevels on a small scale by cutting pieces and setting them up at their proper pitch. Many of these bevels I have obtained before in the same way he does, and when one cuts out a pattern and sets it up the reason for the drawing is easily apparent. I could not, however, see the reason for the way he gets the side or down bevel for a purlin, so I took it on the plan of roof which I have to build and I could not make it work. The bevel on the narrow side came very near being right, but the other side was far wrong.

I send a drawing of the roof plan as I ha[illegible] it to build. The run of the common rafter on one side is 10 feet, and I shall make it one-third pitch, or 8 inches rise to the foot run, which gives 80 inches rise. The other side being 8 feet run will require 10 inches rise to 1-foot run in order to make the ridge the same hight. I have in most particulars followed the drawing given by Mr. Williams. This drawing gives a group of triangles, which if cut out and set up in their proper places and at their proper pitches would make their outlines stand plumb over the lines of the plan. The purlin is seldom used in frame houses, but the down bevel is the same as the down bevel on roof boards in a valley or the bevel across the side of fascia board when it is put on square with the pitch of a roof. Now in the drawing which I send the line *g i* crosses at right angles the line *a e*, which represents the common rafter, and gives the position of the purlin. The base of the triangle *a i g* is the rise of the roof, while the hight is the same as the run of the common rafter.

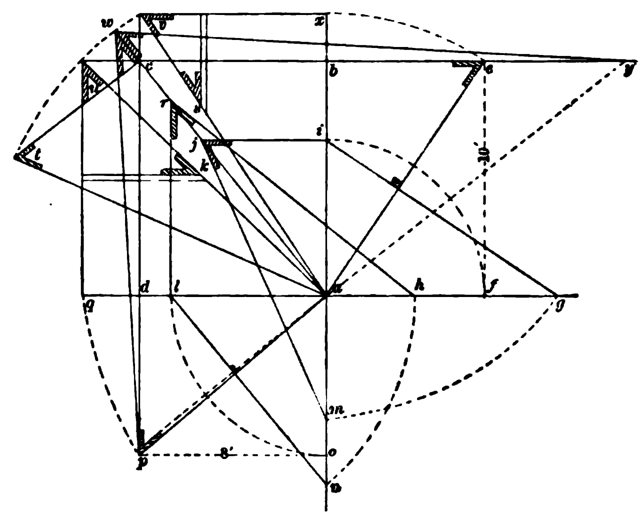


*Diagram Accompanying Letter of "W. S. W."*

Now draw from *i* to *j* parallel with the plate line, then lay down the length of the common rafter from *i* to *m* and draw the line from *j* to *m*, which gives the side bevel for the purlin at *j*. Proceed in the same manner with the other side which gives the bevel at *r*. These bevels have purlins I know to be correct, and they are not the same as those given by Mr. Williams. They are all obtained from the plan, but I never saw the purlin bevel shown this way before.

**Another Veteran's Views of Carpentry and Building.**

*From* R. K., *Pleasanton, Kan.*—The letter in the last issue from a veteran of this State leads me to say that I like *Carpentry and Building* very much, and have been greatly interested in all it sets forth in the way of designs, plans, hints, suggestions, &c. It is chock-full of "meat," but I, being nearly 73 years of age, and having just now come out of a long spell of sickness, do not much feel the need of anything that suggests work. Yet I may get excited over something and renew my subscription for it some time in the near future.

**Making Floors of Horse Stalls Tight.**

*From* C. A. W.," *Port Jervis, N. Y.*—I would suggest to "R. C.," Elk Ridge, Md., who asks in the May issue about making the floors of horse stalls tight, that he put in a concrete floor 3 inches thick, and then on top of this use a slatted rack. I have employed the same scheme with good results. The racks are to be made so that they may be easily removed and the cement floor should be laid with at least 2 inches fall in the length of the stall, say 10 feet, with an iron trough at the foot to carry off the sewage.

**Rafter Problems in Square Root.**

*From* A READER, *Portland, Maine.*—In giving the cut for purlins and rafters of all kinds, I would suggest that if some of our carpenters and joiners would explain their problems in square root and simple plain figures, then more of our carpenters and builders would learn the method of solving such problems, and there would be more room in *Carpentry and Building* for advancement.

# ARRANGING BATHROOMS IN OLD HOUSES.

BY H. L. M. R.

THE cost of plumbing fixtures has greatly decreased in the last decade, and plumbing is now within the reach of any home owner who desires it in earnest. The lower cost, together with the fact of the people becoming better educated to the value of sanitary conveniences by more put. And, as competition has been fierce for the last few years, prices are evidently as low as they are likely to go. There is a limit to the selling price—the cost of making and marketing—and no one should hold off with the idea that plumbing goods will be appreciably cheaper.

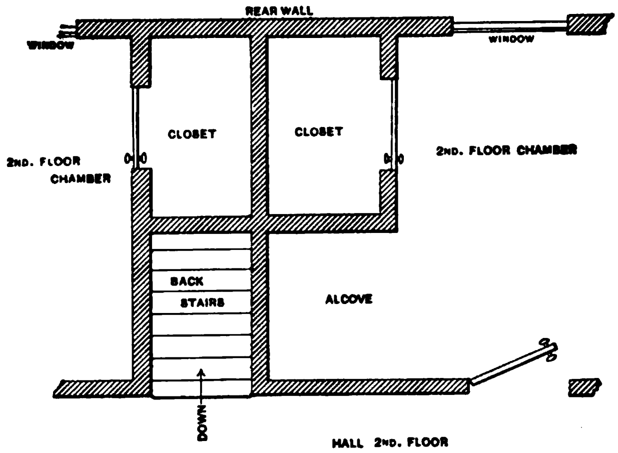



Fig. 1.—Walls as Originally Built.

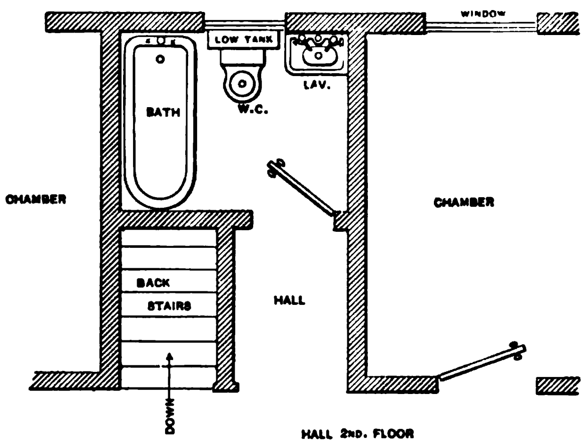



Fig. 2.—Walls Changed to Install Bathroom.

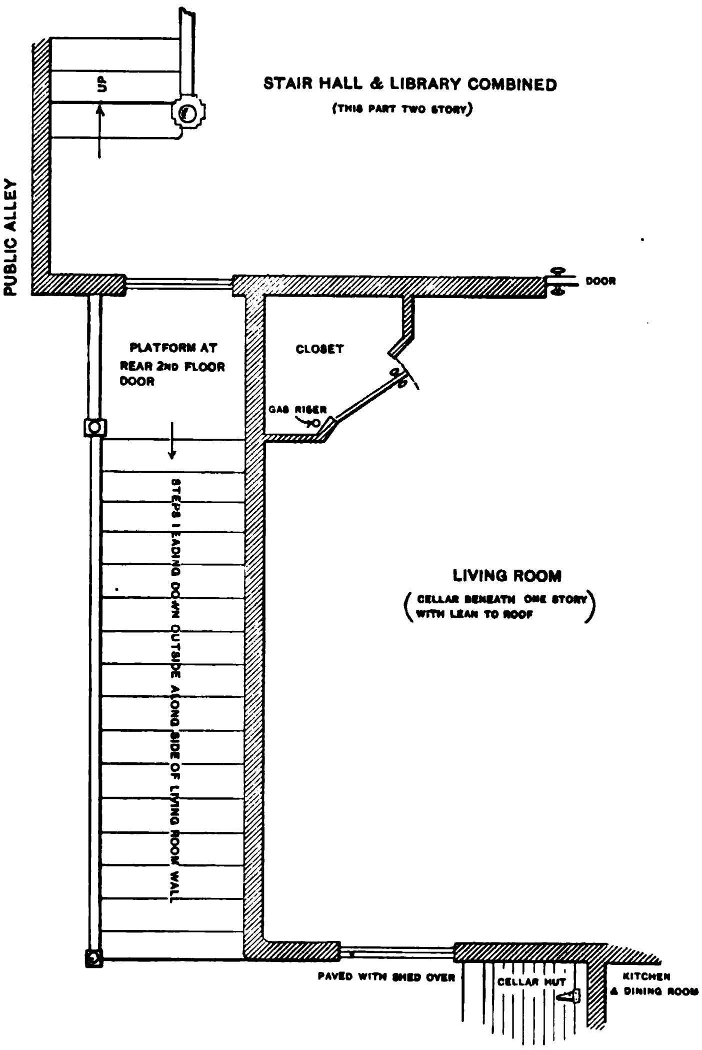



Fig. 3.—Original Arrangement of Frame Building.

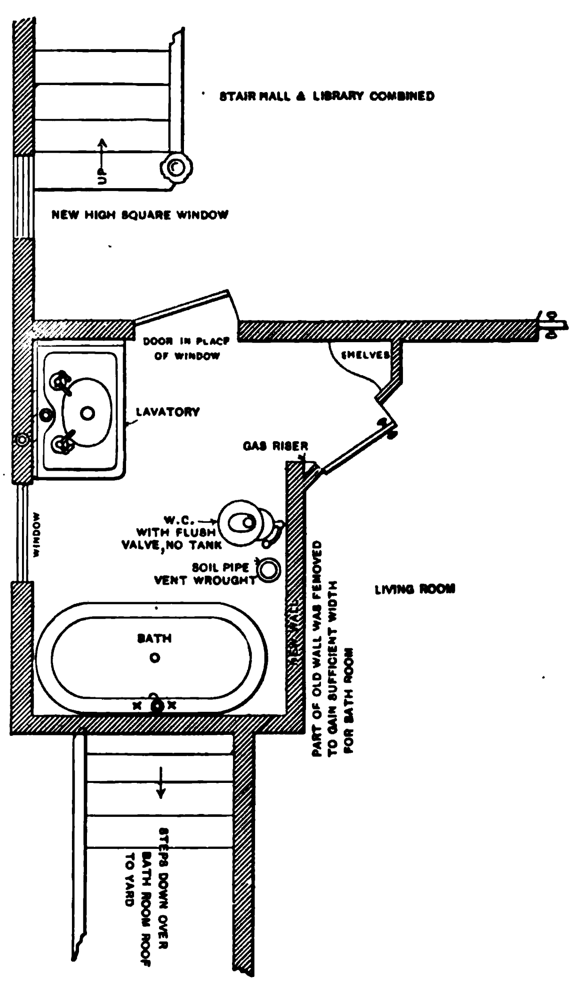



Fig. 4.—Changes Made to Accommodate Bathroom.

*Arranging Bathrooms in Old Houses.*

frequent contact and familiarity with them, has increased the number of buildings put up with plumbing as an original feature from a ridiculously low to a creditably high percentage. The manufacturing facilities of makers of sanitary goods have increased fourfold and all virgin territory is being worked thoroughly to market the out-

In the skirmish for business, however, one field has been generally overlooked—the houses already built without plumbing. In them, if properly worked, are the richest returns to come from any one trade source.

Grafting a bathroom and its fixtures into a house built without considering plumbing is entirely within the domain of the plumber, so far as designing the alteration, securing the contract, superintending the work of foreign lines, installing the plumbing and reaping the profit all around. What more does he want? It is not only necessary but proper to take these jobs at a reasonable figure, and the number of small profits accruing will pay the plumber well for his manifold knowledge of building arts, while the work will be much cheaper to the owner than when the carpenter, bricklayer, plasterer, painter and decorator are dealt with independently. No other craftsmen are, and none has an equal opportunity to be, as versatile as the plumber.

The writer has had four experiences in adapting houses to install bathrooms and fixtures which he thinks worthy of mention. Sketches of each, before and after alteration, are presented. In one of these, a far out of the way place, the writer personally did every stroke of all lines, even to the papering and painting; and it is not badly done either. These jobs were not sought; they came in the regular course of business. By looking for them, the writer expects to do 40 such jobs in less time in the future, and many other fellows can follow suit.

In Fig. 1 is shown what was found in a nice farm house. The owner had prospered and wanted more comfort. He came to the plumber to know the cost of plumbing, dimensions, &c.; said he would have to do something to the house as it was not built for a bathroom, and the fear of building costs had long deterred him from concluding. An appointment was made to meet him at the nearest railroad station on a certain day for the purpose of visiting the house, in order to suggest what, where and how to build to suit the plumbing. After looking the house over, I asked if they could give up the closets to the rear second floor chambers and use portable wardrobes instead. They could. They were advised to do no building at all. The plumber knew best just what was necessary to accommodate the fixtures and would bring his own carpenter, who was familiar with work for plumbers. He would take out the partition between the closets, change the alcove into a hallway, close the closet door holes, and use one of the doors at the hallway, putting in a high, square window to light the room, for $45 extra. This was cheap and easy, and the farmer knew it.

He was then advised that, being away from town, repairs would be expensive and it would be best to spend the money saved in building for the best of plumbing goods and the most careful installation of the work. He did. When the writer left the premises, there was a substantial bathroom, as shown in Fig. 2, a tank in the attic, a force pump and sink in the kitchen and hot and cold water to all the fixtures. The drainage was carried to a ravine 1200 feet away. The bill was $780, and it was paid. Since then a wind mill and tubular well have been put in, and I am now figuring on a gas machine and chandeliers, &c.

In Figs. 3 and 4 are shown the way in which a bathroom was made in a common frame house, built by piecemeal on a small city lot next to an alley, in the suburbs, and out of reach of the city water. What happened after the plumber was given the privilege to "make a way to have a bathroom" is shown in Fig. 4. The house wall was extended along the alley line 8½ feet, and then over to the living room wall. The living room wall was torn out from this point to the main house and a new wall set up, as shown, to gain width. The closet was practically thrown into the bathroom, as a means of entering from the living room. A door was substituted for the window in the library wall and the frame set 4 inches further from the corner. This gave access from other parts of the house. A square, high window was set in the alley wall of the library to offset the loss of light caused by making the bathroom. This room came directly under the outside steps, shown in Fig. 3. Part of the ceiling was made 9 feet high, but the stairs demanded a slant roof and the lowest point of the slant part of the ceiling, at the back of the bath, is 5 feet from the floor. A tank was put in the loft of the living room and water supplied from a large cistern holding 450 barrels, by a force pump in the cellar. The drainage was carried to a vault at the rear of the yard. Altering the building was charged at $70, about the real cost, but the plumbing profit was enough to justify throwing in the alterations.

Another example is giving in Fig. 5, of a modest home in the outskirts of a city when it was built. It was constructed of brick on a small lot, and the owner was proud of it, although it had none but the essential features. When the city water supply system and the sewers grew up to him, he wanted a bathroom, but had no place for it and no room to spare. The writer cut away half the thickness of the dining room wall, one-third of part of the living room wall, put a door in place of the window and built a warm frame addition, as shown in Fig. 6, with the studding turned the flat way. A high window

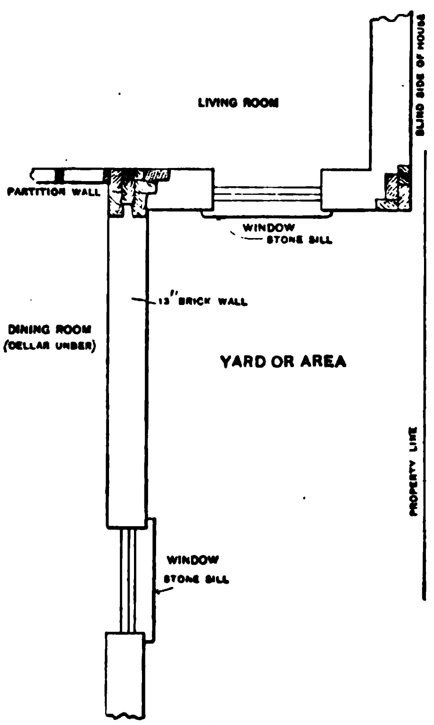



Fig. 5.—Original Arrangement of One-Story Cottage.

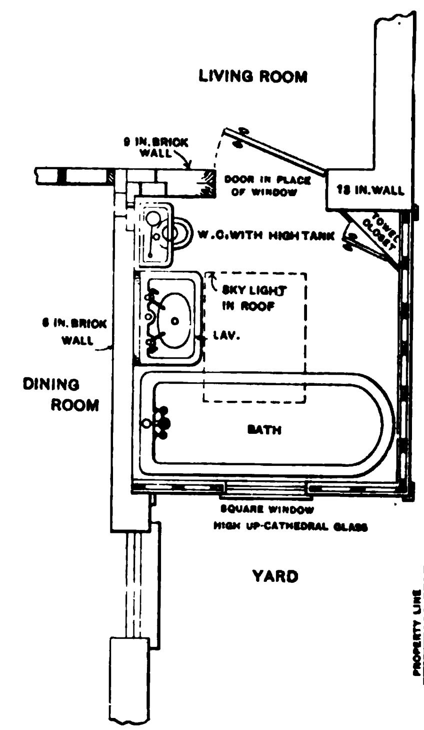



Fig. 6.—Bathroom Built in Yard.

*Arranging Bathrooms in Old Houses.*

with cathedral glass was put over the bath, to add to the good appearance of the room, and a skylight, with ventilator, was placed in the roof to do the real lighting by day. The building work amounted to $80, with small profit, and the plumbing footed up to $380.

Three closets on the third floor of a frame residence are shown in Fig. 7, which afforded the only available space for a second bathroom, which was needed badly. The changes made are shown in Fig. 8. Two closet partitions were removed to make the room and a corner closet was built in each bed chamber. The old closet doors were used in opposite rooms to make them open, as shown, without alteration. The hall door frame was moved 4 inches and the door hung on the inside. The original casing of the frame was narrow. Broad casing was used instead, set well back on the jambs, to avoid plastering and papering in the hall. In this case, and also in that of Fig. 2, the bathroom floor was made 6 inches higher than the house floor, for convenience in placing the under floor pipe properly. Light was obtained by a skylight in the roof, with flaring walls to the ceiling of the bathroom. The actual building cost was $60, but the bill did not mention it. The bill merely stated: "To installing third story bathroom, $340."

The time of a customer is always worth as much as that of a plumber. Let him understand that you know it, that your thought and experience per unit of time will be the most efficient; that you can shoulder a load of care and supervision, regarding the work, for him and give him a chance to make two for one while you overcome the obstacles. Earn his confidence and describe to him convincingly the difference between a good job, with satisfaction from the start, and the haphazard subterfuge renewed and completed by installments and repairs, at continual cost and no satisfaction from the beginning. One customer secured in this way is worth more than a dozen large jobs done in a perfunctory manner.

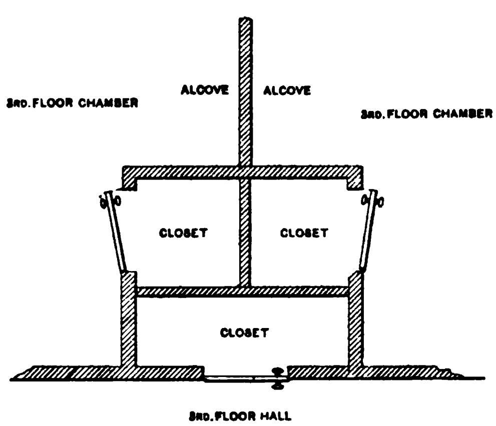



Fig. 7.—Closets Used for Bathroom.

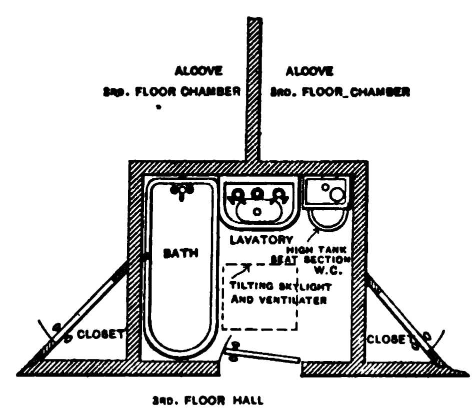



Fig. 8.—The Bathroom Completed.

*Arranging Bathrooms in Old Houses.*

## Hollow Blocks as a Building Material.

At the nineteenth annual convention of the National Brick Manufacturers' Association held at Birmingham, Ala., the first three days of February there were presented for discussion a number of most interesting papers relating to the brick making industry and topics closely relating thereto. Among the papers was one on hollow blocks as a building material, and as this form of construction is rapidly growing in popular favor throughout the country we take the space to present copious extracts from what the author, M. W. Lauer of Chicago, had to say, together with some of the more important discussion thereon:

Hollow blocks, as referred to in this paper, will mean that class of hollow ware used as a structural material for basement walls, with superstructure of frame, or where the carrying walls are entirely of this material. It therefore excludes hollow tile used for floors, partitions and general fire proofing purposes.

Hollow blocks first came into active use in the West 10 or 12 years ago. Prior to that time they were a material of experiment, failing of successful introduction because the building public was skeptical as to the use of a hollow material where a solid wall had been the custom for generations. In time practical demonstrations overcame this skepticism and the hollow block wall was accepted as good construction. The use of hollow blocks was almost entirely in the line of basement foundations for frame buildings. Then the theorist came along showing on paper how various forms of ornamentation might be adopted; how intricate casings and molds of large projection might be made, and how by a combination of the regular blocks, ornamental blocks and molded trimmings almost any style of architecture might be executed with hollow blocks. After much trial and expense it was found that while you can successfully execute elaborate designs on paper, it is another proposition entirely to produce these designs in the form of hollow blocks, by machinery, as a commercial proposition After years of experience it has been found that the ordinary hollow blocks with a few simple, practical trimmings, where combined in a building designed for their use, laid up by competent workmen, produce a well appearing, sanitary and durable building.

The future points to the employment of hollow blocks for residences of moderate cost. That future, however, depends on two things:

1. The elimination (for this purpose) of that class of hollow blocks made of clays unsuited for hollow ware, requiring a product burned to imperviousness, yet practically straight and true. Soft, absorbent blocks are no more fit to enter into residence construction exposed to alternate rain and frost than are the myriad of water guzzling hollow concrete blocks now flooding the market. There is a legitimate field for genuine concrete, but neither soft, hollow clay ware nor concrete in hollow form as now produced (on a thousand and one different hand machines by a thousand and one different men with a thousand and one different mixtures) are fit materials to use for exposed walls in residence construction.

2. The elimination of purely selfish middlemen, ignorant of or indifferent to the requirements necessary to encourage the use of hollow blocks as a structural material. These men are interested in one thing only. That one thing is, how much profit can be made by a sale. They will advocate and encourage the use of "any old thing" with hollow space in it for "any old purpose," provided they can make a sale and a profit. If a sale so made results in discouraging a dozen prospective builders, they still have their profit, and those interested in extending the use of hollow blocks the loss.

The writer after ten years of practical experience in selling good, well burned, impervious blocks, and constructing buildings of same, would urge manufacturers of this material to send out only good, straight, well burned, practically impervious blocks, where they are to be used as described in this paper; to not only do that, but aim to improve the quality and raise the standard of hollow blocks. Lead the demand and do not trail away behind! By so doing and co-operating with such middlemen as have an intelligent conception of and are interested in the future of this material, you will greatly increase the demand for your material.

J. A. Dailey, Terre Haute, Ind.: Hollow blocks are all right when made right out of the right kind of material and laid up right. This is one of the greatest troubles we have. There is no question but what they make a warm building in winter and a cool building in summer, but the material must be the right kind. They must be thoroughly vitrified, and as for their carrying strength, there is no question about that.

Mr. Eudaly: What do you know about hollow blocks for building elevators?

Mr. Dailey: That is one of our specialties. I have a little circular here that some of you may have seen that will give you an idea as to how hollow blocks are used for building elevators and grain tanks.

W. P. Blair: Give us the hight and dimensions of one or two you have put up.

Mr. Dailey: This little circular gives a cut of one we furnished material for in South Chicago. This elevator is 150 feet high, and the tanks are 97 feet high. The blocks are 6 x 8, and 12 inches long. The walls are 6 inches thick. There are three rows of tanks, eight in a row, making 24 tanks, with a capacity of 1,000,000 bushels. They use them for grain. There is not a splinter of wood about this elevator, not even the window sashes, which are steel, and the floor and roof are of expanded metal and concrete. The wall of the main building is only 6 inches thick.

Mr. Eudaly: I thought the people of Chicago had decided not to have any more steel about their elevators. (Laughter.)

Mr. Dailey: The blocks that are used in the construction of these tanks are made out of the same kind of material as Mr. Blair's paving brick. Our plants are close together. We have had our blocks tested at the Pittsburgh Testing Laboratory, and they stand 17,000 pounds to the square inch. The expanded cement roof that I speak of is made of wire netting with cement laid over it. Some one here asked about the thickness of the walls of the tanks. It is 6 inches. During the construction a steel band is placed inside, entirely covered with cement. So far as the regular size building blocks being used for building purposes are concerned, we use them largely for smaller structures and foundation work. They make a much dryer wall for basements. The cement blocks are very absorbent and so the hollow clay blocks make a dryer wall.

Secretary Randall: What is the cost of a hollow clay block building as compared with one of concrete blocks?

Mr. Dailey: They don't cost as much as concrete blocks by about 40 per cent. You will find concrete blocks of all kinds, you will find some of them in the wall all right, and then some of them have absorbed moisture until they will disintegrate. The concrete block helps our trade at home; gives us a demand for No. 2's to be used in the cross walls and basements.

Secretary Randall: In your opinion, then, the clay block is both cheaper and better than the concrete block?

Mr. Dailey: Yes, sir. They make the best cellars of anything on account of being dryer. A gentleman was talking to me the other day about a cellar he had made last year of hollow block, and he said he had never had a cellar keep as dry as this one had. A gentleman asks if the cement adheres to the block. We never have any trouble in that connection. We do not make grooves in our blocks, but there is no trouble about the cement sticking. But where they want us to do so we scratch them on the side, just like you see partition tile scratched.

Mr. Eggers: The plaster would adhere to the tiles anyway, even if you did not scratch them, would it not?

Mr. Dailey: Yes, sir.

W. P. Grath, St. Louis, Mo.: I want to say something in regard to vitrified hollow blocks. I am interested in a roofing tile works at St. Louis, Mo., and we had a large number of hollow blocks shipped from Mr. Dailey's plant at Terre Haute to St. Louis for use in building our factory, everything except the kilns, including the machinery building, dryers and the office building. I guess we shipped 30 or 40 carloads. The machinery building is three stories high, and I had to get a permit to use these hollow blocks. I had to see the building commissioner personally and, after seeing the blocks and examining them carefully, he gave us permission to use them, and on a building which required a 13-inch wall the blocks made the equivalent of a 12-inch wall, and the commissioner was thoroughly satisfied as to the strength of the blocks and said we could use a 12-inch block for a 13-inch wall. The building has been in use for three years and has proven entirely satisfactory. The main building is put up with plain vitrified block, and the office of rock faced block and the office presents a very handsome appearance. We used ordinary plaster and it stuck and will stick forever. Some of the blocks were grooved and some plain, but we did not find any difference so far as the plaster sticking was concerned. We shipped those blocks from Terre Haute to St. Louis, where they make millions of brick, which speaks well for the cheapness of the blocks. Part of the blocks were laid by stone masons and part by brick masons, and a good handy man can lay them up as well as a mason. (Applause.)

Mr. Copeland: Our worthy Mayor told you the other day that we were all modest, and so it seems we are. We have sitting back there in the audience a local brickmaker who manufactures a beautiful cherry red hollow block used in building stacks. There is one we can see from this building that is 165 feet high that I think is a credit to any community, and I would like to hear from Mr. Gregg in regard to hollow blocks for building chimney stacks.

M. J. Gregg, Birmingham, Ala.: I hardly know what to say in this regard. We make these hollow blocks on an ordinary Chambers machine. They are not hollow exactly, they are simply perforated. They are radial, different sizes, some 13 inches in length, about 7 inches at one end and about 5 to 5½ at the other. They lay them in a circle, and by reason of the perforations there is less expansion and contraction. They are laid up in cement. It makes a much stronger structure and one less liable to crack than if laid with common brick, and it is not necessary to bind them with bands of iron, and that is one reason for using vitrified block.

## A Canadian Cathedral.

As a result of the recent competition among English, Canadian and American architects for the St. Peter's Monastery, which is to be erected at Rosthern, province of Saskatchewan, Canada, by the Benedictine Fathers, the design accepted was that submitted by the architectural firm of E. Brielmaier & Son of 24 and 26 East Twenty-first street, New York City, and Milwaukee, Wis. It is estimated that the proposed edifice will ultimately cost in the neighborhood of $1,000,000, and that about ten years will be required for its completion. The architectural scheme provides for a connected group of buildings, including a church at the center, a college in one wing and the monastery proper at the other end. The uniform hight will be four stories and the interior and exterior will be of stone, marble mosaic and brick construction. The main group will cover an area 400 x 336 feet, the church occupying a plot 256 x 105 feet at the center. The college wing will be 51 x 170 feet in plan. The church will have two large towers 208 feet in hight, and the main body of the structure will be 80 feet wide and the transept 105 feet.

The new 12-story fire proof hotel which is to be erected in West Seventy-first street, New York City, will have a frontage of 64 feet, a depth of 83 feet and an extension of 32 feet. The cost according to Architect F. C. Browne is placed at $300,000, and the facade will be of brick with trimmings of terra cotta and limestone.

A building which will be known as the "Railroad and Iron Exchange," and which will be 20 stories in hight, is to be erected on the entire block fronting on West street, from Albany to Cedar streets, New York City. The plot, measuring 78 x 158 2-3 feet, is now covered by seven old five-story brick warehouses which in due course will be razed to the ground. Soundings which have been made for the foundations show that caissons will have to be sunk to bed rock as piles would not be sufficiently strong to sustain the structure. The plans are now being drawn by Cass Gilbert, of 79 Wall street.

# WHAT BUILDERS ARE DOING.

THE annual meeting of the Baltimore Builders' Exchange occurred on June 6 and was largely attended. Unusual interest developed in the address of President John J. Kelly, in which he touched upon building operations in the city and give figures showing what had been done during the fiscal year just closed. He pointed out that during the past 12 months building activity had been the greatest in the city's history, the structures erected being larger, more modern and more costly than those destroyed, and establishing the standard of substantial excellence for future improvements. According to the records of the Appeal Tax Court there were 1343 buildings destroyed by the great fire which visited the city a year ago last February, the assessed value of these being $12,908,300. The number of permits for buildings in the burned district issued to June 1 was 446 at a given valuation of $12,903,780, to which Building Inspector Preston adds 20 per cent., bringing the total valuation up to $15,491,736. With the amount of money available and ready to be spent for the work of municipal improvement it is predicted that Baltimore will be the center of building activity for several years to come.

In touching upon the growth of the Builders' Exchange President Kelly stated that the fiscal year had been in many respects a remarkable one. The great fire attracted to Baltimore a great many people engaged in the various lines connected with the building industry, and to those who came as honest competitors the exchange gave a hearty welcome. The membership of the organization increased during the year 33 per cent., and the financial condition is in a more satisfactory state than at any time during its existence. "Membership in the exchange," he said, "is in a sense a guarantee of integrity and responsibility, insuring just treatment in the dealings of members one with another as well as with the general public."

The report of Secretary John M. Hering was a most interesting document. Tribute was paid to the architects who had loaned plans and specifications to the exchange, and special reference was made to the fact that when on March 20 the 'change noon hour meetings were resumed a daily register of attendance was commenced, which is being faithfully maintained. From the date named to June 3, inclusive, the register showed an attendance of 2267 members and 3447 visitors, or a total average attendance of 85; omitting Saturdays and holidays, the average total attendance would be over 90. Secretary Hering pointed out that in the leading trade journals throughout the country Baltimore has not heretofore been mentioned in the monthly building reports of the leading cities, this being due, he discovered, to the fact that the Building Department of the city has no definite data or tabulation by which this information can be readily secured. He intends to take up the matter with the Mayor at the first opportunity, and expressed the hope that in the future this omission will be remedied and the building activities of Baltimore authentically and promptly published as in other cities.

The election of officers resulted in the establishment of the regular ticket, as follows:

President, Theodore Mottu.
First Vice-President, Theodore F. Krug.
Second Vice-President, Joseph T. Lawton.
Third Vice-President, Frank G. Boyd.
Secretary, John M. Hering.
Treasurer, B. F. Bennett.

DIRECTORS.

| | |
|---|---|
| Walter E. Burnham, | Geo. B. Roche, |
| John S. Bullock, Jr., | Harry L. Starr, |
| A. J. Dietrich, | Henry A. Seim, |
| C. M. Ellinger, | Frank G. Walsh, |
| Jas. L. Gilbert, | Geo. W. Walther, |
| John K. How, | Charles J. Wood. |

The meeting was preceded by the annual dinner, after which State Fire Marshal McAfee made an address on the relation of different structures and their ability to resist fire.

### Cleveland, Ohio.

The value of the building improvements projected in May shows a striking increase over the same month last year, and reflects the "boom" in this line of industry which seems to be sweeping over the country. There were 538 permits issued for improvements, costing $1,069,940, as compared with 410 permits for improvements, calling for an outlay of $481,620, in May last year.

An innovation in connection with the Building Department is the rule that hereafter every new building in the city will have a tag conspicuously attached to it as soon as completed. A record of the numbers issued will be kept on file by the secretary of the Department, and in the books there will also be a brief description of the building and an exact description of its location in relation to the nearest streets. The tags are of brass, and in addition to the number they are stamped with the words, "Building Department" and "City of Cleveland." When the new system is once in operation the various inspectors of the Department will find their work simplified, as in reporting inspections they will refer to the house and building by the tag number instead of attempting to locate it on each report.

### Denver, Col.

The building ordinance which has recently been enacted in Denver, Col., has many interesting provisions which if conscientiously enforced are likely to contribute in no small measure to making Denver one of the model cities. One of the provisions of the act prohibits the erection of flats within a prescribed area, the idea being to reserve the residential district for private dwellings, thus impelling the expenditure of large sums in the erection of handsome homes, while the flats, being built in parts of the city which would not be chosen for fine private dwellings, will tend to enhance in value the property on which they are located. Another provision limits the hight of business structures, thus giving a more or less uniform appearance to all parts of the business section, at least so far as the hight of the structures is concerned.

In the Frank E. Kidder competition for architects and draftsmen, open only to members of the Triangle Club of the city, the Kidder prize was won by L. A. Desjardins of 83 South Eleventh street. According to the conditions the sketch was to be of a three-story building on a 25-foot inside lot, the *façade* to be executed in brick and the style of architecture to be Flemish.

### Elyria, Ohio.

The leading contractors in the building line, as well as dealers in building materials in Elyria, Ohio, have recently organized a Builders' Exchange and elected officers for the ensuing year. The organization was perfected through the efforts of members of the Builders' Exchange in Lorain, who being interested in the movement did a good amount of missionary work in bringing matters to a head. The organization was perfected at a meeting held on the evening of May 4, and was attended by delegates from Cleveland, consisting of James Young, former president of the State Association; W. B. McAllister, president of the Cleveland Builders' Exchange; H. C. Bradley and John Leese, directors of that organization, and Secretary E. A. Roberts, who has been untiring in promoting the Builders' Exchange movement not only in the State of Ohio, but throughout the eastern section of the country. The meeting was largely attended, and addresses were made by the Cleveland delegation as well as by President Pierce and Secretary Stauder, who accompanied the delegation from Lorain.

The local exchange elected officers for the ensuing year, as follows: President, Fred Wolf; vice-president, Harry Winkles; secretary, Phil Kaiser; treasurer, John Murbach.

### Kansas City, Mo.

The contractors and builders of the city are enjoying an amount of business which is far in excess of the volume of work in progress a year ago at this season. A small sized boom seems to have struck the city, and buildings are going up in all sections. According to the figures of Superintendent S. E. Edwards, there were 469 permits for building improvements issued in May, and estimated to cost $1,108,417, as compared with 393 permits for building improvements, costing $702,601, in May of last year. The frontages of the buildings for which permits were issued were 10,020 and 5859 feet, respectively. From these figures it will be seen that the increase in activity as compared with a year ago marks a very high percentage.

### Los Angeles, Cal.

Building operations in Los Angeles continue to break all records, and the figures of 1904, which it was generally expected would be the high water mark in this respect, are being exceeded during each corresponding month of the present year, until now the total of the first five months of 1905 are ahead of the first five months of 1904 by 994 permits and a valuation of $1,620,520. During May there were issued 844 permits, for a total valuation of $1,244,154. In the number of permits issued the record is ahead of any previous month in the history of the city. Compared with May of last year, the record of the month just ended is greater by 279 permits and $342,910 in value.

Building work seems to be turning more largely to smaller structures and residences than was the case last year. Of the total estimated valuation on the permits issued during May only one-fifth were for brick buildings, and of these the cost in no single case reached $50,000. It is claimed, however, that a good deal of large work will be undertaken before the summer is over. Several hotels are to be undertaken in Los Angeles and surrounding towns, and the Hauser Packing Company is to erect four large brick and steel buildings at a total cost of $400,000.

### Memphis, Tenn.

The wave of activity in the building line, which has been spreading over all sections of the country, appears to be gaining momentum with the progress of the season, and the Southern cities are feeling the impetus which has been imparted. Here the value of the building improvements projected in May is placed at $371,000, as compared with $288,282.50 for May of last year. The increase in building operations in 1904 over 1903 amounted to 3 per cent., while according to the present outlook the increase of 1905 over a year ago will approximate something like 50 per cent.

In Birmingham, Ala., the increase is equally striking, the total for May being $315,000, as against $154,000 in May last year.

### Minneapolis, Minn.

Figures for the first five months of the present year show a gain in the value of building operations of approximately 40 per cent. over the figures for the first five months of last year, the totals being $4,210,050, as compared with $2,929,565. The estimated cost of building begun in May footed up to $1,134,790, as against $1,031,000 for May, 1904. The number of permits was 601.

For the rest of the year building will center largely about the State University, which has fully $375,000 available for new buildings. Within a few days contracts will be let for a bacteriological laboratory, to be located in the rear of the campus on the bluffs overlooking the Mississippi River, and for which there is an appropriation of $100,000. Another appropriation of $400,000 is available for a main building to replace the "old main," which was destroyed by fire last winter, and it is likely that work will be begun on the building before the end of June. A $200,000 bequest, made by the late Mrs. Mary A. Elliott, will shortly be available for a philosophical and engineering building. There is likewise an appropriation of $50,000 for a heating and lighting plant.

Minneapolis architects and contractors are greatly interested in the proposed erection of at least five new capitol buildings in as many Northwestern States, and in one instance at least a Minneapolis firm has succeeded in landing a contract in connection with the work on these new buildings. Bell & Detweiler, the well-known architects, have been employed by the capitol commission of South Dakota to draw plans for the new State house that is to be erected at Pierre at a cost of $700,000. North Dakota and Idaho have both made appropriations for new capitol buildings, and Wisconsin and Iowa have appropriated large sums for such additions and alterations to their present capitols that virtually new buildings will result.

The City Council has authorized a $200,000 bond issue to provide the funds for a new High School in the southwestern part of the city and for two new grade schools, one in North Minneapolis and one on the East Side. A $250,000 bond issue has also been authorized to provide the money necessary for finishing the $4,000,000 municipal building that has been in course of erection since December, 1887.

### New Orleans, La.

This city has been experiencing something of a boom in building operations, and it is being reflected in various branches of the market for builders' materials. The report is current that lumber dealers of the New Orleans territory have decided to advance the price on all classes of stock from June 1, thus following an advance of $2 per 1000 feet last March. The point is made that lumber is becoming scarce in the city, due to the activity of building operations and, in some measure, to the demand from Panama. Several railroads are purchasing large quantities in connection with their building plans, notably the Illinois Central Railroad, which is rebuilding its docks recently destroyed by fire. Some concern is being felt among builders and those contemplating building as to whether the present advance will continue for some time or whether it may not even be necessary later on to make still another advance, although mills are being worked overtime to supply the demand. The brick market is also affected, the statement being made that two railroads have purchased the entire supply, one road having closed deals with 14 brick plants, taking their entire product for a year.

### New York City.

Notwithstanding minor interruptions to building operations the past month has witnessed a steady development of the movement, and as indicated by the number of permits issued there has been a remarkable increase as compared with the situation as it existed a year ago at this time. Up to June 1 the value of building improvements for which permits had been issued in the Boroughs of Manhattan and the Bronx was $65,725,000, as against $36,900,000 for the corresponding period a year ago. During May the value of new buildings projected in the same boroughs was $15,652,025, as against $9,363,000 in May of last year.

In Brooklyn permits were issued in May for 916 buildings to cost $6,547,415, which compares with 446 permits for building improvements, costing $3,500,485, in May last year.

At the recent annual meeting of the Employers' Association of Roofers and Sheet Metal Workers of Greater New York the following officers were elected for the ensuing year: President, Thomas P. Flanagan; vice-presidents, E. D. Hooker and I. D. Moritz; secretary, Jacob Ringle, and treasurer, John Ackerman. Board of Governors: M. F. Westergren, M. Harrison and John Morrow.

Arbitration Board: E. D. Hooker and M. Harrison.

Executive Committee: John Seton, M. W. Westergren, M. Harrison, John Grace, E. V. Schenck and John Nicholson.

### Philadelphia, Pa.

The record breaking pace at which building operations are being conducted still continues, and the figures for May as issued by the Bureau of Building Inspection are in excess of any corresponding month in recent years. In fact, it is safe to say that no such degree of activity in the building line has been witnessed in the history of the city as the figures referred to would indicate. There were 959 permits taken out during the month of May, covering 1976 operations, and calling for an estimated outlay of $4,390,980, as against 970 permits, covering 1701 operations and costing $3,251,520, in May of last year. ..s has been the case in previous months this year, a large percentage of the operations relate to dwelling houses, this being due to the rapid development of many of the outlying districts of the city. Of the grand total for May $2,648,085 will be expended for the erection of 1197 dwellings. So far this year the Bureau of Building Inspection has authorized the erection of 4790 private dwellings at an estimated cost of $10,735,465, while for the corresponding period of last year permits were granted for 3171 dwellings, costing $7,284,050. From this it will be seen that the increase this year over the corresponding period of 1904 is very nearly 35 per cent. An interesting feature of the exhibit is the indicated demand for manufacturing plants, there having been 13 permits issued for such buildings, estimated to cost $433,000. The new schools projected call for a trifle over $200,000; warehouses, $102,500; a place of amusement, $135,000, and additions and alterations a trifle over $511,000.

In the geographical disposition of the operations the Twenty-seventh Ward is far ahead of any other in the amount of improvements projected, the figures showing 323 permits, involving an outlay of $840,345. Four West Philadelphia wards contributed nearly $1,600,000 of the total amount of improvements, for which permits were issued during the month.

### Portland, Ore.

Building operations in Portland have dropped off somewhat during the last few weeks, owing probably to the general interest taken in the Lewis and Clark Exposition, which opened on June 1. Builders are not anticipating a very active summer, although it is believed that a considerable amount of work will be undertaken. The unusual amount of building, due to the heavy construction work at the fair will probably result in a reaction during the present summer, although the steady growth of population should largely counteract any movement of this sort.

Contractors are pleased with the labor outlook and are of the opinion that building will not be disturbed by strikes or lockouts during the remainder of the year. Building materials are showing some tendency to advance, but it is not believed that the advance will be serious enough to discourage building.

### Rochester, N. Y.

The report of the Bureau of Buildings and Combustibles for the month of May shows a gratifying increase in the amount of new work projected as compared with the corresponding month a year ago. The figures are remarkable by reason of the large number of dwelling houses for which permits were taken out, those issued in May calling for an estimated outlay of $386,603, as against $256,755 in May a year ago. These figures compare with $955,412 in April, $706,612 in March, $104,190 in February and $81,825 in January. For the same months last year the figures show $764,112 for April, $95,460 for March, $121,685 for February and $245,500 for January. From this it will be seen that the total for the first five months of the current year was $2,234,642, as against $1,483,432 for the corresponding period of last year.

### San Francisco, Cal.

According to the present outlook the spring and summer will exceed the same seasons of last year in the number and value of large structures undertaken. There being at present a number of big buildings under way in both the retail and wholesale districts. While it is generally understood that the demand for hotels and apartment houses of the more expensive sort is pretty well supplied, several building permits for large fire proof hotels have been recently taken out. Residence building is about normal in the city, although there is a great increase in the construction of high classed residences in the suburbs.

During May 496 building permits were issued for construction work of a total estimated value of $2,110,150. Of this amount $1,129,241 was for new buildings to be erected and $189,909 was for alterations to old buildings. The building operations undertaken during the first five months of the year reached a total of $9,684,000.

The Pacific Commercial Museum of San Francisco has received inquiries from Manila for information concerning the structural material and equipment for a large hotel to be built in that city on the pattern of the Queen's building at Hong Kong, China. The building is to contain 150 apartments for guests, dining rooms, billiard halls, reading rooms, smoking rooms and reception rooms. It is understood that bids and specifications for the structural work have also been solicited from Belgium.

Among the larger buildings which are to be erected in San Francisco during the present summer are, the California Bank building, a 16-story structure; the Ruef building, to cost $70,000; the Knickerbocker building, to cost $100,000; a 15-story and basement fire proof hotel building, to cost $100,000, and a new three-story and basement brick machine shop, to be erected by the Joshua Hendy Machine Company, at a cost of $90,250.

### Seattle, Wash.

The building outlook is generally considered good. The total value of the work undertaken during the first five months of the year is just about equal to the total of the same five months during 1904, but is considerably better than was anticipated six months ago. General business conditions are good, and although the architects do not report quite as much heavy work as was the case a year ago, it seems probable that the increase in residence building and in small business structures will fully counteract any falling off in the larger sort of buildings. Among the work in the near future are a four-story brick building, to be erected by John A. Roebling's Sons Company, at a cost of $50,000; a theater and office building, to be owned by J. A. Moore, to cost $400,000, and the Harry A. Bigelow building, at the corner of Fourth and Pike streets, to cost $30,000.

### St. Paul, Minn.

Every month of the present year has proved to be ahead of the corresponding month last year as regards its building figures, and May is no exception. The cost of building improvements projected in May totals $616,675, as compared with $538,810 for May, 1904, and the number of permits issued was 236, as against 195 for May a year ago. The total figures of the five months of this year are $2,053,085, as compared with $1,362,722 for the same period last year, the number of permits being 777 and 629, respectively.

May has been particularly notable for the unusual number of large contracts that have been started, the largest one being that for the Twin City Rapid Transit Company's $500,000 plant at University and Snelling avenues in the Midway district. The contract, which has been awarded to George Cook of Minneapolis, calls for the erection of 15 fire proof buildings of reinforced concrete. Nine of the buildings are to be ready for occupancy by January 1.

The Midland Storage Company and A. Booth & Co. are both preparing to erect storage warehouses at St. Peter and Third streets, at a cost of about $250,000 apiece. Each warehouse will be from seven to nine stories high, built of fire proof material throughout, and it is expected that they both will be ready for occupancy by the first of next year.

Emanuel L. Masqueray of New York has been commissioned to prepare plans for the Catholic cathedral to be erected on Summit avenue at a cost of $1,000,000. Preliminary plans that have been submitted provide for an edifice in the shape of a Greek cross, surmounted by an imposing dome.

The City Council has authorized a $150,000 bond issue for an auditorium, the cost of which will reach a total of $550,000. There will also be erected a new High School in the northern part of the city, to cost $150,000.

### Tacoma, Wash.

Some builders report that if present prospects are carried out June will be a record breaking month in the matter of building work in Tacoma. The amount of new work contemplated, for which in several cases the contracts have already been let, but for which permits have not yet been taken out, bids fair to make the total building operations during June considerably greater than was the case in June, 1904. During May 140 building permits, to the total valuation of $137,357, were taken out, which is slightly below the value of permits taken out in May, 1904. Of the permits issued more than half were for dwellings, and, according to the present outlook, this percentage will be maintained during the summer. Among the work in prospect for the immediate future may be mentioned a number of important school buildings, the S. H. Hyde residence, to cost $18,000, and the building of the Tacoma & St. Paul Lumber Company, to cost $12,000.

### Notes.

Contractors who have looked up the law on the subject claim that the new building ordinance passed by the Board of Aldermen of Denver, Col., April 20, and embracing rigid regulations concerning terraces and fire proofing of buildings, is illegal. They base their claim on the fact that by a provision of the charter no ordinance becomes effective until it has been published in the newspapers or in pamphlet form. The building ordinance, it is claimed, has never been published in any shape, and there are intimations that an injunction will be obtained with a view to preventing Building Inspector Willison from enforcing the law.

A vast amount of building is in progress in Salamanca, N. Y., and much more is being planned for the immediate future. Suburban property is being rapidly improved, and it seems to be the general opinion that within a comparatively short time there will be plenty of desirable houses for dwelling purposes.

# LAW IN THE BUILDING TRADES.

#### LIABILITY FOR ACCIDENT IN BUILDING OPERATIONS.

One was rightfully upon premises where a contractor was constructing a steel building, and while there was struck by an object falling from above. The workmen of the contractor were working above with cold chisels, and when the party injured fell a cold chisel fell close beside him, and this chisel had the initials of the contractor upon it. It was held that the absence of any proof explaining such facts warranted a presumption of negligence on the part of the employees of the contractor for which the latter was liable.—Melvin *vs.* Pennsylvania Steel Company (Mass.) 62 N. E. Rep., 379.

#### ESTIMATES MUST BE ON LABOR AND MATERIAL ACTUALLY USED.

Where a written contract provides that certain contractors will erect a building on a certain lot for the owner of same for a fixed sum, payable in installments on estimates and certificates of the architects as the work progresses, the estimates must be on the labor and material actual used in the building and cannot be extended to include material not so used, although in course of preparation for such work.—McConnell *vs.* Hughes (W. Va.) 40 S. E. Rep., 437.

#### COURTS WILL NOT ENFORCE SPECIFIC PERFORMANCE OF BUILDING CONTRACT.

One who has taken a lease of a building to be constructed according to certain plans and specifications cannot obtain a temporary injunction forbidding its intended construction according to different plans, as the Court will not conduct building operations by its mandates and because a contract to build or repair will not be specifically enforced.—Backes *vs.* Curran, 73 N. Y. Sup. Rep., 492.

#### CONTRIBUTORY NEGLIGENCE OF CARPENTER.

A carpenter was employed to lay a floor under the hatchways of a five-story building and complained that the place was dangerous because of the hoisting in progress; but said that he was insured. He was injured by the fall of merchandise which slipped out of a sling which was being hoisted up the hatchway. A safer place was available for him to work in, and the Court held he was guilty of contributory negligence and could not recover for the injury.—Kueckel *vs.* O'Connor, 73 N. Y. Sup. Rep., 546.

#### SUFFICIENCY OF PROOF OF AGENCY.

In an action to recover money expended in preparing to perform a contract for fire proofing a building evidence that certain agents of the owner had the management of the building under the owner's direction, including the rebuilding, and that such agents telegraphed and wrote the owner as to whether he desired to have the building fire proofed at a certain cost, to which he replied in the affirmative, is sufficient to show that such agents had authority to enter into the contract.—Swanson *vs.* Andrus (Minn.) 88 N. W. Rep., 252.

#### DAMAGES THAT MAY BE RECOVERED ON FAILURE OF HEATING PLANT.

Where a contractor for a steam heating apparatus guarantees that it will be ample to warm all the rooms in which radiators are placed to a certain temperature in zero weather, on a special finding that the apparatus was constructed according to specifications, but was insufficient for the production of such result and of the amount necessary to make it produce such result, the owner of the building is entitled to recover that sum from the contractor.—Board of Education *vs.* Jaeger (N. J.) 50 Atl. Rep., 583.

# OFFICE EQUIPMENT OF THE UP-TO-DATE ARCHITECT.

IT is a fact which does not admit of dispute that the success of a business depends very largely upon the perfection of its organization and the method with which it is conducted. This applies with equal force to the business of the progressive, up-to-date architect, and if he expects to carry on his affairs in an economical and efficient manner he must have a thorough and careful system in all the details of his office. In the first place his office should be equipped with an easy, quick, efficient and comprehensive method of taking care of the stock, of filing drawings, specifications, estimates, contracts, bonds, &c., which are constantly accumulating, so that any particular one of them can be obtained at a moment's notice, and so that they will always be in order, ready for immediate reference.

In considering the care of drawings and tracing cloths used in a drafting room it may be stated that they are sold in continuous rolls of 10, 50 or 100 yards, and in widths of 36-inch, 42-inch and 48-inch. These widths of paper can be cut into sheets 18-inch, 24-inch, 24 x 36-inch or 36 x 48-inch without waste. These sizes, with rare exceptions, are well adapted to all of the different sizes and requirements of the drawings of an architect's office. It is much easier and quicker for a draftsman to go to a drawer and take out a sheet of the size he desires than to take down a large, heavy rool, carry it to the table, lay off a sheet and cut it, and then replace the roll. We recommend, therefore, says a writer in an exhange, that as soon as a stock of paper is received the office boy take it to a table fitted for the purpose and cut it into sheets of the above sizes in about the ratio that the past experience of the office has demonstrated they will be used, and lay them down flat in drawers, each kind of paper in its own especial drawer, where, from their horizontal position and the weight of the pile above them, they will soon become fixed in a flat condition and will be much easier for the draftsman to handle when he is ready to use them. To facilitate cutting these sheets we would recommend a table with a heavy top about 52 inches long and 40 inches wide. In the rear of this table top, and level with it, we would fit a box large enough to contain a roll of paper of the largest size, with compensating rollers in it, so that the paper will easily revolve in the box as it is unrolled. The box should have a hinge lid closing over it, with a fastening, to keep it firmly closed when the table is in use, and leaving just space enough between the lid and the table top for the paper from the roll to be easily drawn out upon the table top as it is cut. A straight edge should be fastened securely to the top of the table close to one end and at right angles to this box to guide the paper as it is drawn from the box. This straight edge should be graduated in inches, so as to serve as a measure in determining the size of the sheets. A groove should be run along the back of the table close to the box for a guide to the knife used in cutting the paper. Similar grooves can also be made at right angles to the one above described so as to divide the sheets into the proper sizes. Beneath the top of the table there should be a case of drawers of the proper size to contain the sheets after they are cut, the sheets to be taken from these drawers as they are used.

### Blue Printing.

Almost every architect has made his own experiments in the use of different devices for duplicating drawings. All have tried the hectograph process, the moonstone process, and various other processes, but all have sooner or later returned to the blue printing process as the most correct, durable, cheapest and most convenient means of duplicating drawings. There are, however, only a few hours in the day that the sun's rays are strong enough to make a good blue print; and then dark and cloudy weather interferes with this work, so that blue printing by the sun's rays is very uncertain. As a result nearly all well regulated architects' or engineers' offices use some electrical process, which is always ready for business day or night, and always does its work just the same. Every office, therefore, which does its own blue printing should have a dark room and a cylinder or some efficient electric blue printing machine. The dark room should not be very large, just large enough to contain one table for cutting paper, which should be of the same kind as just described and room enough for the cutter to work in conveniently. The tills for rolls should be large enough to contain tubes, each tube being of the proper size to contain one 50-yard roll of paper, and all prepared papers —except the roll in the box—should be kept in air tight tubes, which should be painted black on the inside. If so kept, in a dry place, they will keep in good condition for six months or longer. It is necessary that the room should close up tight, but should be lighted by a small window glazed with ruby glass or with an electric or gas lamp with a globe of the same color. The printing machine should be placed as close to the dark room as possible, for the convenience of the operator. A large sink for washing prints should also be near at hand. It should be large enough to contain the largest print made upon the machine without folding it. It should have a supply and waste for the water, so that the water will be constantly running in and out of the sink. A drying rack is necessary for drying the prints after they have been washed, and this can be placed over the sink or over a drip board attached to the sink. Heavy rubber rollers, something like a clothes wringer, are also desirable, as they make the drying process more speedy and leave the prints in better condition. A wooden sink lined with lead or zinc is very easily obtained, and is very convenient for washing prints.

### Filing Drawings.

After the drawings are made and copied the next great problem that confronts the architect is how to file and care for them so as to occupy the least space in the office and yet be easily obtainable for reference whenever desired. There are many reasons why it is advisable for the architect to preserve the tracings of every building of any importance for which he makes drawings, not only until the work is completed and ready for acceptance, but for as long a period thereafter as possible. Changes or additions to the building may be made in the future which make it very desirable to have the plans from which the building was erected. They not only save a vast amount of labor in taking surveys, but they may disclose many items of construction that cannot be easily discovered without them, as, for instance, gas pipes, electric wires, sewers, plumbing pipes, &c., that are concealed in the construction. They are also very useful in case of the destruction of the buildings by fire or otherwise in settling insurance adjustments.

A uniform size of sheet has already been recommended. These can be easily laid in an envelope made of heavy Manila paper that will fold over the drawings after they have been laid in the envelope when open. A case of drawers to preserve these envelopes is necessary, the sizes of the drawers to be such as will fit the different sizes of envelopes. One size of drawers will file all of these drawings—viz., 28-inch front and 39-inch deep—while 18 x 24-inch for scale drawings and 24 x 36-inch for detail drawings will be found the sizes more commonly used, and these sheets will fit an envelope made for 24 x 36-inch sheets, the 18 x 24-inch size being laid in side by side. If 36 x 48-inch sheets are used for the same job they can be folded in the center, and they will then fit the envelope, so that one envelope will contain all of the drawings for any one building. If 12 x 18-inch and 18 x 24-inch envelopes are used they can be filed in the same size drawers by laying two envelopes side by side. These drawers can be made in blocks after the Unit Plan and built up to a sufficient hight and length as the necessities of the office require and to fit almost any space available. In order to make this system of filing available it is necessary to have a convenient and quickly available system of reference to go to with the files, so that not only the drawings of any job can be quickly and easily found, but that any sheet of these drawings can be obtained without having to remove and handle over all of the sheets in the envelope perhaps two or three times. To overcome this difficulty we recommend placing in the lower right hand corner of every sheet a tablet which gives, first, the architect's name; second, the number of the job; third, who made the drawing and the date upon which it was made; fourth, the number of the sheet;

fifth, who traced it and when it was traced; sixth, the number of the drawer in which it is filed; seventh, when checked and by whom, and eighth, the name of the owner. This enables the person upon opening the envelope to turn up the corners of the sheets until he finds the number of the sheet he desires and he can then remove it without displacing the other sheets. When the envelope is folded up there should be a stamp placed on the lower right hand corner of the envelope on the upper side, which gives first, the name of the architect; second, the number of the job; third, the drawing in which it is filed; fourth, the time of filing, and fifth, the name of the owner. This not only aids in having the drawings always placed in the right envelopes, but the placing of the envelopes in the right drawers. By raising up the right hand corners of the envelopes and reading the numbers of the jobs there is no trouble in finding the particular one wanted and removing it without disturbing other envelopes in the same drawer.

There should be a catalogue to go with the file, arranged in alphabetical order and give, first, the job number; second, the number of the drawer in which the drawings are filed; third, name of place in which building is located; fourth, date when building was commenced; fifth, name of architect; sixth, name of owner; seventh, remarks. This catalogue can be bound in book form and placed in one of the drawers or in some convenient place near the filing case. By reference to this catalogue the number of the drawer in which any particular set of drawings is filed can be easily ascertained without opening and closing drawers or disturbing the drawings.

### Filing Catalogues.

Of paramount importance to an architect are the catalogues he receives from the different manufacturers and dealers in the materials that enter into his work. They are in a measure his "stock in trade." They are a source of information without which he could hardly do business. It is therefore very important that he should be able to so dispose of and preserve these catalogues that he can in a moment obtain any one of them he desires. They constitute his reference library. A large number of these are furnished to the architect in nicely bound books, such as hardware catalogues, plumbing catalogues, &c. These can be kept in an ordinary book case, so as to be easily available. But a very large amount of this matter reaches him in the form of pamphlets, circulars, leaflets, &c., which it is necessary to preserve in some kind of a box. For filing this matter a closed box made of wood or of sheet metal about 12 inches square and 3 inches thick, which has a hinged lid on one side, will be found convenient, as the contents of this box are usually taken out for examination, and the box shields its contents from dust and keeps them straight and in order. These boxes are numbered and filed in cases also, these cases to be made on the Unit Plan to correspond with the drawing files.

A book is also to be kept in connection with this file, which will be found one of the most useful books in the office. In this book are registered the names of the dealers in each kind of material, and in connection with the name the address of the person or firm, together with the kind of literature on file, each of these entries to be made under its proper heading, together with the number of the file in which the literature is found. These headings are to be alphabetically indexed at the beginning of the book. For illustration, in the index you find hardware, page 40. You turn to page 40, you find the heading, hardware, file No. 27; and under this heading you find the entry, James Smith, Providence, R. I., 16 Weybosset street, catalogue of special hangers for sliding doors. This at once conveys to you the intelligence that Mr. Smith is a manufacturer of hangers for sliding doors, that his place of business is in Providence, that you have his catalogue and that it is found in box No. 27.

### Estimates for Payments to Contractors.

One of the important duties of an architect is the preparing and issuing of estimates for payments to contractors for work done and materials furnished in the erection of a building under the architect's supervision. Much depends upon the correctness and efficiency of this work. Various methods of keeping these accounts and forms of certificates have been invented and offered to the archi-

Estimate No.........
..................
M.................Owner.
M.................Contractor.

| | | |
|---|---|---|
| Excavating and Grading | | |
| Stone Work | | |
| Brick Work | | |
| Concreting | | |
| Plastering | | |
| Carpenter's Work | | |
| Iron Work | | |
| Slater's Work | | |
| Sheet Metal Work | | |
| Hardware | | |
| Painting | | |
| Plumbing | | |
| Electric Wiring | | |
| Light Fixtures | | |
| Heating | | |
| ........ | | |
| ........ | | |
| ........ | | |
| ........ | | |
| ........ | | |
| Total | | |
| Deduct | | |
| Net | | |
| Deduct Former Payments | | |
| Amount Now Due | | |

**Office of HOUSE & BARNES, Architects,**

**PITTSBURGH, PA.**

Estimate No............... ........................................

M...............................................

Sir:— .......................................

M........................................... Contractor................now entitled to..............payment for work done and materials furnished by........for your .................................................................as follows:

| | | |
|---|---|---|
| Gross Amount........................ | ........ | ...... |
| Deduct........................ | ........ | ...... |
| Net........................ | ........ | ...... |
| Deduct Amount of Former Payments.... | ........ | ...... |
| Amount Now Due........................ | ........ | ...... |

Respectfully,

Received payment, HOUSE & BARNES, Architects.

.................. ......................Contractor.... Per.................. ... ..

tects for their adoption and nearly every architect has his own form of certificate. The form shown herewith has been used with entire satisfaction by the writer. The certificates and stubs are together, bound in books of 100 or 200 in a volume. The stub shows the value of each kind of work that has been done at the time the estimate is made. It is thus a perfect exhibit of the condition of the work; it shows the gross value of the work done and the value of each item. It also shows the amount reserved as a guarantee for the perfection of the work done, which, when deducted from the gross amount, leaves the amount due the contractor. The certificate shows the owner the gross value of the work done up to the date of the certificate; it shows him the amount held in reserve as a guarantee; it shows the net value of the work, the number of payments made, the amount which has already been paid the contractor, and the amount now due, which is a full exhibit of the financial condition of the enterprise at the time the estimate is made. When the net amount due is paid to the contractor he signs this estimate and it becomes a receipt for the amount.

## New Publications.

**The Design of Beams, Girders and Columns.** By William H. Atherton. 236 pages; size 5½ x 8 inches; 201 illustrations. Bound in heavy board covers. Published by J. B. Lippincott Company. Price, $2, postpaid.

The matter contained within the covers of this book is based on articles originally contributed by the author, an English engineer, to the *Mechanical World*, and deals in an elementary manner with the main principles and considerations involved in designing beams and girders of such forms and materials as actually occur in structures and in machines. The book is intended to be strictly introductory in its aim and scope; consequently no attempt has been made by the author to exhaust the subject. There are 17 chapters, profusely illustrated and embracing examples illustrative of the graphical method of estimating the stresses in the several members of braced girders. The author points out that although mathematical intricacy has been intentionally avoided his aim has been to make the treatment of the subject thorough within the limits described and the mode of presentation such as can be easily understood by the architect and engineer. On questions of fundamental importance the author has gone to the root of the matter, giving full proofs of the leading formulæ, but has touched lightly on points of less significance. The concluding pages of the volume are given up to an extensive index alphabetically arranged, the use of which will greatly facilitate reference.

**Building Materials, Their Nature, Properties and Manufacture.** By G. A. T. Middleton; 420 pages. Size, 6 x 8½ inches. Illustrated with 197 diagrams and 12 plates from photographs. Bound in stiff board covers. Published by B. T. Batsford, London; represented in the United States by William T. Comstock. Price, $4, postpaid.

This work, by an English author, describes various materials used in the construction of buildings, and tells more or less of the present methods of their manufacture. What is presented represents the results of much research and study, as well as what the author saw in visiting the slate quarries of North Wales, the stone quarries of Somerset, Gloucestershire and Rutlandshire; the iron and steel works of Middlesbrough, the terra cotta works of Ruabon, the Portland cement works at Greenhithe and near Leamington, and numerous brick fields and lime kilns, as well as important manufacturing premises in and around London. The data obtained has been presented in clear, comprehensive style, and the work as a whole will be found a valuable addition to the architect and builders' library of trade literature.

The work comprises 45 chapters, some of the more important of which relate to the growth and structure of timber, its classification, &c., the main varieties of iron, paints, brick, stone, mortar and concrete. The aim of the author has been to include all information relating to the subjects indicated that could possibly be of value or interest to English users of building materials. A very full and exhaustive index will be found convenient for ready reference.

**Easy Lessons in the Art of Practical Wood Carving.** By Fred. T. Hodgson. Over 300 pages. Size, 5½ x 8 inches. 185 illustrations. Silk cloth binding, with gilt side and back titles. Published by Frederick J. Drake & Co. Price, postpaid, $1.50.

This work, as indicated by its title, is intended to take the young workman from the very beginning of carving, and by easy steps carry him through the intricacies of the art until he is able to produce a creditable piece of work. There are many opportunities for the mechanic who is clever with his tools to produce attractive and useful articles for the household and other purposes, and the book under review is designed to assist to this end. All important, of course, is the use and care of carvers' tools, and this phase of the subject is considered in the opening chapter. The materials on which to use the tools stands next in importance, and is made the basis of comment in the second chapter, while in the third there is given something on the grain of wood and other important matters in connection with the subject of carving. The various styles of carving are then taken up, such as flat carving, rounded forms, figure carving, incised and intaglio carving, lessons being given in each one of the styles, together with a description of the tools necessary and the methods of using them. The concluding chapter is devoted to miscellaneous examples of finished work of various kinds in order to provide designs for the young carver to execute. This is followed by an index alphabetically arranged.

A supplement to the work consists of a series of perspective views and floor plans of 50 low and medium priced houses.

ANNOUNCEMENT is made that hereafter the firm of Samuel Hannaford & Sons, architects, Cincinnati, Ohio, will consist of Samuel Hannaford, consulting architect, and H. E. Hannaford, C. E. Hannaford and Herbert Spielman.

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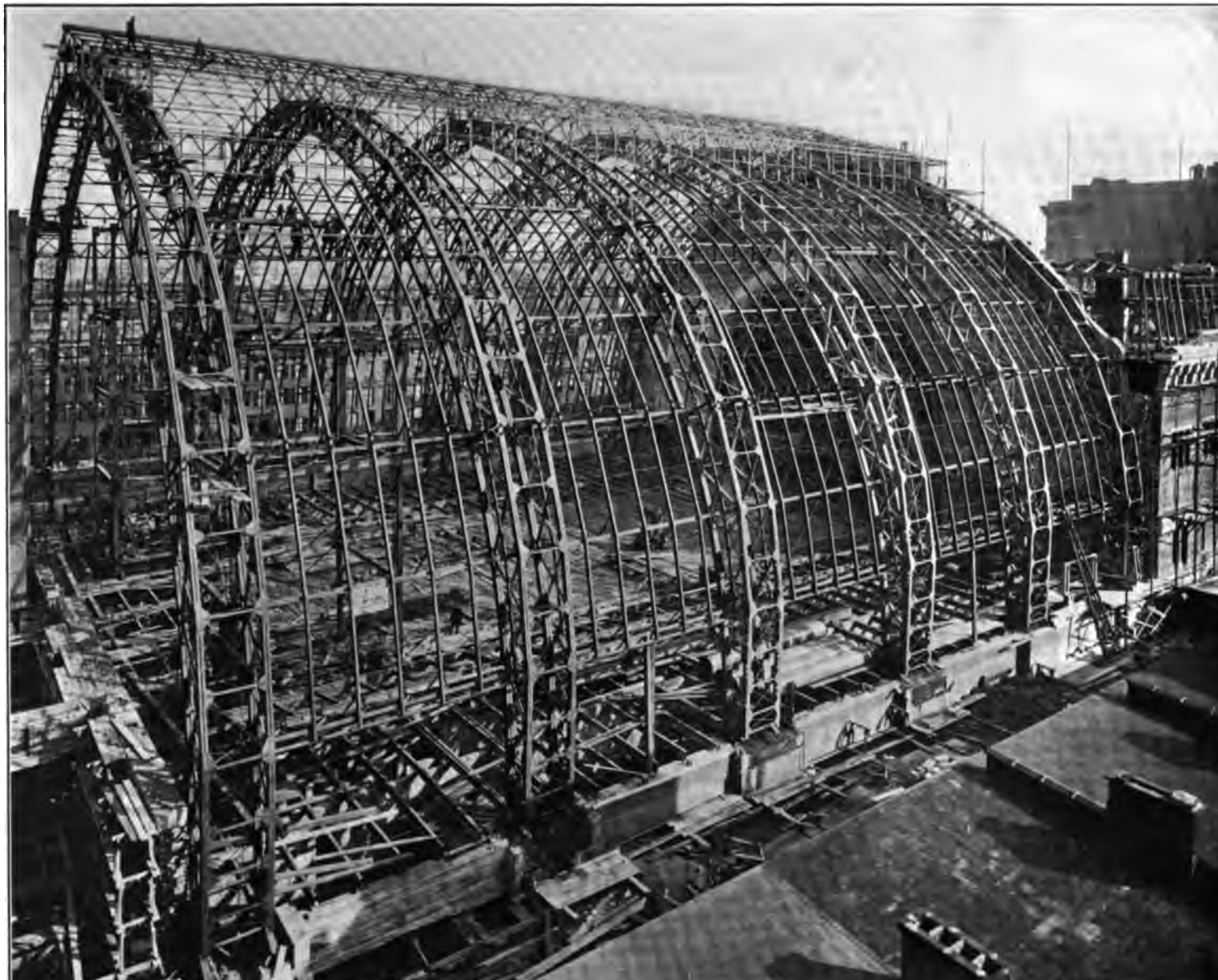

STEEL FRAME WORK OF DRILL HALL ROOF, 69TH REGIMENT ARMORY, LEXINGTON AVENUE, N. Y. CITY.

HUNT & HUNT, ARCHITECTS. MILLIKEN BROS., STEEL CONTRACTORS.

SUPPLEMENT CARPENTRY AND BUILDING JULY, 1906.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
232-238 WILLIAM STREET, NEW YORK.

AUGUST, 1905.

## Six Months' Building Operations.

The building season is now sufficiently advanced to afford an excellent idea of the volume of business in progress in this particular branch of industry and to confirm the opinions expressed in the early spring as to the amount of work likely to be executed during the current year. Reports from leading cities and sections show a degree of activity in the way of building which is without a parallel in the history of the country. Almost without exception the figures of the building departments of the principal cities covering the first six months of the year indicate a marked increase in building operations as compared with the same months of 1904, the gain in many instances ranging from 30 to 80 per cent., making an average for over 30 cities of practically 50 per cent., as compared with the figures for the first half of last year. A noticeable feature is the extent to which suburban property is being improved by the erection of hundreds and thousands of dwelling houses, while the cottages put up by manufacturing companies as homes for their own workmen constitute no small factor in the building equation in many localities. This tremendous gain in the volume of operations as compared with a year ago is a most potent factor in the industrial situation of the country, and bespeaks a highly gratifying condition in those branches of trade directly involved. Locally there has been a steady growth in the building movement during the past few months, by reason of the return to more normal conditions through the adjustment of labor difficulties. For fully two years there has been more or less of a handicap to building operations, creating a dearth of flats and apartment houses which has resulted in a greatly increased rate of rental, and retarding in a measure the natural development of the upper portions of the metropolis. Now, building is being conducted in those sections upon a scale unknown before, and the builders' advance into the Borough of the Bronx has been so rapid that at the present time six-story flats are becoming a popular type of project. At the present rate of building it will not be long before the lost ground has been recovered, and there will be living accommodations for all who may choose to come.

## Lectures to Plumbers.

The growing dissatisfaction with the old apprenticeship system in all lines of trade is the cause of much of the present search for better means of recruiting the ranks of skilled workmen. Positive favor has been shown by skilled men engaged in business and employing large numbers to the modern trade school, but unfortunately these schools are available only in large centers. They have not been established throughout the country to the extent that they can be regarded as solving the problem, but that their efficacy is held in high esteem is indicated by the fact that in different sections tradesmen are feeling it incumbent upon them to take steps to provide, in addition to training in the handicraft, suitable instruction on the theory and principles of the trades. The widespread character of the movement indeed may be realized when it is stated that a series of lectures has been arranged for young plumbers by the Glasgow and West of Scotland District Council of Plumbers. The object of these lectures, which may be referred to in passing, is to promote the better education of the plumber in matters of sanitary practice, and they are free for the registration of competent men. It appears that periodical discussions on topics of interest are encouraged, and the recent opening of the lecture course was inaugurated with a discourse by Thomas Daye on the relative merits of hydraulic drawn and hand made lead pipes and traps.

## The Apprentice of To-Day.

All this goes to show, however, that the training of the apprentice under the old system is no more satisfactory abroad than it is here in the United States. The apprenticeship question has for a number of years occupied considerable attention at the conventions of the National Association of Master Plumbers and has been carefully considered by a special committee appointed for the purpose. The conditions under which the apprentice works at the present time are very different from those in the days when he worked under the immediate supervision of his employer, who could give him both careful training and a full explanation of the principles which underlay the work on which he was engaged. Now his employer, through the change in conditions, is occupied in other lines and in meeting the demands of competition. The journeyman with whom the apprentice may be working has little time to give him either the training or explanation that he would be very willing to give if the old conditions prevailed. That the young man can best acquire a knowledge of the work and its principles by working with the journeyman all will concede, but that the instruction and special training must be provided by some other method is equally true. In view of this fact the course that has been instituted in Scotland and the courses that are to be started in Paterson and a few other cities cannot be too widely followed. As the master plumber profits to a greater extent from the proficiency of his apprentices than any one else, he should co-operate with his fellow tradesmen in providing methods of giving his apprentices the additional training they need.

## The New Plaza Hotel.

Another mammoth hostelry is about to be added to the large number of those already established in the metropolitan district, and which when completed will represent an outlay of many millions of dollars. It will occupy the site of the present Plaza Hotel on Fifty-ninth street, just west of Fifth avenue, and face the lower end of Central Park. The old structure, which is in itself an imposing building, is to be razed to the ground, the work of the wreckers having been commenced July 1. The drawings of the new building have been prepared by Henry J. Hardenbergh, who, it may be interesting to mention in passing, designed the Waldorf-Astoria Hotel, the Manhattan and other notable buildings. The new structure will be 17 stories in hight and will have a frontage in Fifty-ninth street of 250 feet, in Fifty-eighth street of 145 feet and will cover the block from Fifty-eighth to Fifty-ninth street. The hotel will contain about 700 rooms, will be of fire proof construction, thoroughly up to date in all its appointments and equipment and will have a driveway into the building from the Plaza and an Italian garden in the rear. It will be constructed by the George A. Fuller Company, and it is expected to be ready for occupancy by September 1, next year.

## Structural Development by Enactment.

Our building laws are epitomes of past rather than current practice and are seldom sufficiently elastic to allow for new methods or new constructions. It is probably not too much to say that most features of modern fire proof and steel frame construction have been evolved without the sanction and often in opposition to existing laws and have only been legalized after having stood the tests of time. The laws follow the development, but often operate to thwart or divert the best progress. We are all of us prone to travel in ruts, says a recent issue of the *Brickbuilder*. When the civic authorities prescribe exactly what we shall do in a great variety of emergencies we are very apt to follow their lead rather than to specially study the best solution, irrespective of statute, for each structural emergency. There have been repeated illustrations of the extent to which well intended and carefully considered building laws have been the means of permitting and extending the use of constructions which would probably never have come into vogue except for possible interpretations of the statutes. No building law yet devised has really encouraged fire proof construction. Our laws have repeatedly fostered some of the most worthless forms of construction, which were devised simply to evade the law and to reduce the cost at the expense of security. The fact that fire proof construction has developed in spite of various legislative checks and the discouraging competition of worthless systems is unquestioned evidence that there is a real demand for the best, and that it is valued properly by those who are competent to judge thereof. We must have building laws, and such laws are necessarily conservative, looking to the past rather than to the future; but in these days of progress it is not wise for any one to say to architect or constructor that there is no room for improvement. We believe that on the whole better results are accomplished when the care and forethought are devoted to the selection of city officials clothed with proper discretionary powers rather than when such care is expended in the elaboration of a building law such as that recently adopted by Cleveland, whose only defect is that it says too much and leaves nothing for future developments.

## Los Angeles Bank Building.

The Citizen's National Bank of Los Angeles, Cal., is preparing to erect a five-story fire proof building which will have a frontage of 92 feet on Main street and 168 feet on Third street, and will be of reinforced concrete throughout. On the ground floor, besides the bank premises on the corner, there will be six store rooms. The bank premises, 67x72 feet, will be provided with the most modern safe devices, vaults, &c. This part of the building will be provided with three entrances, one at the corner, one on Third street and one from the main hall. The interior fittings will include marble counters, tile floors and bronze grill work. On the second floor the fronts will be of glass so as to permit of show window display for stores on the second floor. Above this the floors will be arranged as offices, there being nearly 160 office rooms provided. Rooms without outside exposure will be lighted by two light wells, each 20 x 52 feet in dimensions. The main entrance to the building will be on Third street. This opens on two elevators and on concrete stairways finished in marble and steel. The building is being erected by the Citizen's Security Company at a cost of about $200,000.

THE residents of Flushing and Jamaica as well as the people living in that section of Long Island, N. Y., are greatly disturbed over an order from the Department of Buildings directing the destruction of the Johannes Sprong house on the Fresh Meadow road, between Flushing and Jamaica, on the ground that it is unsafe as a habitation. The building is believed to be the oldest in Flushing, the records apparently showing that it was constructed in 1662. It is a stone house with shingle roof and is one and a half stories in hight. During the Revolution it was one of the houses in Flushing which afforded quarters for the British and Hessians during their occupation of the place. The house was also the scene of a siege when cannon were used and for years there was imbedded in the walls of the building an old iron cannon ball about the size of a croquet ball, but not long ago this choice relic was dug out by some vandal and carried away. The house is at present in a rather dilapidated condition, but no more so than it has been for generations back. An attempt is being made by the Flushing Historical Society to raise a fund to buy the property and thus preserve it for its historical value.

## Galveston's Sea Wall.

The massive cement concrete sea wall which has just been completed at Galveston, Texas, and which is designed to forever protect that city from the ravages of the sea and from such tragic disasters as that of the night of September 8, 1900, when a terrific storm and tidal wave sweeping over the city caused a loss of more than 6000 human lives and the destruction of many million dollars' worth of property, is 17 feet high, 16 feet wide at the base and 5 feet at the top. A portion of the city has been raised to this level, with a wide driveway skirting the wall, the cost of the work approximating $1,500,000.

Some idea of the magnitude of the undertaking may be gained from the fact that 102,000 yards, or 150,000 tons, of concrete were used; 100,000 tons of broken stone or riprap to prevent the action of the water directly on the sea wall; 40,000 yards, or 50,000 tons, of sand; 135,000 barrels of cement; 18,000 tons of round piling; 4,000,000 feet, or 750 carloads, of sheet piling; 10 carloads of reinforcing steel rods, requiring altogether to move it something like 18,000 cars. This it is stated is equal to one carload of 40,000 pounds, or 20 tons, to every foot of completed wall.

## A Russian Mine of Oak.

A Russian timber dealer is said to have discovered a valuable mine of oak in a river of south Russia, it being in layers 3 or 4 feet deep, scattered over 150 square miles, and its most striking feature is its variety of colors, supposed to be due to the variegated soil of the river bottom. No fewer than 12 shades of pink, blue, yellow and brown have been noted, each log having its own uniform shade. The logs taken out have ranged from 40 to 200 feet in length and from 15 to 20 inches in diameter, and it is estimated that more than 150,000, averaging 70 feet, remain.

THE new department store which is to be erected on the north side of Thirty-fourth street just west of Fifth avenue, New York City, by John Claflin, will be ten stories in hight and will cost $1,500,000. According to the plans of architects Hale & Rogers, which have just been filed with the Building Department, the structure will have a frontage on Thirty-fourth street of 150 feet and a total depth of 197½ feet. Granite and limestone will form the façade. There will be spacious entrances, eight passenger elevators, and the construction will be fire proof throughout.

Charles Field Wilcox, Providence, R. I., died suddenly at his home in that city, July 12. For more than 30 years he practiced the profession of architecture in Providence and was the designer of well-known buildings. He was a man of quiet tastes, devoting his time to his profession, his church and his family. He leaves a widow, three daughters and a son.

# HOUSE AT BROOKLINE, MASS.

SCATTERED among the suburbs of the city of Boston are numbers of attractive residences covering a wide range of style and cost and affording excellent opportunity for the close observer to study what may be regarded as "types" of domestic architecture. With a view to showing our readers a recent example of some of the work which has been executed in that section of the country we have taken for the subject of our half-tone supplemental plate this month the residence of Mrs. James E. Thomas, located on Cummings road, in what is known as the Aberdeen district, Brookline, Mass. An examination of the picture, which is a direct reproduction from a photograph taken especially for *Carpentry and Building*, shows a rather striking design of clever exterior treatment, the notable features being the imposing effect produced by the stone work, the covered piazza extending across the major portion of the front and around the side, the outside chimney as shown on the right elevation and the shingle treatment of sides and gables.

The floor plans show a commodious arrangement with the position of the kitchen, such as to completely isolate it from direct connection with both the living room and the dining room, communication with the latter, however, being established by way of the double pantries, so that there is no danger of the odors of cooking reaching the principal rooms on the main floor. The dining room, reception hall and living room are so disposed one to the other as to afford a fine *suite* should occasion require. The main stairs are at the rear, so that the reception hall is practically a reception room of liberal proportions. On the second floor are three sleeping rooms with ample closets, a "den" lighted by a double ornamental window, a bathroom and a hall, from which there is ready access to all rooms on that floor. In the attic is a servants' room, a billiard room, 14½ x 23 feet, and ample space for storage purposes.

According to the specifications of Architect C. H. Blackall, 20 Beacon street, Boston, Mass., all framing lumber is of spruce. The sills are 6 x 8 inches, the corner posts 4 x 8 inches, the girts and plates 4 x 6 inches, wall and interior studding 2 x 4 inches, placed 12 inches on centers, while the roof beams are 2 x 8 inches, placed 20 inches on centers. The exterior of the house is covered with square edged spruce boards back plastered and faced with extra sawn cedar shingles, left turned with the weather.

The under floors throughout the house are of ⅞-inch spruce, while the upper floors are of North Carolina matched pine. The vestibule has a ceramic tile floor. The finish throughout is of white wood stained and finished in shellac on the lower story and finished in white paint elsewhere, except in the kitchen, where the finish is of North Carolina pine varnished. The plumbing is of the usual open fixture style, with enameled iron bathtub, siphon jet water closet and porcelain bowl with 2-inch marble slabs. The house is heated by a Magee furnace made by the Magee Furnace Company, Boston, and having separate pipes running to each room.

The exterior finish of the house is of cypress painted a light green. The builder was P. J. Cantwell, 31 Perry street, Brookline, Mass.

Front Elevation.—Scale, ¼ Inch to the Foot.

*House at Brookline, Mass.—C. H. Blackall, Architect, Boston.*

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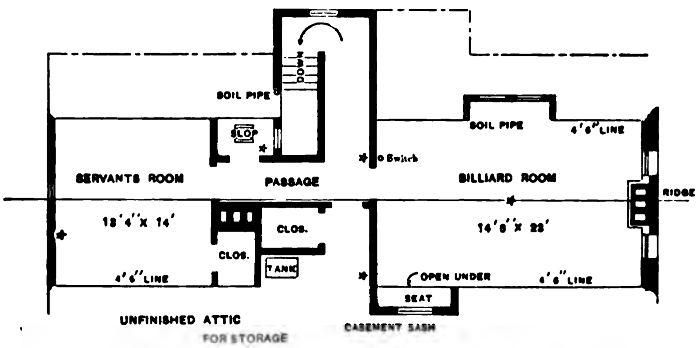
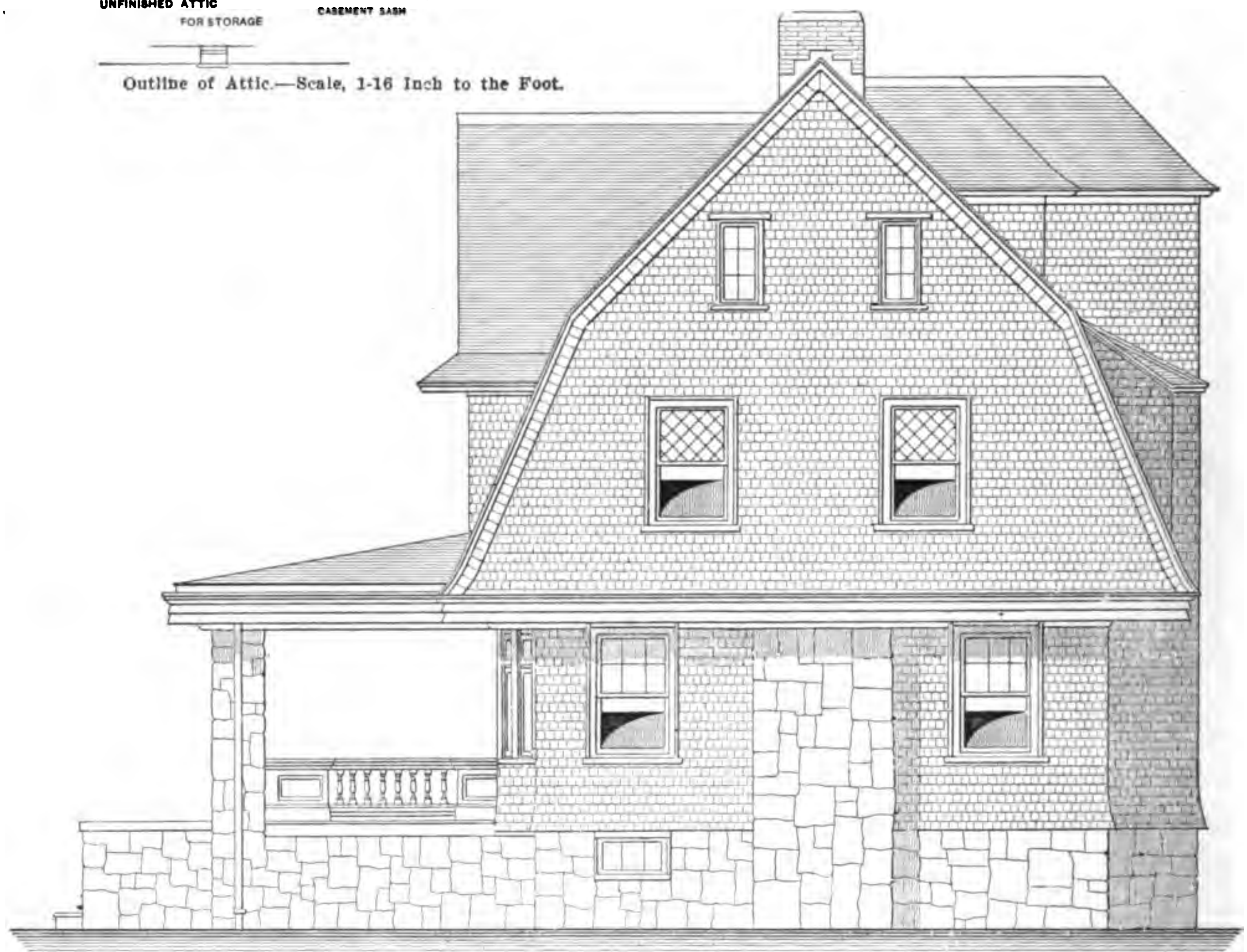
THE new women's clubhouse to be erected at the corner of Nahant and Broad streets, Lynn, Mass., was designed by Miss Josephine Wright of Cambridge, Mass., who also designed the Massachusetts Building at the St. Louis Exposition and Carnegie Hall in Cambridge.

## Relation of the Engineer to the Architect.

Among the interesting papers read at the recent convention of the American Institute of Architects, held at Washington, was one by C. T. Purdy of Purdy & Henderson, in which he dealt with the relation of the engineer to the present day architect. At the very start he pointed out the change which has been wrought in architecture by the advent of the rolled beam, the characteristic features of this new era being the substitution of the steel frame for the heavy masonry walls of massive construction, great hight of buildings, larger openings in walls, wider spans in rooms, magnified requirements for ventilation and sanitation, electric light and power, the modern elevator and the great multiplicity of structural and mechanical problems which these things involve. " This new era with its new conditions," the author points out, "partially explains why the engineer has suddenly, as it were, become a distinct factor in the building problem." It is because of this enormous expansion of problems involving technical knowledge, and because the methods of treating these problems have been elaborated during the last 30 years upon a basis which affords much more accurate and definite results than anything so far as we know in use before the present time.




Outline of Attic.—Scale, 1-16 Inch to the Foot.



Side (Right) Elevation.—Scale, ¼ Inch to the Foot.

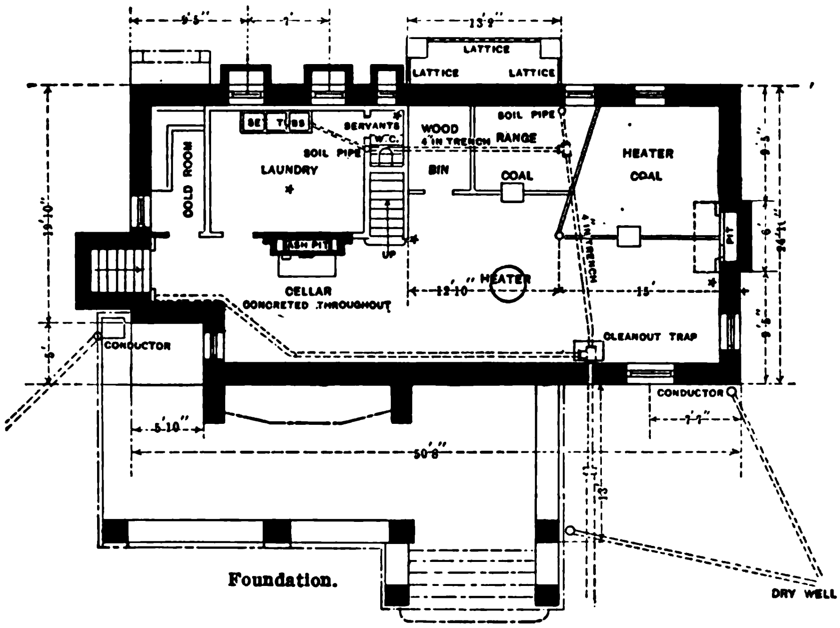
*House at Brookline, Mass.—Elevation and Plan.*

While some of the vaulted ceilings and domes of the old world make men wonder how the designers calculated so closely and did their work so well, it is undoubtedly true that a large part of even the best buildings constructed prior to the advent of steel were dimensioned and fixed structurally upon the basis of experience and precedent. Every new building called for careful comparisons and the judgment of the most experienced persons, as the actual calculation of stresses and strains was unknown. Now this is all changed. The rule is the other way in every up to date architect's office. The dimensions and sizes of all details of construction, as well as the mechanical features of modern buildings, are calculated, accurate and definite results are sought, and we pay less and less heed to what the dimensions and sizes of the same details were in other buildings. Judgment is not eliminated, but in a large measure it is transferred, and the experience required is the experience of the technical man rather than that of the observer.

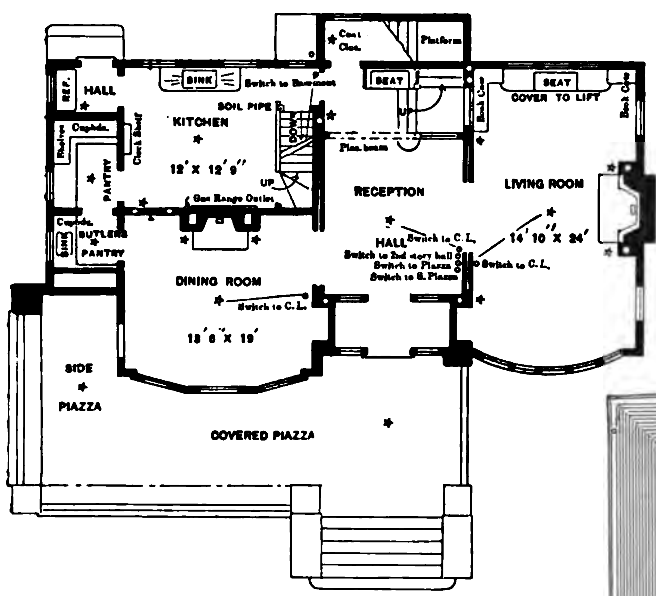
The engineering profession as a profession is comparatively a new thing. Compared with that of the architect it is really in its infancy. The employment of architects, their work as designers and their supervision of construction are fixed things the world over. Their place in the business world and even their standard rate of compensation is universally conceded. With an engineer it is entirely different. He has been struggling, particularly during the last generation, for an acknowledged place as a professional man and for a like independence.

The structural engineer ordinarily includes in his part of the work the structural frame work of the building, be it much or little, the foundations, and also the masonry whenever it becomes complicated or questions of strength are involved. This part of the designing of a building can be accomplished in several different ways. 1. The architect may do the work himself, without assistance.

2. The architect may have the work done by some manufacturer. 3. The architect may have the work done by the builder, or the owner, with his consent, may have it done in that way. 4. The architect may employ the engineer as a part of his own force. 5. The architect may associate the engineer with himself as a partner. 6. The architect may employ a consulting engineer, who has his own independent office and practice. 7. The architect

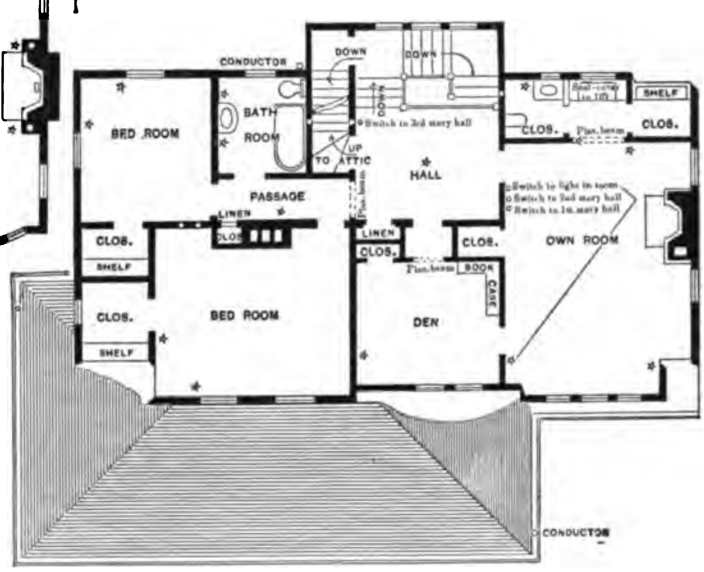



Foundation.




First Floor.

*House at Brookline, Mass.—Floor Plans.—Scale, 1-16 Inch to the Foot.*




Second Floor.

may be associated with such an engineer, employed directly by the owner, without any personal arrangement with him in relation to the matter. 8. The engineer may have control of all the work, with the architect more or less subordinated to him.

Perhaps the most important explanation for this divergence of practice is that of cost. "Undoubtedly," says Mr. Purdy, "this is often the reason why inexperienced or incompetent men are employed." Some of the ways in which structural designing is now being done ought to be ruled out altogether, and this is particularly true of the one in common practice in New York ten years ago. The day is coming when no architect who values his reputation will venture to receive assistance from the manufacturers or his employees whether that assistance is paid for in a regular way or not. It might also be added when no engineer regularly employed by a manufacturer or practicing as such himself will expect to be called on for such services. It is an old saying that "no man can serve two masters," and it is because this is true that this relation sooner or later is certain to disappear.

The steel frames in some of the most notable buildings both of the East and the West have been designed by the builder or under his immediate direction. This is particularly true of the first high buildings. The builder's confidence in the practicability of the new methods of construction and his willingness to share in the responsibility of their introduction made that way of doing the work acceptable and pardonable when these first buildings were erected. It is, however, an undesirable relation from the architect's point of view, and that is sufficient to prevent its adoption. The employment of engineers by an architect as a part of his own force is open to at least two serious objections, particularly when it is done in an office of moderate size. The character of the work which is ordinarily produced under such circumstances is not likely to be of a high order. The other objection comes from the other point of view. The subordinate and limited character of the service ordinarily required in such cases is certain to be distasteful and not acceptable to the most competent engineers. For these two reasons it is a method that probably will not be permanently maintained. The employment of the engineer by the owner as the associate of the architect or in general charge of the work is also undesirable. As an associate it divides responsibility, while in charge of the work it subordinates all other considerations to the structural.

The cost of the work has been the hardest difficulty to satisfactorily adjust. It has prevented the employment of the engineer more than anything else. If the cost of his services could always be obtained from the owner without encroachment upon the architect's regular fees it would undoubtedly do much to simplify the problem. The general acceptance, however, of such an arrangement in the immediate future is something for which we scarcely dare hope.

In any case the architect ought not to be obliged to pay out more than he receives. It is right that the engineer should be adequately paid, but it is also right that there should be a fair division. The writer would suggest the following rule regarding the compensation to cover all ordinary work: Charge the owner 7½ per cent. commission for all technical work for which engineers are required. If the 7½ per cent. is obtained from the owner, pay the engineer 5 per cent. when superintendence is included in his services, and 3½ per cent. when it is not. If only 5 per cent. commission is obtained from the owner, pay the engineer 3½ per cent. when superintendence is included in his services and 2½ per cent. when it is not. The cost of the engineer's services for extraordinary work, under this rule, would have to be adjusted in each individual case, and the question of whether work was ordinary or not would have to be determined before the work was begun. The rates named in the rule would not be sufficient to cover all cases. Often the actual cost of designing the structural steel work for a theater, without superintendence, is 5 per cent., or more. Let us turn now to the other query: Has the relation advantages of sufficient importance to warrant changing other methods we have been using in order to secure its adoption. It seems to the writer that it has.

In this day of the centralization of power and responsibility the best interests of the owner are subserved by making one man responsible. No relation between architects and engineers can ever give satisfaction that is not founded upon this fundamental idea—the centralization of responsibility in one man. If this is true engineers should not hesitate to accept a position of subordinate service, for it may be reasonably contended that the architect should be in this position of supreme control. In this new dispensation, whatever else he is, he must be a man of affairs in the architectural world, and the engineer cannot take that place of responsibility without subordinating his technical work to the larger demands of such management. The architects, however, should not fail to appreciate the changing conditions; they should not hesitate to meet the engineer half way. They want only reasonable prices for their labor and undivided responsibility for their own departments and the credit which is due to them for really worthy achievement. With less than this they will not be content.

## Leveling an Oilstone.

A handy method of quickly reducing parts of a stone which stand too high or improving the form of a worn slip is to scrape it with the edge of a piece of glass, used in the same way as a steel scraper is used on wood. A piece of glass can always be obtained when perhaps the ordinary methods of rubbing down are not available or would take too much time. The stone can be scraped in this way either with or without water. Without water is perhaps the best, as it is then easier to see how much is being removed. If one end or one corner of the stone stands higher than the rest it is easier to reduce to a general level in this way than by the ordinary methods, which make the surface flat, but cannot easily remove a slope to one end or one side, says a writer in a recent issue of *The Patternmaker*. A slight inclination in any direction causes the oil to run off the stone, and it is advisable, therefore, always to leave the stone slightly hollow so that the oil will tend to run to the middle when it is left standing.

The greatest wear occurs not in the middle of a stone, but near the ends, at the places where the movement of the tool is reversed. It is therefore chiefly a small area at the extreme ends which requires scraping down, and sometimes a little in the middle and along the sides, to take some of the hollowness out.

When the stone is reduced in depth the edges of the case and cover may be scraped and a few shavings planed off, and the stone and case may thus in a few minutes be made as clean as if it were new.

THE traveling scholarship of the Washington Architectural Club for 1905 has been awarded to Fred. V. Murphy of the Supervising Architect's office of the Treasury Department, Washington, D. C., who has taken advantage of the unusual opportunity thus afforded and is spending the summer months touring the British Isles, Holland, Belgium and France. He sailed for Queenstown June 13, and will reach Paris in the fall in time to enter the School of Fine Arts in that city. Mr. Murphy went to Washington from Chicago, where he was graduated from the North Division High School, and he made such a brilliant record in that institution and in his professional work in Washington that great things are hoped for him in the architectural profession after he has had the benefit of a course in the Paris school.

## Country Houses in Russia.

The timber built dwellings of even the richest land owners in Russia lack the picturesque construction familiar to travelers in Norway and Sweden. The walls are generally formed of square beams, from 1 foot to 18 inches in thickness, laid one on the other and neatly joined at the corners. They are fastened together by wooden bolts, sometimes 3 feet in length, driven at short intervals. The interstices are made air tight with dried moss, saturated with pitch, then dried in the sun, and the whole is covered with a sheathing of thin planks, on the inside as well as the outside of the walls. When these walls are covered with paint on the outside and plaster within they are as impenetrable to the winter blasts as the hull of a ship, and far warmer than the same thickness of stone or brick would be.

The old houses have thatched roofs, like those of the peasant's *izba* (cottage), but more modern dwellings are shingled. The rooms are almost always lofty and some of them, notably the drawing room and the dining room, are of large dimensions.

The plaster walls are tinted with a wash of some light shade for the drawing and bed rooms, and a darker one, possibly brown, for the dining room. The furniture is simple, very likely home made, or, as is frequently the case of late years, one of the cheaper varieties of American and English manufacture.

In describing the Russian country dwelling mention may be made of the vast underground construction which takes the place of our cellar, says a writer who has traveled through the country. This is the storehouse, equal to the house in area, and is divided by means of corridors radiating from a large open space in the center, the doors of these storerooms being all securely fastened with huge home made locks.

The central space is occupied by a bed of carefully dried sand, in which are planted roots to be used during the long months of winter—parsnips, carrots, turnips and the like. Huge casks and barrels, looking like a regiment of very stout soldiers in the dim light, are filled with salted beef, fish, half fermented cabbage (*stchie*) and beet roots. These form an important part of the winter diet.

Should the storerooms be opened to our inspection we would see innumerable sides of bacon, smoked mutton, hams, smoked geese, and still other casks containing butter, linseed and other vegetable oils, cheeses (an important item of farm produce), and other regiments formed by sacks of flour.

Impossible, you say? Not at all, for you must remember that on this estate from 40 to 50 mouths must be fed every day, besides the guests, who form no inconsiderable item in the consumption of the winter's stores.

THE new 23-story office building which is to be put up for the United States Express Company, on Greenwich and Rector streets and Trinity place, New York City, will cost in the neighborhood of $1,500,000 and will cover an area of about 17,800 square feet. According to the architects, Clinton & Russell, 32 Nassau street, the exterior will be brick with stone and terra cotta trimmings. The general contract for the erection of the structure has been awarded to the Thompson-Starrett Company, 49 Wall street. The same concern has secured the general contract for the erection of the club house and educational building which the Workmen's Educational and Home Association is to erect on the north side of Eighty-fourth street just west of Second avenue, this city. The new edifice will be five stories and basement in hight and will be provided with bowling alleys, gymnasium, billiard rooms, library, reception rooms, *café*, &c.

# A STUDY IN BUILDING CONSTRUCTION.

By Morris Williams.

It often happens in country towns that a carpenter, mason or bricklayer, especially if posing as a contractor, is called upon to assume the responsibility of erecting buildings of such designs and dimensions as would tax the ingenuity of a fairly well educated architect. The owner of such buildings seemingly does not realize the enormity of the responsibility and how very possible it is for him to make an irremediable mistake in the selection of the man for such an undertaking. Such a method of building is unfair to the architect, the builder and even to the owner himself. Viewing such a method from an architect's standpoint shows it to be on its face a gross injustice, and he reasonably considers in an unpleasant light the builder who will assume such responsibility gratuitously. On the other hand, in considering such a method in its bearing and effects on the builder, we find that he is imposed upon by the owner with burdens alien to his vocation.

I have been wondering often how unreasonable some people are in expecting an uneducated workman with no better qualifications than are obtained by practice in manual labor to be able to turn out as satisfactory a construction as if possessing all the technical qualifications and professional training of a competent architect. The unreasonableness of some men goes often beyond this where we find them hampering the poor builder with strict injunctions to follow their whims and caprices on various points of construction that no man would dare present to a professional architect. The architect is always privileged with unrestricted freedom and if he is the right kind will insist upon knowing all the requirements of the owner prior to the drawing of the plans and not be humbugged afterward with changes.

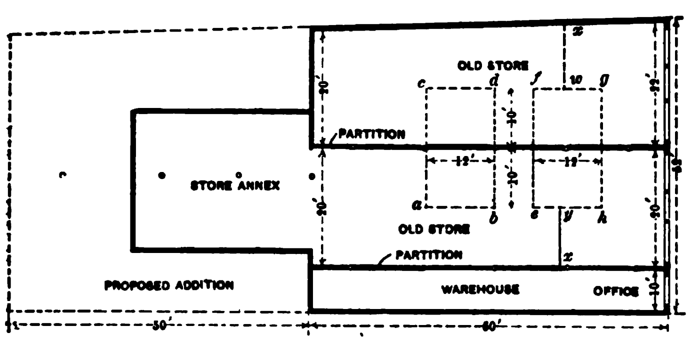



Fig. 1.—Plan of Old Building.

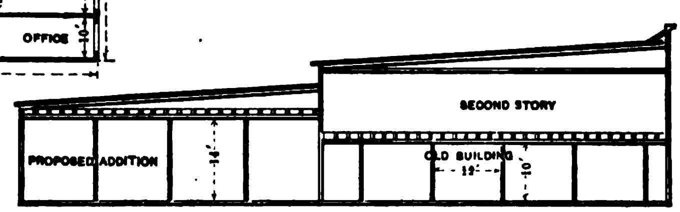



Fig. 2.—Longitudinal Section of Old Building.

*A Study in Building Construction.*

The builder, on the contrary, is expected to follow the whims of the owner and whatever drawings he may have had prepared, and as a result will find himself in a very short time as helpless as if no drawings had ever been in existence. The writer of this article had an experience of this kind not very long ago and of the worst type of its kind. An account of the vicissitudes encountered and of the methods used to meet them will be the subject of what follows, wherein we purpose to deal carefully with many very important problems in construction that are likely to be of interest and value to those country builders who have hitherto failed to acquaint themselves with the fundamental elements in building construction and who find themselves burdened with all the responsibility with no help whatsoever outside of their own theoretical and practical knowledge.

The fact that the building under consideration developed from a first conception of a small wooden addition 40 x 50 feet that was to cost according to the estimate of the owner from \$300 to \$400, into a brick building measuring 52 x 110 feet and which must have cost at least \$10,000, indicates unmistakably that such a change could not possibly be made without bringing in its train a vast sum of troubles and vexations for the builder.

The plan shown in Fig. 1 represents the old structure, with the addition alluded to above, as representing the first conception. It was what is known as a balloon frame building, the hight of ceiling being 11 feet, while the new addition was to have a ceiling hight of 14 feet. The sectional view, as shown in Fig. 2, will give an idea of how the store floor would appear by this arrangement. The partitions shown in the old store were to be taken down and the floor above was to be supported by a line of girders resting upon steam or gas pipe, as was also the roof of the new addition.

Having this knowledge as to what was to be done we will now proceed to figure out the size and strength of the materials, commencing with the columns and girders, which it had been determined should replace the original partitions. As it was advisable to have the store floor space as clear of obstructions as safety would allow it was decided to space the columns 12 feet apart. Our problems will be first to calculate the load each column will have to support; second, what size of steam pipe will safely support the load, and third, what size of girder will safely stand the uniform load of the floor above over the span of 12 feet, which is the distance between the columns.

Referring to the plan, Fig. 1, it will be seen that the area to be supported by each column will equal 240 square feet, which is found by the following method: Between the two rows of columns, which were to replace the partitions, there is a distance of 20 feet and from the right hand row looking from the front to the wall is 20 feet. The span between the columns we know to be 12 feet. The wall on the right side will support half of the distance, as shown from W to X, and the row of columns on the left side will support half the distance between the two rows of columns, shown from Z to Y. The remaining area, as shown at E, F, G, H, will have to be supported by the column K. Allowing 45 pounds to the square foot of area we find by multiplying 45 by 240, which is the total area, that the total load to be supported by each column is equal to 10,800 pounds, or very nearly 5½ tons.

In Mr. Kidder's "Architects' and Builders' Pocket Book," page 465, Table XII, where safe loads in tons for gas or steam pipe columns are given we find that a gas or steam pipe 6 inches in diameter and 10 feet long will safely bear the weight of 25.06 tons, which is nearly five times the safe bearing strength required for the load the columns in this case will be called upon to sustain. Although it is not stated what factor of safety Mr. Kidder adopts in the computation of his table we will rightly assume that a 6-inch gas or steam pipe 10 feet long has an ultimate bearing strength of four times 25.06 tons, which will equal 100.24 tons—that is, the column will sustain the weight of 100.24 tons before it will collapse. Hence we are sure that it will safely bear the weight of 5½ tons, which, according to our computation, is the weight it will have to sustain. Being satisfied as to the column we will now turn our attention to the girder.

Referring again to Fig. 1, where A B C D represents the area to be supported by the girder and which equals 240 square feet, we find by multiplying 240 area by 45 pounds load per square foot to be 10,800 pounds. Our problem now is to find out the size of a girder that will bear this weight without bending, thus guaranteeing a safe bearing strength.

In order to obtain what is known as the safe bending moment in foot-pounds we will have to multiply the load in pounds by the span in feet and divide the result by 8. Following this rule in our calculations we have 10,800 pounds, the load, multiplied by 12 feet, the span, which gives us 129,600 pounds; this divided by 8 equals 16,200, which is the bending moment in foot-pounds, and 16,200 multiplied by 12 gives 194,400, which is the bending moment in inch-pounds. We will now proceed to find the resisting moment in inch-pounds, with a safety factor of 4 for a yellow pine girder that will equal the bending moment in inch-pounds.

Suppose we assume an 8 x 10 girder; to find the resisting inches we multiply the depth in inches by itself and the result by the width and then divide by 6, as follows:

$$10 \times 10 = 100 \times 8 = 800 \div 6 = 133\ 1\text{-}3,$$

which is the resisting inches of the girder. We now multiply the resisting inches 133 1-3 by the modulus of rupture, by which is meant a constant representing the strength of the material, and which for yellow pine is 7300. Thus 7300 multiplied by 133, the fraction being omitted, equals 970,900 inch-pounds, which is the resisting moment of the girder. Next divide this result by 4, the factor of safety, and we have 242,725, the safe resisting moment in inch-pounds, as compared with 194,400 inch-pounds, the bending moment; hence the 8 x 10 yellow pine girder is amply strong, as according to these figures the safe resisting moment is 48,325 inch-pounds in excess of the bending moment in inch-pounds.

It will be noticed that we have obtained this result by allowing 45 pounds per square foot of area, which allowance includes the dead and live loads. The floor to be supported being a residential apartment and as such is never supposed to be incumbered with anything like such a load to the square foot.

The total floor area of the old building, as shown in Fig. 1, measures 60 x 50, or 3000 square feet. Multiplying this by 45, which is the load to the square foot of area, gives us 135,000 pounds, or 67,500 tons, a load that such a floor would never be called upon to carry. As before stated, the side walls will sustain half the load, leaving the other half to be carried by the steam pipes and girders. Each pipe we know will carry 25.06 tons, and this multiplied by 5, the number of pipes used, gives us 125.30 tons. As the total load to be carried is only 67,500 tons we thus find that our pipes and girders contain nearly twice the safe bearing strength required to carry the total load and four times the safe bearing strength necessary to carry half the total load, which is all that the pipes and girders will be called upon to sustain.

We are now ready, as far as the old building is concerned, to take down the partitions and replace them with the pipes and girders. After securing the floor above by means of substantial "shoring" the replacement was successfully accomplished, and no sooner was it done than we were informed by the owner that he had changed his mind and instead of utilizing the old building, as he had originally intended, it was now determined to take it down and replace it with a one-story frame structure 60 x 110 feet in size, having a uniform ceiling hight of 14 feet. This change necessarily made the 10-foot steam pipe columns useless and the recomputing of the strength of the girders imperative, while doing many other problems of construction, as the reader will readily understand from an inspection of Figs. 3 and 4 of the drawings. It will be noticed that we have now one line of girders running right through the center building and nine columns 14 feet long to support them, whereas before we had three rows of girders and columns varying in hight—two to support the front part and one to support the proposed addition in the rear.

The longitudinal section, shown in Fig. 4, clearly illustrates the nature of the construction involved.

The problems we now have to contend with are as follows: First, the width of footing for the cellar walls, as shown at M; second, the dimensions of the brick piers under the first girder, which runs through the cellar and supports the store floor; third, the size of this girder and that of the joist, and fourth, the size of the 14-foot steam pipe columns, also the size of the girder above the columns to support the ceiling joists and rafters.

As soon as the old building was taken down and almost before the excavation was commenced the owner decided upon one other change—namely, to use brick instead of studding for the outside walls. Our first problem therefore is to find the width of footing under a cellar stone wall that is to support the weight of a brick wall, &c. For this purpose it will first be necessary to know the safe bearing power of the soil. The following is a table given by several well-known authorities as to the safe bearing power of various soils:

*Safe Bearing Power of Soils.*

| | Bearing power. Tons per square foot. Minimum. | Maximum. |
|---|---|---|
| Rock hard in native bed | 200 | .. |
| Rock equivalent to best quality masonry | 25 | 30 |
| Rock, very soft | 5 | 10 |
| Clay, dry, in thick beds | 4 | 6 |
| Clay, soft | 1 | 2 |
| Gravel and coarse sand, very compact | 8 | 10 |
| Sand, compact | 4 | 6 |
| Sand, clean and dry | 2 | 4 |
| Aluvial soil, quicksand | ½ | .. |

The soil in our case at the depth of 7 feet was found to be a very poor quality of soft clay. So poor, in fact, as to enforce the greatest precaution in fixing upon its true bearing power. We decided upon 1 ton to the square foot, which, on referring to the table, is shown to be the minimum safe bearing power of soft clay.

We will now proceed to calculate the weight which one square foot of soil will have to carry. We present in Fig. 5 a partial cross section taken on the line X Y of the plan, Fig. 3. This shows at a glance the various items the footing of the cellar wall will be called upon to carry—namely, a stone wall weighing 150 pounds per cubic foot, a brick wall 120 pounds per cubic foot, the first floor 100 pounds per square foot and the roof, including the timber and gravel, 20 pounds per square foot, while the snow load equals 12 pounds per square foot. Then for each foot in length of stone wall we have

*Stone Wall.*

1 foot 6 inches x 1 x 7 = 10½ cubic feet.

10½ cubic feet x 150 pounds per cu. foot = 1575 pounds.

*Brick Wall.*

1 foot 0 inches x 1 x 20 = 20 cubic feet.

20 cu. feet x 120 pounds per cu. foot = 2400.

*First Floor.*

1 foot 0 inches x 10 = 10 square feet.

10 square feet x 100 pounds load per square foot = 1000.

*Roof, including timber, gravel and snow load.*

1 foot 0 inches x 10 = 10 square feet.

10 feet 0 inches x 32 pounds per square foot load = 320 pounds.

The load to be carried as here computed is

| | | |
|---|---|---|
| Stone wall | = 1,575 | pounds. |
| Brick wall | = 2,400 | pounds. |
| First floor | = 1,000 | pounds. |
| Roof, &c. | = 320 | pounds. |
| Total load | 5,295 | pounds. |

The safe bearing power of the soil that is to carry this load, as previously stated, is only 1 ton to the square foot. To find the width of the footing we divide the total load, 5295 pounds, by 1 ton, or 2000 pounds, which gives 2.6475. The decimal has a foot value of a little over three-fifths, or 7 inches; hence the width of the footing will be 2 feet 7 inches.

We will now calculate the strength of the brick pier shown in Fig. 4. It will be noticed that it is to carry the weight of a portion of the floor as well as a portion of the roof. Referring to the plan, Fig. 3, the dotted lines A B C G indicate the dimensions of the portion of the floor to be carried—namely, half the distance between the piers and the walls on each side and half the distance between the piers on each side. From A to B we have 12 feet and from B to C 20 feet; hence the portion of floor to be carried by the pier is equal to 12 x 20 = 240 square feet. Allowing as before 100 pounds per square foot of load we find by multiplying 240 by 100 that the pier will be called upon to carry 24,000 pounds floor load. Again multiplying 240 by 32 pounds, the load of the roof, we obtain 7680 pounds, which added to 24,000 gives 31,-680 pounds, which is the total load to be carried by each pier.

The ultimate strength of a brick pier laid in mortar is 1562 pounds to the square inch of section. A pier 18 x 18 inches contains 324 square inches, which multiplied by 1562 gives 506,088 pounds, which is the ultimate strength. Dividing this amount by four, the factor of safety, we find the safe bearing strength to be 126,522 pounds, or nearly 63¼ tons. The load to be carried, as above found, is only 31,680 pounds, or a little less than 16 tons; hence we know that a brick pier, 18 x 18 inches, is excessively strong and will safely bear a load four times the weight that in this case it will be called upon to carry.

The next step is to figure the safe bearing strength

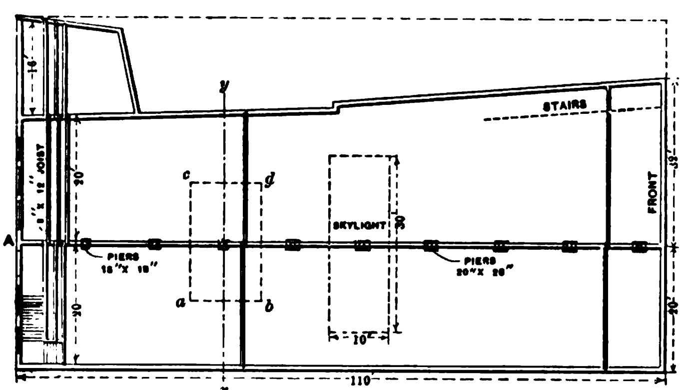



Fig. 3.—Plan of Building as Remodeled.

of the built up spruce girder or beam which rests upon the brick piers and supports the joist of the floor, as shown in Fig. 4. In Fig. 6 is shown a section and elevation of the girder, from which it will be seen that it is built up of six planks spiked together, 40d. spikes being used for the purpose. In Fig. 4 it is shown to be a continuous girder from the rear wall to the fourth pier, which supports the steam pipe columns marked 6 on the drawing. The sectional dimension of the girder is 12 x 12; the load to be sustained by each space between pillars is 24,000 pounds, found as shown in Fig. 3 at *b a c d* which measures 20 x 12 = 240 square feet at 100 pounds per square foot = 24,000. Now, to ascertain whether a 12 x 12 inch spruce girder is strong enough to safely carry this load. we will by the following formulæ figure out the bending moment in inch-pounds and the resisting moment in inch-pounds.

The formula for the bending moment is to multiply the load in pounds by the span in feet and divide by 8; thus 24,000 pounds, the load, multiplied by the span 11 feet, gives 264,000, which divided by 8 gives 33,000 as the bending moment in foot-pounds. Now, 33,000 multiplied by 12 gives 396,000, the bending moment in inch-pounds.

We will now figure the resisting moment in inch-pounds by first finding the resisting inches of the girder. The rule is to multiply the depth of the girder in inches by itself, and the result by the width dividing the product by 6. Performing the operation we have

12 x 12 x 12 = 1728 ÷ 6 = 288, the resisting inches.

Now, 288 x 4800, the bearing strength of spruce perpendicular to the grain (modulus of rupture) gives 1,382,-400, which divided by 4, the factor of safety, gives 345,600, the resisting moment, as compared with 396,000, the bending moment. We thus find that a 12 x 12 inch hemlock girder is hardly strong enough to carry the load assigned it—namely, 24,000 pounds, or 12 tons.

To add to its strength we will spike another 2 x 12 to it and thus make it a 14 x 12 inch girder. Proceeding now to find the resisting moment of a girder of this sectional dimension, we have the following:

12 x 12 = 144 x 14 = 2016 ÷ 6 = 336 resisting inches.

Now 336 multiplied by 4800, the bearing strength of spruce, gives 1,612,800, which, divided by 4, the factor of safety, equals 403,200, resisting moment compared with 396,000 bending moment. From this it will be seen that a girder 12 x 14 is amply strong for the purpose.

The method of computing the strength of girders as here exemplified refers to girders over one span uniformly loaded and supported at each end. If a uniformly loaded girder is firmly fixed at both ends it has been found to be one and one-half times as strong as a girder similarly loaded at both ends. The girder with which we are dealing is one fixed at both ends, as may be seen from an inspection of Fig. 4. It is fixed in the wall at one end and at the other it is fixed by the weight of the steam pipe column marked No. 6, while the weight of the other columns, marked 7, 8 and 9, fixes firmly each span respectively, thus making the girder over each span a fixed girder at each end. From this it is obvious that by placing the steam pipe columns on top of the girders we have gained one and one-half times the strength of a girder that is merely placed on supports. In fact, we have gained sufficient strength to enable us to use a 12 x 12 inch girder and thus do away with the necessity of addng a 2 x 12 inch piece to form a 12 x 14 inch girder, thus saving lumber and labor without losing strength.

Our next problem will be to ascertain the

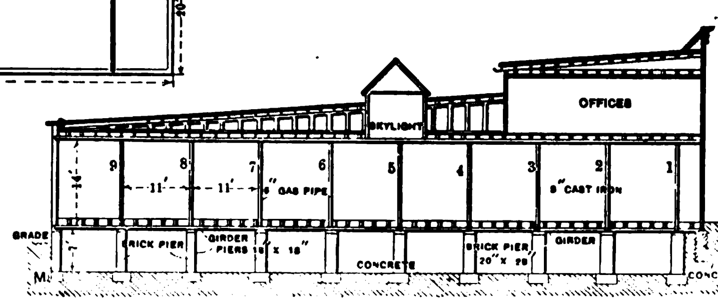



Fig. 4.—Longitudinal Section of Remodeled Building.

*A Study in Building Construction.*

size of the floor joist. Referring now to Fig. 3, it will be observed that the joist in the main floor have a span of 20 feet from the girder to the side walls. As it is determined to place them 12 inches on centers the area that each joist will have to support is 20 feet. Assuming a 3 x 12 joist. our method of ascertaining whether or not it will carry the load of 100 pounds to the square foot will be as follows: 100 pounds multiplied by 20 feet, the area, gives 2000 pounds, the load, and this multiplied by 20, the span, equals 40,000, which, divided by 8, gives 5000 as the bending moment in foot-pounds. Now, 5000 multiplied by 12 gives 60,000, the bending moment in inch-pounds.

Next we will figure the safe resisting moment of a joist 3 x 12 x 20, as follows: Multiplying the depth 12 by itself we have 144, which, multiplied by 3, the width, gives 432, and this divided by 6 results in 72 resisting inches. Seventy-two multiplied by 4800, the strength of spruce, gives 345,600, which, divided by 4, the factor of safety, equals 86,400, the resisting moment, as compared with 60,000 bending moment; thus it is found that the floor joist, 3 x 12 x 20, placed 12 inches from center to center is excessively strong and will support a greater load than 100 pounds to the square foot of area.

We will now ascertain how much a 3 x 12 x 20 joist will carry if placed 16 inches on centers instead of 12 inches. The area a joist placed 16 inches on centers will have to sustain is equal to 20 feet multiplied by 1 foot 4 inches, or 26 2-3 feet. This area multiplied by 100 pounds to the square foot gives 2667 pounds, the load on one joist. Multiplying this by 20, the span, gives 53,-340, which divided by 8, gives 6667½ bending moment in foot-pounds. This multiplied by 12 is 80,010, the bending moment in inch-pounds as compared with 86,400 resisting moment found in the previous calculation. A 3 x 12 x 20 joist will therefore sustain the load of 100 pounds to the square foot when placed 16 inches on centers, and as the floor with which we are dealing would never be loaded even with 100 pounds to the square foot, we considered that it would be wasting lumber to place the joist at a less distance apart than 16 inches between centers, except a few extending about 12 feet from the rear wall, which floor space was to be used for storage room.

Tte next operation is to find the size of steam or gas pipe having the bearing strength to support the roof. We will commence with the pipes marked 6, 7, 8 and 9 in Fig. 4. We show in Fig. 6 an elevation of one of these pipes, from which it will be seen that the foot rests on the spruce girder, while its top end supports the yellow pine girder, which in turn supports the ceiling joist, roof timbers, &c. The length of this pipe from one girder to another is 14 feet 2 inches. To determine the bearing strength we must first ascertain the area and load each pipe will be called upon to support. We multiply 12 feet, the distance between each pipe, by 20, which is half the width of the building, which equals 240 square feet

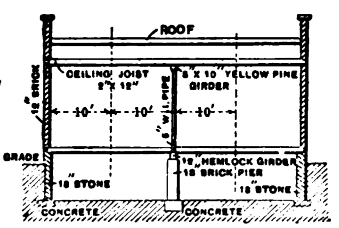



Fig. 5.—Cross Section of Remodeled Building.

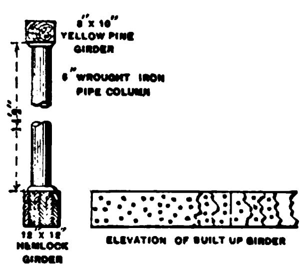



Fig. 6.—Built-up Girder and Wrought Iron Pipe Column.

*A Study in Building Construction.*

of area. Now, 240 square feet of area multiplied by 45, the number of pounds to the square foot, gives 10,800 pounds, or nearly 5½ tons. Mr. Kidder in his table of safe bearing strength for steam or gas pipes gives 23.12 tons as the safe bearing strength for a steam pipe ¼ inch thick, 6 inches in diameter and 14 feet long; hence a pipe of these dimensions is far in excess of the strength required, but as a pipe of smaller dimensions, although sufficiently strong, would not give a pleasing appearance it was decided to use the 6-inch pipe.

Turning now to the pipes marked 1, 2 and 3 in Fig. 4 it will be seen that they support a second story and roof. And as the second story is intended to be used for offices a load of 60 pounds per square foot of area is sufficient allowance, as is also 35 pounds per square foot for the roof, from which we obtain a total load of 95 pounds per square foot of area as the weight to be supported by each of the pipes. The area in this case is the same as for the pipes 6, 7, 8 and 9—namely, 240 square feet. This amount multiplied by 95 pounds, the load, gives 22,800 pounds, or 11 tons, which is less than half the weight a 6-inch steam or gas pipe is capable of safely supporting. The second story over these pipes was an afterthought on the part of the owner, and it made him nervous as to the ability of the 6-inch pipes to support it, and here is where comes in the annoyance to the builders. An architect would have had the freedom to decide unchallenged owing to his professional standing, but in the case of the builder, a mere carpenter, there is room for doubt, whatever his technical knowledge may be. In this case the owner insisted upon having three cast iron columns 1 inch thick and 8 inches in diameter, weighing 3 tons each. On referring to the tables accepted by the highest authorities on the strength of materials we find that a column of this dimension and quality of material has an ultimate bearing strength of 785 tons, dividing which by 5, the factor of safety, we find the safe bearing strength to be 157 tons. Three of these columns therefore would support safely the weight of 471 tons, and when it is considered that the total load the three will ever have to support, according to our own computation of 95 pounds to the square foot, which is greatly in advance of the probable load, is only 34 tons, the use of such columns for such a purpose becomes almost a crime, surely an absurdity.

The next problem which confronts us is to find the safe bearing strength of the yellow pine girders. We have already found that 8 x 10 timber is amply strong to sustain the weight of the ceiling joist and the roof timber above the columns marked 5, 6, 7, 8 and 9; but here we have the weight of the floor in addition to the above to be sustained. The load now to the square foot of area is 95 pounds. To find the bending moment it is necessary to ascertain the total load of the area assigned to each span of girder, which will be, as already found, 240 square feet. Now 240 feet of area multiplied by 95 pounds, the load, gives 22,800 pounds, which multiplied by 12 feet, the span, equals 273,600. This amount divided by 8 gives 34,200, the bending moment in foot-pounds. This in turn multiplied by 12 gives 410,400, bending moment in inch-pounds.

To find the resisting inches of an 8 x 10 yellow pine beam we multiply the depth by itself and the result by the width, dividing the product by 6. In this case

10 x 10 = 100 x 8 = 800 ÷ 6 = 133 1-3 resisting inches. Calling it 134 for the sake of convenience and multiplying by 7300, the strength of yellow pine (modulus of rupture) equals 978,200, which divided by 4, the factor of safety, gives 244,550 safe resisting moment, as compared with 410,400 bending moment. These figures demonstrate that a 8 x 10 yellow pine girder will not answer the purpose. It will be observed that we have used 4 as a factor of safety in our calculations. We will now try 2 as a factor of safety in order to ascertain how the 8 x 10 girder will work. The resisting inches as found are 134, and 134 multiplied by 7300, the modulus of rupture, gives 978,200, which divided by 2, as a factor of safety, equals 489,100 safe resisting moments, as compared with 410,400 bending moments. This shows that an 8 x 10 yellow pine girder will resist two times the load assigned, but as correct construction calls for a resisting strength of four times the load, we are under the necessity of finding some means of strengthening the girder. This may be done by having it cased, which is the common method of finishing girders. We will add 2 inches to each side and 1 inch to its under side, thus building a girder 12 x 11 inches cross section, and will now proceed to find out its resisting moment. Eleven inches multiplied by itself gives 121, which multiplied by 12, the width, gives 1452, this divided by 6 equals 242 resisting inches, and 242 multiplied by 7300, the modulus of rupture, gives 1,766,600, which divided by 4, the factor of safety, equals 441,650, safe resisting moment, as compared with 410,400, bending moment. We thus find that a girder of the sectional dimensions stated is even stronger than safety calls for.

Next in order is the flooring joist of the second story, and we will ascertain whether a 2 x 12 placed 16 inches on centers will have the safe bearing strength required to sustain a load of 60 pounds to the square foot of area, which is the load determined for this floor. We would here state that the joist were determined upon as ceiling joist prior to the decision of the owner to have a second story. The area each joist will have to support is 20 feet by 1 foot 4 inches, equaling 26 2-3 square feet. Now 26 2-3 square feet, the area, multiplied by 60 pounds, the load, will give us 1600 pounds as the total load on one joist. Sixteen hundred, the load, multiplied by 20 feet, the span, gives 32,000, which divided by 8 equals 4000, the bending moment in foot-pounds. Four thousand multiplied by 12 gives 48,000, the bending moment in inch-pounds.

To find the safe resisting moment in inch-pounds of a joist 2 x 12, we square the depth, which gives 144, and multiply by 2, the width, equals 288, which, divided by 6, gives 48, the resisting inches. Now, 48 multiplied by 4800, the strength of the material or modulus of rupture, gives 230,400. This, divided by 4, the factor of safety, equals 57,600, the safe resisting moment, as compared with 48,000, the bending moment, thus showing a 2 x 12 x 20 joist to be amply strong to sustain the load of 60 pounds to the square foot. On referring to the plan, Fig. 3, it will be found that the span on the left side of the girder measures 25 feet from girder to the partition which follows the side of the stairway; hence we will have to calculate the safe bearing strength of a joist 2 x 12 x 25 in order to ascertain if its strength its sufficient to sustain a load of 60 pounds to the square foot. The area each joist will have to support in this case is 25 x 1 foot 4 inches, which equals 33 1-3, and this, multiplied by 60 pounds, the load, gives 2000 pounds, which one joist will be called upon to support. Now, 2000 multiplied by 25 equals 50,000, divided by 8 gives 6250, bending moment in foot-pounds, and this reduced to bending moment in inch-pounds gives 75,000, which, compared with 57,600 safe resisting moment, shows that a joist the dimensions given will be insufficient to sustain the load required on this side of the building, but, as already stated, the timbers were in place to serve for ceiling joists, and under the circumstances there was nothing to be done but to double the joist in order to obtain the required strength.

This completes the computation of the materials and I hope not a few of the readers will be benefited by my endeavors to help them.

# ELECTRICITY FOR WOOD WORKING MACHINES.

BY G. E. W.

IN actual test and practice small motors for operating wood working machines have demonstrated their economy and efficiency, and where electric power is furnished at reasonable cost the results are highly gratifying. From an insurance point of view the use of electrical power in a wood working establishment is of importance. With current obtained from outside sources, and small motors installed so that all risks from sparks or short circuiting are eliminated, the danger from fire is practically nothing. This cannot be claimed of steam operated machinery, where the engine room is usually located in the basement or at one end of the establishment. The number of fires started in lumber mills and wood working shops from carelessness in the engine room, either in handling the hot ashes or stoking the fire when combustible waste had accumulated in the room, is far greater than many imagine, and the last report of the National Board of Underwriters showed that upward of several hundred such fires are started annually. A fire in a wood working shop generally proves disastrous, for with the great amount of inflammable material on hand it is difficult to control the flames.

The economy of using small electric motors for operating wood working lathes, band saws, tenoning machines, emery wheels, &c., is obtained in many ways. In no other establishment is there such irregularity in operating the different machines as in a wood working shop. Few of the machines are kept working for more than 80 per cent. of the time, and in the case of emery wheels and grindstones for sharpening the small tools probably 20 per cent. would represent the amount of time. With no loss of power when a machine is not being used, the saving effected amounts to considerable in the course of a year.

In operating circular saws by electricity another point of economy is effected. In cutting through an ordinary piece of lumber or planking knots and sections of hard, close grain are frequently encountered. In order to overcome this obstacle the power of the machine must be much greater than that required for ordinary sawing. With a 12 horse steam power plant it is impossible to run at the maximum with safety, for a sudden hard section of the lumber would completely check operations. Usually it is not safe to use more than 85 per cent. of the maximum power with steam. Owing to the fact that the electrically operated machine can be run for a short time above the normal load a smaller horse-power motor can be successfully used without trouble. Thus a 12 horse-power motor can easily operate up to 13 or 14 horse-power if trouble is experienced. In a recent test with electrically operated circular saws it was found that a 12 horse-power motor drove the saw at a speed of 1000 revolutions per minute through a 10 x 7 inch piece of damp pitch pine, cutting 6 feet per minute. By actual measurement of the electrical current consumed it was found that 13.8 horse-power had been required to make the cut. Had the saw been driven by a 12 horse-power steam engine the saw would have stuck and work been stopped. Such a shutdown in a saw mill is of vital importance, as the time lost through stopping the machinery represents a wide margin of loss in the end. It may be admitted that a plank of this size and condition would not have been put through a mill operated by such a small engine, but it is always better to have a margin of safety to provide for unexpected obstacles. No man can gauge accurately the condition of the timber that comes to him. A green or damp piece of lumber may offer trouble that is entirely unexpected in any mill or shop.

When running light the electric motor consumes only sufficient current to do the work. In the case of the 12 horse-power steam engine the full amount of coal consumption would be required for running light as for a normal load. The electric motor, on the contrary, would cut under light loads at corresponding reductions in the amount of current consumed. As an illustration a test was made with the same 12 horse-power motor described above when running under a light load. A 2-inch piece of deal was run through the circular saw at the rate of 6 feet in ten seconds. Instead of using the full 10 horse-power of the motor the readings showed that only 5 horse-power was actually consumed. Similarly with a 6-inch deal 2 feet in length the cut was made in 20 seconds at an actual consumption of only 5.2 horse-power.

Where the load must be changed frequently the electrically driven circular saw proves the most economical. There is no time lost in changing the power from light to heavy load, and should obstacles be encountered the motor is ready to respond immediately. It runs easily from 3 or 4 horse-power up to 12 or 13 horse-power, thus saving time and consumption of energy. The operator has his machine always under his immediate control, and there is no accident that can prevent him from doing his work under most unusual conditions.

When direct connected the electric motor represents the widest range of economical operation, but even when driving two or more machines by means of belts taken from one pulley time and expense are saved. The adjustment of the belts for the proper speed of the two or more machines is a matter of scientific accuracy. When this is once accomplished one may be operated under a light load and the other under an unusually heavy load. The power not required for the former combines with the latter to equalize conditions. Thus a 5 horse-power motor driving a band saw and a vertical spindle machine running at 1200 revolutions may consume less than 3 horse-power for ordinary light loads on either one or both of the machines, but when required the overload up to 5.86 and even 6 horse-power can be as easily handled. Where two or more operators are using machines running by belts on the same pulley this wide margin of safety is quite essential, for it is impossible for either operator to know just what the other is doing. It frequently happens that both machines are running under heavy loads, and unless the steam engine has a wide margin of safety trouble will often result.

Tenoning machines driven by 5 horse-power motors from a link belt making 2700 revolutions per minute will run light on 3.4 horse-power, and when tenoning hard pitch pine may consume 5.95 horse-power without a stop. Likewise a planer driven by a 5 horse-power motor has demonstrated its ability to adapt itself readily to the changing load without loss of efficiency. A series of tests was made with one designed to cut an 8 x 24 inch plank. The change in the load was carefully noted, and also the amount of power consumed and the time required to make the cut.

For ⅛-inch undercut in pitch pine 9 inches wide it took 3.4 horse-power to finish a plank a trifle over 8 feet long in 25 seconds. For ¼-inch overcut through a 6-foot plank 3.2 horse-power was required for 20 seconds. Thus in both of these light loads the saving in power was the difference between the amount consumed and the total horse-power of the motor, for had a 5 horse-power steam engine been used the full amount must have been kept available for instant use.

The operation by electricity of emery wheels and grindstones for sharpening tools in a wood working factory is peculiarly gratifying. The amount of current needed for operating these is very small, but often when the full steam power is in use any additional work may cause a breakdown. In the shop where electricity is employed it is possible to use current for emery wheels when all the other machines are being operated on heavy loads without in any way straining the motor or causing overheating of the armature. An emery wheel making 1640 revolutions per minute consumes only 0.43 horse-power when not grinding, and when working this may be increased one-half or more than double, depending upon the nature of the tools being sharpened. The highest load required for the wheel is for sharpening a molding cutter, and it may then use from 1.25 to 1.75 horse-power. Now it is possible on a 5 horse-power motor running at full load to operate the emery wheel at the same time without causing trouble.

The installation of a wood working shop is for the sake of economy and efficiency, and it is unwise to secure a 20 horse-power steam engine to do the normal work of a 10 horse-power machine. However, as allowances must be made for overload work, it is equally unpractical to install a 10 horse-power steam engine when the overload may some days run a trifle above this. A margin of safety must be allowed for. It is just because the electric motor can be made to do extra work for a short time without impairing its efficiency that it proves of such great advantage in the wood working shop.

Another point is the ease with which the size of the plant can be increased. When a shop outgrows its 10 horse-power steam engine the problem of enlarging it to meet new trade is sometimes perplexing. It means either another small steam plant or a larger engine to take the place of the original. Either process is expensive and sometimes impossible owing to lack of space. Moreover, two steam engines may be as much too large as the single one is too inadequate, and it is manifestly uneconomical to operate a 10 and 5 horse-power engine to do 12 horse-power work.

To enlarge the size of the electrically operated shop is, on the other hand, the simplest of questions. An additional motor of any desirable size can be installed and connected with wires. It may be placed overhead, where it will take up no space needed for other purposes, or installed under the machine, where it is equally inconspicuous. If additional wood working machines are needed the wire connections with them can be made with little difficulty, and the space problem hardly enters at all into the question. Thus an ordinary shop can be enlarged as the business increases, and the engine room as a factor in the progress is eliminated.

In the small carpenter's shop, where only two or three heavy wood working machines are required for occasional jobs, the electric motor is almsot indispensable to-day. There is no cost for the power except when the machines are in actual use, and it is always immediately ready. Considering the greater amount of work that can be obtained and the facility with which it can be done the electrically operated machines must eventually take the place of the hand and foot operated wood working machines for even the smallest shops. Electric current is distributed so generally now that there is little difficulty experienced in purchasing all that is needed for either the small or large shop.

## Association of Cement Block Machine Manufacturers.

A meeting of the leading manufacturers of cement block machines was held the last week in June at the Great Northern Hotel, Chicago, for the purpose of establishing a permanent organization to promote the quality of concrete blocks manufactured, and to take a position between the public and the makers of the blocks for the purpose of educating the public what to expect and how to use the blocks as well as of educating and inducing the manufacturer to use means to produce a block which shall meet the necessities of the consumer. The organization was perfected under the title of the Association of Cement Block Machine Manufacturers of the United States, and at the meeting representatives of 20 block machine makers were present. S. J. Wiltsie, Jackson, Mich., was chosen chairman and O. U. Miracle, Minneapolis, secretary.

A feature of the meeting was the presentation of a number of interesting papers, and there was much earnest discussion of various phases of the cement block industry, most being said perhaps on the matter of insurance rates on blocks. Another interesting feature was the address of E. C. Cairns, chairman of the National Fire Protective Association and in charge of the laboratory work for testing fire proof materials, who took for his subject, "What the Insurance People Are Doing for the Concrete Block Industry." What he had to say attracted much attention and considerable comment. Another paper dealt with "Concrete Block Architecture," another by Mr. Miracle was entitled "The Position of the Block Machine Manufacturer Relative to the Public," while J. F. Angell of Columbus, Ohio, discussed "The Terms of Sale of Concrete Block Machines," a matter which was of interest to all present.

THERE has just been issued from the Bureau of Forestry what is known as "Bulletin No. 60," containing a comprehensive and detailed description of the forest on about 16,000 acres in the mountains of western North Carolina, which is to be lumbered so that its value as a summer resort shall not be impaired. This tract is typical of many others in the Southern mountains where undeveloped resources afford an opportunity for the practice of forestry or conservative lumbering. The conditions described in the Bulletin furnish a concrete example of what such land will yield when placed in the care of a forester who will look after its landscape features while cutting the merchantable timber. Tables of growth and yield are provided, the logging and pleasure roads are located, and a system of fire protection is outlined. The report has been prepared by Franklin W. Reed, and those of our readers who are interested in securing a copy of the Bulletin should address The Forester, United States Department of Agriculture, Washington, D. C.

## The Pittsburgh Builders' Exchange League.

Exhibits of various kinds of materials entering into the construction and equipment of modern buildings, whether intended for dwelling or business purposes, are to be found as valuable adjuncts of a number of the leading Builders' Exchanges of the country, and a movement is under way in connection with many others to inaugurate displays of such goods as features of the quarters occupied by local builders' organizations. Prominence has been given to the movement by the action of the exchange in Baltimore, and still more recently attention has been called to it through the publication of a daintily printed pamphlet sent out by the Builders' Exchange League of Pittsburgh. This organization has just taken possession of new quarters in the Heeren Building, at the corner of Penn avenue and Eighth street, and, as showing the advantages of them, the pamphlet in question carries plans of the two floors occupied, one of which styled the Hall of Exhibits is devoted almost exclusively to displays of materials entering into the construction of buildings.

The new headquarters have been leased for five years and the floor space is 14,000 feet. The rooms have high ceilings, abundant light and ventilation, fine interior finish, adequate elevator service and all the conveniences of a modern building to make them commodious and attractive. The new home of the league is intended to become a daily gathering place, the center of a close and mutually valuable association of all its members.

The offices of the league, with general meeting rooms, association rooms, &c., are on the fifth floor, a plan of which is given in Fig. 1 of the engravings. Desk spaces are rented to agents of the building industries and to contractors, corporations and firms interested in the various lines connected with building.

A feature which has been made possible by reason of the more commodious quarters is the "Hall of Exhibits," as it is termed, occupying the sixth floor of the building in question, and a plan of which is shown in Fig. 2 of the illustrations. This space is to be devoted exclusively to a permanent free exhibition of strictly high class building materials and appliances. Architects and builders especially will find the exhibit convenient and attractive in many forms, as it will be sufficiently broad in its scope to also enlist the interest of the general public, thus making it in a sense educational.

In this connection it may not be without interest to give a brief history of the organization mentioned, which came into being October 7, 1886, as the Pittsburgh Builders' League, with the following officers: President, W. B. Lupton; first vice-president, H. R. Barnes; second vice-president, A. Alston; secretary, E. A. Knox, and treasurer, T. J. Hamilton. Meetings were held in a hall at the corner of Smithfield street and Fifth avenue, and these quarters were occupied until the building was torn down to make room for a large store. The league then moved to the Renshaw Building, at Ninth street and Liberty avenue; then to the Lewis Block, at Smithfield street and Sixth avenue, and, finally, to the Dimling Building on Market street, where the Pittsburgh Builders' League and the Pittsburgh Builders' Exchange were consolidated July 31, 1903, under the name of the Builders' Exchange League.

The organization occupied these quarters until April 1 of the present year, when it removed to the Heeren Building, already referred to. The league has a membership of 1150, representing 16 subassociations and also including 60 members who represent trades that have no associations.

The 1905 officers of the league are: President, Samuel Francies; first vice-president, J. Charles Wilson; second vice-president, S. Keighley, and treasurer, T. J. Hamilton. Mr. Hamilton has filled that office ever since the organization of the Pittsburgh Builders' League. At present the league is without a permanent secretary, but R. K. Cochrane is acting in that capacity.

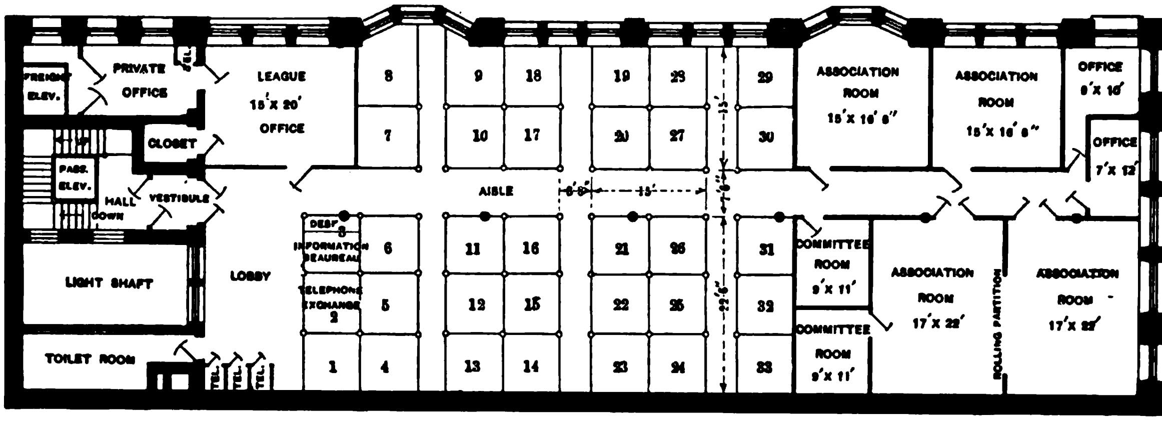



Fig. 1.—Plan of Fifth Floor, Showing Offices, Association Rooms, &c.

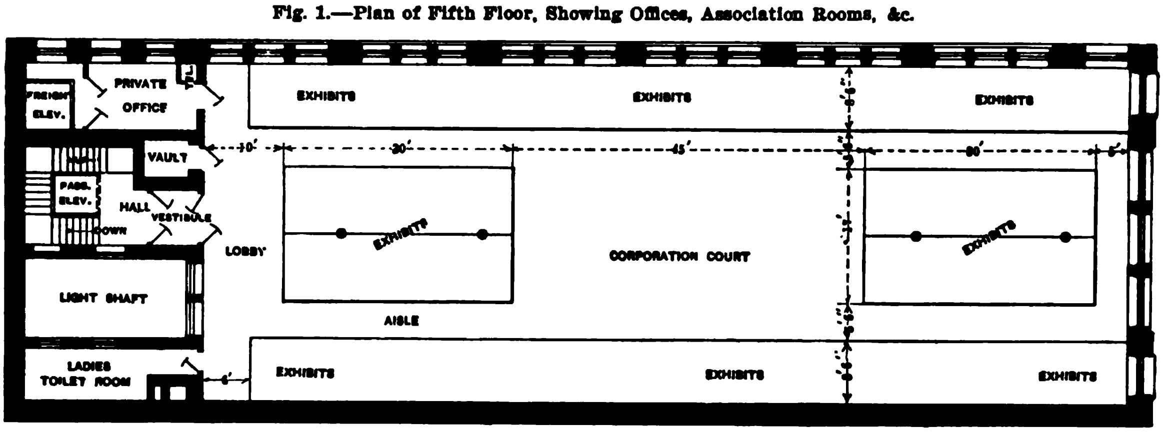



Fig. 2.—Plan of Sixth Floor, Showing Arrangement of Space for Exhibits.

*The Builders' Exchange League of Pittsburgh.*

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A NEW TEN-STORY office building, estimated to cost $500,000, is to be erected at 176 and 178 Broadway, New York City, for the Title Guarantee & Trust Company. The plans, which have just been filed by the architects, Howells & Stokes, call for a structure having a frontage of 75 feet and a depth of 119 feet. We understand that only six stories of the building will be erected at the present time.

# CORRESPONDENCE.

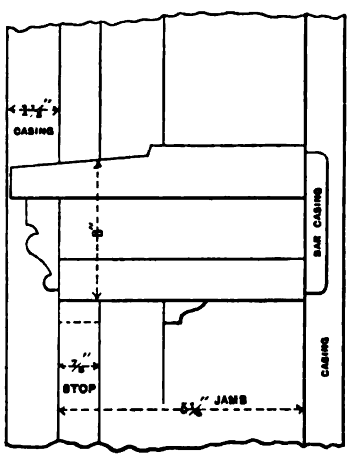
### Meaning of the Term "Muntins."

*From* J. S. F., *Takoma Park Station, D. C.*—Will you please tell me what Mr. Hodgson means by the word "muntins," as used in the last line of his article on "Doors and Doorways," page 155, of the June issue of the paper, and where he gets the term? This information may be of interest to others besides myself.

*Note.*—The question asked by our correspondent can readily be answered by reference to any standard glossary of architectural terms, or by looking up the word in Webster's Unabridged Dictionary. The word "muntins," often called "munnions" or "mullions," comes from the French word "moignon," meaning "stump of an amputated limb; mutilated." Its definition means the central vertical piece that divides the panels of a door, or the slender bar or pier which forms the division between the lights of windows, screens, &c.; an upright member of framing.

### Constructing a Transom Bar.

*From* W. A. S., *Eureka Mo.*—Complying with the request of "M. S. M.," Spokane, Wash., in a recent issue, I




*Constructing a Transom Bar.*

inclose herewith a sketch of a transom bar which I hope will be of assistance to him. I have used the construction shown very often and find that it gives entire satisfaction, as water cannot run back to the inside. I also use the same style of bar for outside door frames with transoms that are not protected by porch or door hood.

### Figuring Size of Joists for Second Floor of Store Building.

*From* H. M. E., *Benson, Arizona.*—I want to build a two-story structure 30x100 feet, the lower story to be used as a storeroom with no supports in the center. The upper floor is to be devoted to living rooms on each side of a 6-foot hall running through the center. All material is to be Oregon pine, 2x6 outside studding and 2x4 inside on upper floor. The roof is to have a rise of 3 inches to the foot. The upper story is to be ceiled throughout. The storeroom is to have a metal ceiling and siding. What I would like to know is the size of joists to use for the second floor and how far apart they should be placed on centers.

*Answer.*—In reply to the above Frank E. Kidder, the well-known consulting architect, furnishes the following data:

The accompanying engraving shows a cross section through a building, such as the correspondent describes, the hight of stories being assumed by the writer, as they are not given. I would not advise using anything lighter than 3 x 14 inch joists spaced 16 inches, center to center, for the second floor and would recommend that the rafters and ceiling joists be set before the permanent partitions, so that none of the weight of the roof will come on the second-floor joists. For convenience in putting on the roof and ceiling a line of studding can be put up temporarily and removed after the rafters and ceiling joists are braced. The roof and ceiling will then settle to a permanent bearing, and when the second story partitions are set the roof will not bear upon them. The method of figuring the spacing for the second-story joists is as follows:

First find the load per square foot of floor that the joists must support. This will be made up as follows:

| | Pounds. |
|---|---|
| Weight of 3 x 14 inch joists, 16 inches C. to C.. = | 9 |
| " single flooring.......................... = | 3 |
| " metal ceiling.......................... = | 2 |
| Live load, say.......................... | 30 |
| | 44 |

Each partition forming the sides of the passage will weigh about 9 pounds per square foot (if it is ceiled both sides), and if the story hight is 10 feet the weight per lineal foot will be 90 pounds. These partitions are approximately three-eighths of the span from each end, and to reduce the load to an equivalent distributed load we must multiply the weight of one partition by three, which gives 270 pounds as the equivalent distributed load per longitudinal foot of floor. Dividing this by the span (29 feet) we have 9 pounds as the equivalent load per square foot. Adding this to the 44 pounds already found we have 53 pounds as the least load per square foot that the beams should be computed to support.

Rules C and D, page 36 of "Strength of Beams, Floors and Roofs," are as follows:

For strength only:

$$\text{Spacing of joists in feet} = \frac{2 \times B \times D^2 \times A}{W \times L^2} \quad \ldots\ldots (C)$$

For stiffness:

$$\text{Spacing of joists in feet} = \frac{8 \times B \times D^3 \times E}{5 \times W \times L^3} \quad \ldots\ldots (D)$$

in which $B$ denotes the breadth of the joists, $D$ the depth of the joists (both in inches), $L$ the span in feet and $W$ the load per square foot. For Oregon pine $A = 90$ and $E = 110$.

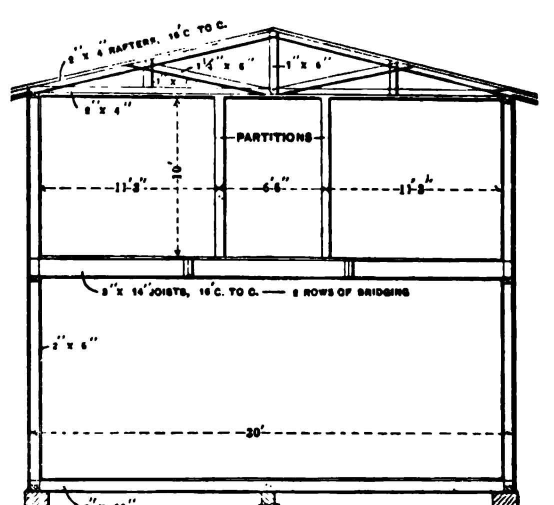
In this case we will assume $B$ at 3 inches, $D$ at 14 inches, $L = 29$ feet and $W = 53$ pounds. Substituting in formula ($C$) we have:

$$\text{Spacing in feet} = \frac{2 \times 3 \times 196 \times 90}{53 \times 841} = 2.3 \text{ ft.} = 28 \text{ ins.}$$

Substituting in formula ($D$) we have:

$$\text{Spacing in feet} = \frac{8 \times 3 \times 2744 \times 110}{5 \times 53 \times 24{,}389} = 1.12 \text{ ft.} = 13\tfrac{1}{2} \text{ ins.}$$

Therefore, if we wish a good stiff floor the joists should not be spaced more than 13½ inches on centers, but they would be safe spaced 28 inches on centers, although they would sag a good deal. The spacing could




*Figuring Size of Joist for Second Floor of Store Building.*

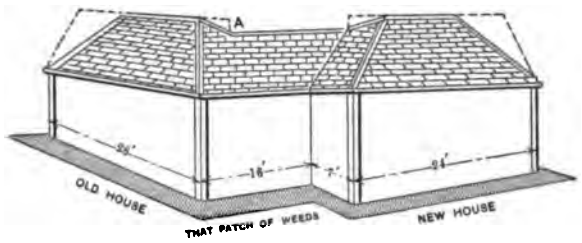
be increased to 16 inches without any harm. Under the partitions between the rooms two 2 x 14 inch joists or one 4 x 14 inch should be placed and the joists should be braced by two rows of cross bridging. I might say that 30 pounds per square foot for live load is rather small, but it is probably ample for a building such as this.

### Knot for Tying Sash Cord.

*From* C. A. W., *Port Jervis, N. Y.*—In answer to "Old Reader," Evanston, Wyo., I would suggest that he employ the knot called the "figure eight," and he will then have no trouble, for the harder the weight pulls the tighter becomes the knot.

### Joining New Roof to Old Building.

*From* T. M., *San Francisco, Cal.*—I send herewith a sketch in perspective on the lines of "Mr. Polk's" plan published in the May number of the paper, page 142, for




*Joining New Roof to Old Building.*

joining a new roof to an old building. This gives at a glance to any one not familiar with diagrams and plans the appearance of the roof when completed and the broad suggestion as to its construction. The plan of "Mr. Polk" is to my way of thinking the best yet submitted in reply to the problem of "J. C. W." in the March number. The dotted lines on my sketch at the ridge show where the latter may be continued over plumb with the intersection of the lower ridge forming smaller ornamental gables if desired. The dotted lines at the extreme right and left of the sketch indicate the outlines of the gables if not hipped. The construction of the opposite side of the roof to that shown on the sketch or inside angle of the L-shaped roof is self evident, there being but one gutter running along the intersection of the new with the old roof and starting from the ridge at the point marked A on the sketch.

The second roof plan submitted by "E. H. B.," River Head, N. Y., in the April number in reply to the same problem deserves mention for its simplicity. This plan when finished would look just as if both houses came adrift from different points of the compass and accidentally met and locked horns, thereby perpetuating a wooden monument expressive of conflicting emotions wherein the feeling of pity and regard tinged with obscurity on beholding such a jumble of ungainly and ungraceful lines would be paramount.

And there are yet other plans relating to the same problem, some of which are known to the writer, but before submitting them he would like to hear from "J. C. W." himself. For upon submitting this question it will be remembered that he never gave a reason why he could not use "that patch of weeds," or whether that patch was included in the grounds belonging to the house or not. Moreover, it has strongly appealed to me upon reflection what possible reason he could have for that patch of weeds at the end of the old building, since he holds it so sacred as not to dare to trespass upon it with either the new or old structure. Perhaps he means to tether a goat there or it may be there is an old well at that point. If there is I would suggest that he fill it up with rocks.

In conclusion I would say that "J. C. W." has no reason to complain of a lack of suggestions in the solution of the problem he proposes. Whether his problem was meant to help him out of a real difficulty or just to draw out an expression of opinion he succeeded admirably. It makes no difference either way whether his problem was in jest or earnest—all carpenters frequently meet with just such cases—but will "J. C. W." remember that he is not "the only pebble on the beach," and presumably he has much yet to learn. I notice too that he is most anxious to succeed and I like his grit. These inquiries are just the brightest spots in *Carpentry and Building* and that is just as it ought to be, but we are waiting for an expression from "J. C. W." himself, if it is only an expression of gratitude for favors conferred.

### Durability of Washington Fir for Sills.

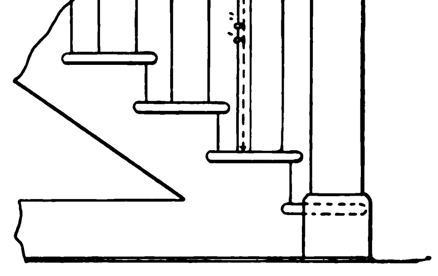
*From* G. W. B., *Tacoma, Wash.*—In regard to the inquiry of the correspondent relative to the durability of Washington fir for sills permit me to say that if sills and joists are alternately exposed to dampness and dry air they will decay or dry rot in a few years, varying from 5 to 15. If the timbers are exposed to dry air or open air my observation is they will last as well as oak and are as strong. I have found after 15 years' practice in Washington that our native fir is as fine a building timber as I have ever used. I take proper care in the construction, and during the time mentioned I have never had to renew a sill or joist in connection with my own work, and I have used fir in about every class of building. I might also mention in this connection that fir makes a very pleasing and durable finishing lumber.

*From* A. W. S., *Seattle, Wash.*—Replying to the Texas correspondent in a recent issue regarding the durability of Washington fir for sills I would say that this material is as durable as anything I have ever used. I would suggest, however, that it be steamed and kiln dried.

### Hight of Hand Rail and Newel.

*From* C. B. Hamlin, *Warren, Pa.*—In regard to the inquiry of a correspondent in a recent issue relative to the proper hight to place the hand rail I inclose a sketch which illustrates a rule which I have practiced for the past 25 years or more. Place the top of the rail 33 inches from the top of the tread at a point 1 inch back of the center of the tread, no matter what may be the depth of rail, width of tread or pitch of stairs. This given point on the tread means on the cut of string, as indicated in the sketch.

With regard to the correspondent's question as to the hight of newel I would say that it is easily determined by a similar sketch, which it seems to me any man can make if he can build the stairs. The point of the



*Hight of Hand Rail and Newel.*

rail meeting the newel varies and depends on whether the rail runs straight to the newel or has an easement, as shown in the sketch. The marks on the line of the straight rail show this difference. Some other length of easement would show a different result. I also place my newels so as to take the place of a baluster, either long or short, as the plans may require, thus making the distance from the newel to the next baluster the same as between other balusters. This applies to angle balusters also. More skill, however, is required to plan and build the stairs in order to obtain these results than to obtain the proper hight of rails and newels.

**The Prize Designs as Seen by "An Old Chip."**

*From* X. Y. Z., *Springfield, Ill.*—I am one of the old time carpenters who "served his apprenticeship" and "served it full," and while for years I have not pushed the plane or shoved the saw I have never lost my interest in those who do. In those days we worked from sun to sun in the summer and from seven in the morning until 9 at night in the winter, with an hour each for dinner and supper. Plans for building were usually made in the summer and the house commenced in the fall. The winter was devoted to getting out sash, doors and blinds, riving out the shingles and shaving pins, for pins then were cheaper in some cases than nails. It was about this time that machinery began to be used in the wood working trades and the discussions sometimes rose high as to whether it was to be an advantage or disadvantage to the workmen. So high did the discussion often rise that it sometimes hit about the eye. Workmen were divided into two classes,—one which believed that there should be no machinery used, because it did the work that the human machine should be paid for doing, the other class contending that the machine was a producer and not a consumer and that the greater the production the more products we would all have to consume. I belonged to the latter class.

I have made a great many predictions as to certain things affecting workmen in our trades. Some of them have been fulfilled—others not. When *Carpentry and Building* started I predicted that it would have the effect of changing the local customs and bringing terms, &c., to a more general understanding. This prediction has proven true. We hear less discussion about beams and joist, scantling and stanchions, studding, siding, sheathing, roofing, headers, cripples, jacks, and even the terms porch, veranda and piazza seem to be better understood than at one time. Whether the difference between a right hand and left hand door has been settled may be a question, but one thing is sure, it is not now discussed to the extent it was a few years ago.

Notwithstanding the fact that I have traveled considerably at home and some abroad, I have carefully read every issue of *Carpentry and Building* and have always been interested in the discussions carried on, and I must say sometimes greatly amused. When I read the conditions governing the first contest for przes I said: "Now this is what is going to try your souls." I could imagine your committee going over a large number of plans, sifting out the utterly unworthy and bringing them down to what would probably receive the prizes. Then the fun would commence, for there would be the question of superiority one over the other, and I seemed to hear some member of the committee say, as he glanced from one design to another and back again,

"How happy could I be with either
Were t'other dear charmer away."

It is possible a committee differently constituted would have reversed the order and given first prize to the second and the second to the first, so closely in merit they have been as seen after publication. The one to whom the second prize was awarded may say this is luck. Well, it cannot be helped; what we call luck enters into pretty much all our projects.

It would seem from the language of those discussing the prizes that they thought it was a part of the duty of the committee to change the plans, putting in a door here and a vestibule there. This appears in a discussion of the prize designs in nearly all the contests in the past and the Thirty-eighth Competition, for $3500 houses, is no exception, for in the June issue a correspondent criticises the author of a design for providing no refrigerator. Well, a refrigerator is a good thing to have, especially if one has ice, but if it is the province of the committee to change designs in order to bring them up to date, why did they not put the refrigerator in a cool place instead of in a hot kitchen and over the laundry tubs? Why did they not make provision for the ice to be put in from the outside and not invade the kitchen, or is it one of those refrigerator contrivances that furnishes its own ice at trifling cost? Various other questions of this kind might be raised, but possibly I have said enough to start some of the wise ones a-thinking, and if I have I hope they will put their wisdom on tap and allow it to run through the columns of *Carpentry and Building.*

**Which Construction Makes the Warmer Wall?**

*From* J. P. Kingston, *Worcester, Mass.*—In looking over the Correspondence columns of the February issue I notice on page 46 the inquiry from "J. A. P." of Katepwe, Assa., asking with regard to the construction of walls for a building. The point is, which would make the warmer house, but if I had to choose between the two methods mentioned I would say that 2 x4 studs boarded inside and outside would surely make the stiffest and strongest building. Another excellent method is to lath and plaster a rough coat on the inside of the studs, then fur over this with ⅞-inch strips and lath and plaster again. This is the scheme I have adopted in connection with a house for a very cold climate. The usual method here is to back plaster and fur or nail lath on the inside of the boarding between the studs, then lath crosswise over these and plaster with one coat of common mortar. I have just finished a house in which the work was done in this way. This method and the second one suggested by "J. A. P." is affected a little by the shrinkage of the studding, but in either case I do not see any object in using studding larger than 2 x 4. I have in mind a house built for a friend of mine 17 years ago and for which I have since made plans for additions and alterations. The owner has often remarked that it was the warmest in winter and coolest in summer as well as the stiffest house he ever saw. This house was framed in the regular balloon style with 2 x 4 studs and ledger boards on which to rest the joist of second and third floors. It was boarded both inside and out with matched spruce, over which was placed good building paper, and then clapboarded the first story and shingled the second. The inside was furred 16 inches on centers or over each stud with ⅞ x 2 inch furring, then lathed and plastered. This manner of construction would make a wall just about the same thickness as one with the 2 x 6 studs.

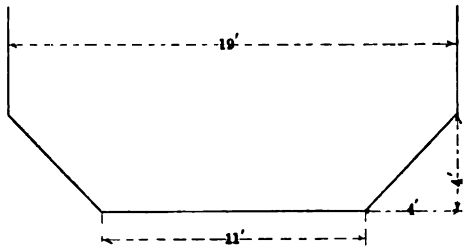
I would mention here that in order to make this or any other method thoroughly effective the space between the ends of the joist or bottom of the studs should be thoroughly cut off by 2-inch blocks or brick work. The same thing should be done at each floor above by putting a block back of the ledger board at the side of the building or joist at the end of the building and another block on top of the joist. This if well done will cut off all drafts, make a good fire stop and keep rats or mice from getting through. I would suggest that in all cases the boarding should extend to the top of the plate on the outside and the rafters setting on same. It is just as easy to do it this way, and the construction is much warmer, while the appearance is ever so much more workmanlike. If studding extends above the attic floor, as it often does more or less, I would board the space to the top of the plate, whether the other parts were boarded inside or not, and then cut pieces between the rafters to fill the space from the plate to the boarding, and it ought to make a good job.

My attention has recently been called to a material which I think if properly used will add greatly to the warmth of a house. It is a plaster board made in layers of paper and plaster; is about 5-16 inch thick, and, I understand, is fire proof. It takes the place of any kind of lath where any hard plaster is used. I have a sample at my office, and at the first opportunity I am going to try it especially for outside plaster work. I think it will be grand, for it can be nailed directly onto the boarding, or if one wants to economize in gables or small spaces it may be nailed directly onto the studs without the boarding. The latter method, however, I would not recommend for the best work.

I would suggest to all readers of *Carpentry and Building* if they want to help make warm houses that the easiest and simplest method is to plaster all outside walls to the floors, then turn the floor paper up onto them about 4 or 5 inches before putting on the base. In this section of the country we have double floors for all houses, so that I have strips of paper 12 inches wide creased at right angles and laid partially against the wall and the remainder lying on the floor. Then after the base is put on over it and before the top floors are put down the deafening paper is put in place, care being taken to cover onto the paper placed against the wall.

### Treatment of Gable of Brick House.

*From* CARPENTER, *Petersburg, W. Va.*—I am so well pleased with the answers to my inquiry in the March issue as to the best method of attaching grounds to a brick wall that I now send a plan representing a bay end to a brick house with wood gable, the roof projecting over the corners on a square. I want a treatment of the wood finishing, such as shingles, brackets, drops, ornaments, &c., as I desire to finish it up in good style. In




*Treatment of Gable of Brick House.*

this connection I desire to thank those correspondents who took the trouble to reply to my previous inquiry.

### Effect of Copper on Iron Conductor.

*From* C. H. T., *Norfolk, Va.*—I have heard that the placing of copper in connection with iron in a leader or in a gutter in such a way that the water passes from the copper to the iron will produce an electric current or action which eats away the iron. I am very desirous of verifying this statement, and hope that some of your readers will give their experience on the subject. At the present time I have some work where a copper leader discharges into a cast iron standpipe in the ground. It is said that if the water passes from the iron to the copper no disadvantage is felt. As I do not know the needs of this matter I hope some experienced man will give facts for the benefit of the readers. Does the copper affect cast iron the same as the lighter sheet metals used commonly in building construction? If a copper leader discharging into a cast iron pipe at the bottom will destroy it, I should like very much to know some simple way of overcoming the trouble.

*Note.*—We shall be glad to have our readers give their views on this subject.

### More Explanatory Work with the Steel Square.

*From* OLD BEGINNER, *Rochester, N. Y.*—I read and study *Carpentry and Building* to a considerable extent and am well pleased with what I find in its columns. I am somewhat in sympathy with "J. F. D." of Dallas, Texas, when he says he would like to see a little more explanatory work given from actual measurements as it is done with the steel square rather than geometrical solutions, as poor boys would then learn to read the square more accurately. I suppose I am not as smart as some of those who contribute to the columns, but I have been trying to follow the articles in relation to geometrical drawings by Mr. Kittredge, and must confess that so far it is pretty much all Greek to me. Do not imagine for one instant, however, that I am criticising the author's methods, as I doubt not they are all right for those who have the gift and ability to follow this kind of drawing.

Referring to the floor plans accompanying Mr. Kingston's house in the February issue, and which appear on page 33, I would like to ask what is intended by the space at the side of the chimney. I take it that the square hole represents the chimney flue, but the round one does not show on the cellar plan, but starts at the first floor. It is also shown on the second-floor plan of the two-family house.

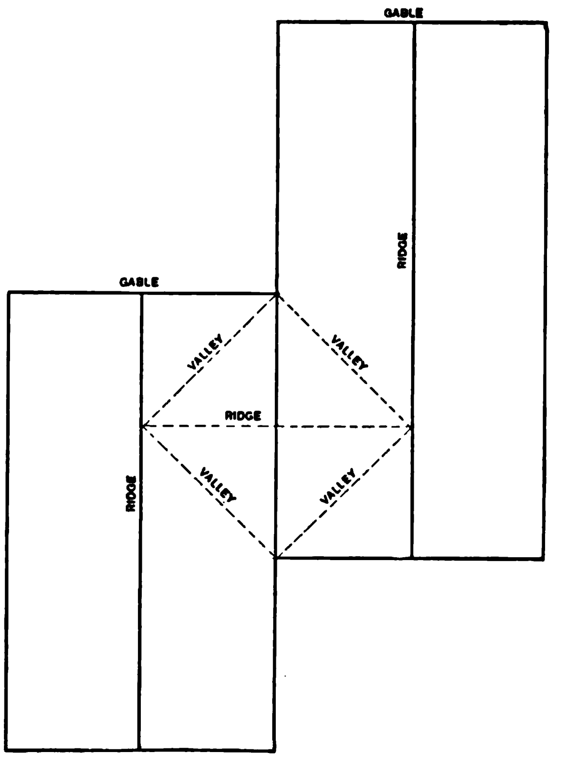
*Note.*—We would state for the information of the correspondent above that the circle in the space immediately at the right of the chimney flue represents the boiler for the hot water supply. As the building is intended for two families, there must necessarily be another hot water boiler for connection with the range in the kitchen on the second floor.

### Repairing Cracks in Hard Wood Floors.

*From* J. C. B., *Dowagiac, Mich.*—Will some of the experienced readers of the paper tell me how the cracks in a floor caused by the shrinkage of tongue and groove flooring may be effectually and cheaply filled? I have had in mind a composition of fine sawdust with some sort of binding substance, say rosin melted and mixed with the sawdust. Here is a chance for some of the experienced members of the trade to throw light upon a subject likely to interest many others besides myself.

### Roof Connection Between Old and New Buildings.

*From* J. B., *Los Angeles, Cal.*—I would like some of the many readers of *Carpentry and Building* to give me their views as to the best method of joining a new building to an old structure under the circumstances indicated in the sketch inclosed herewith. Both are gable buildings




*Roof Connection Between Old and New Building.*

and I want to know if the valleys can come together as indicated by the dotted lines.

*Note.*—We see no reason why our correspondent should not connect his roofs as indicated, but we publish the question for discussion by the readers.

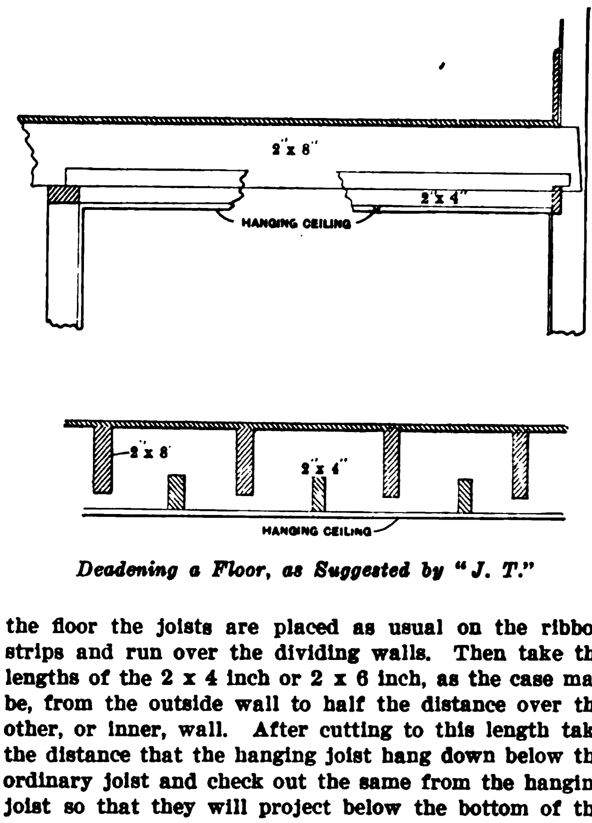
### Suggestions Wanted for Shingling and Weather Boarding a Circular Tower.

*From* J. E. N., *Leland, Ill.*—I would like to make a few suggestions as well as ask some questions which I shall be glad to have answered through the medium of the Correspondence department, as I am only a country wood butcher and do not see executed work of the kind mentioned. As the editor kindly published the inquiries which I made a short time ago, I will not ask to have these appear in the very next issue, but am willing to give somebody else a chance and have mine published later on.

In the first place I would like to have some one tell me how to side or put clapboards on circular work, also floors, ceiling, cornice, crown and bed molding, &c., and whether or not the siding and moldings are kerfed. In short, I would like to have the practical readers tell me all about the construction of the modern circular porch or veranda, also how they would shingle a round or circular porch roof, and whether they circle the butts and shave the sides. If they do I presume they are obliged to have a different pattern for each course as the radius diminishes. Another thing I would like to see published in the Correspondence department is different designs of shingled gables with patent shingles, such as for circular, oval, diamond and square butts. Another point on which the practical readers can throw light is the construction of different kinds of gutters, such as are used on modern buildings at the present day that set on top of the roof. I think I have asked enough questions to keep some of my brother chips pretty busy for a while. I will therefore draw the curtain over my wants in the hope that what I have said will cause the bright minds in the trade to give free rein to the expression of their practical ideas along the lines indicated.

### Deadening a Floor.

*From* J. T., *Sioux City, Iowa.*—In reply to the inquiry of "W. H.," Lethbridge, Canada, I send a sketch which indicates the method I would suggest for overcoming the difficulty of which he complains. In the construction of




*Deadening a Floor, as Suggested by "J. T."*

the floor the joists are placed as usual on the ribbon strips and run over the dividing walls. Then take the lengths of the 2 x 4 inch or 2 x 6 inch, as the case may be, from the outside wall to half the distance over the other, or inner, wall. After cutting to this length take the distance that the hanging joist hang down below the ordinary joist and check out the same from the hanging joist so that they will project below the bottom of the other joist 1½ to 2 inches at least, which will give a clear passage from one side to the other. I only use this method in connection with stone and lime buildings, but it will readily be seen that it is applicable in connection with frame buildings as well.

### Hollow Block Construction.

*From* HOLLOW BLOCK, *Chicago, Ill.*—As hollow concrete blocks are being extensively used at the present time in many localities as a building materal I think it would be of interest to discuss the merits of this form of construction through the Correspondence columns. For my part I would like to hear from some builders who have used hollow blocks and who will tell of the advantages or disadvantages or both of this form of construction as well as of any errors encountered in the process of the work. I would also like to have them express an opinion as to the value of the particular machine that may have been used, the system employed for securing joists and rafters to the walls and other points likely to prove of interest to the architect and builder. There are, it is well known, many machines on the market, each manufacturer putting forth strong claims for his own apparatus, but in my opinion the practical man who uses the machine is the best judge of it and is able to point out its faults.

At the present time I am making drawings and estimates for a two-story hollow block cottage. The firm from which I expect to purchase a machine for making the blocks advocates the use of iron stirrups for each joist. If I use this method will it not be necessary to use anchors as well on the joist? The machine dealers are chary about giving this sort of information, as many of them employ draftsmen and architects and want you to purchase plans from them, when they tell you all necessary information will be given. Another question I would like to ask is if plaster can be applied direct to the blocks without using lath and furring strips? I trust some of those who have had experience in this line of work will express their views freely for the benefit of the trade at large.

### Pitch of Roofs.

*From* EXPERIENCED BUILDER, *New Jersey.*—In connection with the discussion which is now in progress regarding the proper method of designating the pitch of a roof I beg to say that while it is generally recognized in the trade that one-third pitch is a rise of rafter of one-third the full width of a building, it is so simple to say "so many inches rise to the foot run" that it should be the universal custom not only of carpenters but of every one who has to use feet and inches.

*From* ROYAL VENTILATOR & MFG. COMPANY, *Philadelphia.*—Regarding "Subscriber's" inquiry, together with diagram showing different pitches of roofs as understood by him, we beg to advise that we have used the following plan for many years: If we were instructed to draw plans for a customer who desired a roof having quarter pitch said roof would be drawn with a rise of 3 inches to a foot. If he indicated he wanted one-third pitch the plans would be drawn with a rise of 4 inches to a foot. Should he desire one-half pitch these would be drawn to indicate a rise of 6 inches to a foot. The width of building or length of span would have nothing whatever to do as indicating the pitch of roof. This would only determine the length of the rafters.

It has also been our custom to follow this mode of making bases where customers have indicated to us their roof had a third pitch, quarter pitch or half pitch. The pitch of roof, as you state, is often described in the degrees of a circle; this is also easily understood.

*Note.*—We publish this letter of our correspondent as tending to show the diversity of practice regarding the pitch of roofs, but, as stated in the June issue, the general custom in the building trade is to measure the pitch of a roof in parts of its span.

### Roof Framing Method Criticised.

*From* W. S. W., *Sterling, Kan.*—I have observed with surprise and wonder the comments of Morris Willams on the points raised by "W. F. P." in the June issue of the paper. In his reply to this correspondence Mr. Williams admits he made a misstatement in the February issue, 1903, page 37, with regard to the length of rafter No. 2, when in reality he was right and "W. F. P." was wrong. It is not the bridge measure of the whole run and rise in feet that we multiply by the run, for that bridge measure taken in feet is the length of the rafter itself. It is the bridge measure of the run and rise per foot in inches which is to be multipled by the run, and that is 12 and 18. He has well said that it is not the figures that give the cuts which are to be multiplied, for any two figures on the square that bear the same relation to each other as do 12 and 18 will give the cuts. But their bridge measure would be quite different. The bridge measure of

12 and 18 inches is 21⅝ inches, which multiplied by 8 gives 173 inches, or 14 feet 5 inches. The bridge measure of 8 and 12 feet is 14 7-16, or 14 feet 5¼ inches. Now how much too long is the rafter?

If "W. F. P." will multiply the bridge measure of 8 and 12 inches he will get a rafter 9 feet 8 inches long, and if he calls the 8 and 12 feet instead of inches his rafter would be 116 feet long. We do not have to use different figures on the square for getting the bridge measure and the cuts, but the same figures when we take 12 inches as the run and whatever the rise may be per foot of run. I can hardly think Mr. Williams has been correctly represented, as his answer seems so far astray.

#### Rules for Gutter and Spout Sizes.

*From* G. Y., *Pittsburgh, Pa.*—A rule for determining the size of gutters and down spouts which has been used with satisfaction for some time past is as follows: For each 100 square feet of horizontal projection of roof area 1 square inch in cross section of down spouts for leaders should be used. In other words, for a practical application of the rule a round leader

2 inches in diameter would serve 100 square feet of roof area.
3 inches in diameter would serve 500 square feet of roof area.
4 inches in diameter would serve 1,000 square feet of roof area.
5 inches in diameter would serve 2,000 square feet of roof area.
6 inches in diameter would serve 3,000 square feet of roof area.

#### Constructing Inside Blinds.

*From* F. H. H., *Utica, N. Y.*—Some time since I noticed in the columns of the paper a description of a method of constructing inside blinds, and as the subject is one which appeals to me I desire to describe my plan of doing this kind of work. Inside blinds should be so constructed as to keep out all the light possible by having the whole frame molded. The slats can be fitted closer at the ends than is the case where square edges are used. In order to make good inside blinds it is essential to have kiln dried lumber, else the heat from the window will shrink and twist them. The usual thickness is ⅞ inch. For windows 2 feet 2 inches to 3 feet 4 inches the blinds can be made four-fold, while for 2 feet and less three and two fold. Where the blinds for the window are wider than 3 feet 4 inches I would make them six-fold. The stiles should be face marked on the crowning side. In doing the work lay out the mortises by machine, working from the end of the stiles and boring for the slats from the same end. I space the distances of the holes by means of a ratchet pattern in the boring machine. Where there are panels the mortises should be laid back ⅝ inch—the depth of the plowing. Have a double mortise at the meeting rails so as to admit of being cut in halves. The stiles should be molded before boring.

A four-fold set of blinds has three rebates ¼ inch each. Add ¾ inch for the total width. Save time and lay out one-half the width only, making the outside fold ½ inch wider than the other.

A six-fold set of blinds is increased by five rebates. Divide one-half the width into three folds and beginning with the center make each fold ½ inch wider than the next. If the blinds fold into a pocket then the width of the outside fold should be the size of the pocket. The rails must be tenoned, coped, molded and sized to fit the stiles. Next bore the pockets for the rods on the face side of the rails, after which the frames are put together, the panels being placed where required. The slats are tenoned and fitted into the frames, after which they are glued, chamfered, wedged and made smooth by running through the sander. The rods are stapled by machine having a spacing ratchet identical with the one in the boring machine; the rods are then stapled to the slats. Putting on the rods last admits of the frames passing through the sanding machine. The blinds are then jointed on one edge, run through a two-sided molder or rebating machine, the operation doing rebating and beading and bringing to the exact width. If the size of the blinds be marked on the end it will save time and much trouble.

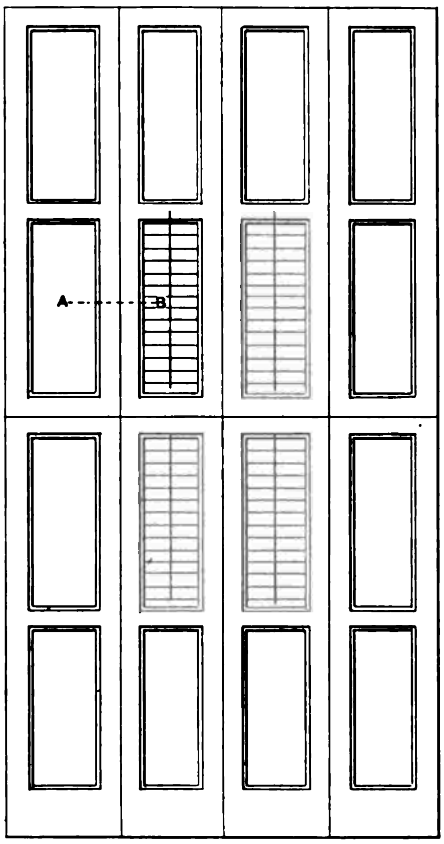



Fig. 1.—Elevation of the Completed Blinds.

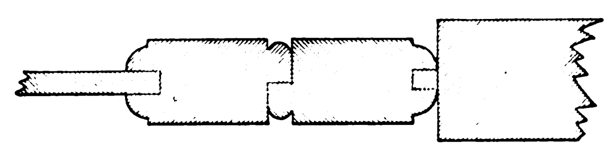


Fig. 2.—Horizontal Section on Line A B of Fig. 1.

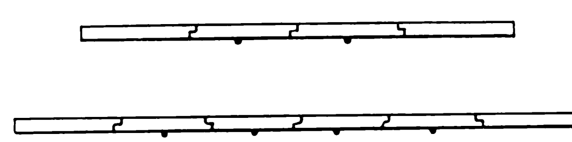


Fig. 3.—Horizontal Section Showing How to Rebate for Four and Six Fold Blinds.

*Constructing Inside Folding Blinds.*

In hanging inside blinds great care should be taken in sorting the sizes, and be sure all are right before commencing. After being fitted put on the flat butts at the centers and loose pin butts on the outside folds. After being hung and swinging properly mark with a straight edge at the meeting rails and saw in two. The work is completed by putting on the latches in the center.

The illustrations which are presented herewith show the arrangement of the panels and the general construction employed. Fig. 1 represents an elevation of the blinds drawn to a scale of ¾ inch to the foot, while Fig. 2 is a section on the line AB of Fig. 1 and is drawn one-half full size. Fig. 3 is a horizontal section showing the correct way to rebate four and six fold blinds, the scale being ¾ inch to the foot.

The Red Rock Spring Company, recently incorporated at Bar Harbor, Maine, contemplates the erection this season of a 400-room hotel near the spring, which is located on the Harden Farm road, on the south side of Green Mountain and near the famous Kebo Valley golf links of that place.

# SOME RULES FOR CONCRETE.

THE above is the title of a paper recently read before the Iowa Engineering Society by Charles P. Chase of Clinton, that State, and as concrete is being extensively employed at the present time in connection with building work and other forms of construction, what the author had to say is likely to interest many readers of this journal. We quote as follows:

Many rules are given for concrete, some of which are very good and others unreliable, and what holds good in one situation many not in another. To the engineer it can only be said, Study carefully your material and the use to which it is to be put. Don't put railroad arch concrete under a country pavement, or *vice versa*, or use the same mixture for a reservoir wall that you would for a retaining wall. These things are sometimes done, even in Iowa.

### Preparing the Concrete.

In preparing concrete the sand and cement should be mixed dry first; then add water, and then subsequently add the crushed stone, gravel or whatever the aggregate is to be, and then thoroughly mix the mass. All mechanical mixing also, by whatever machine, should follow this rule. It should be transferred in as large quantities as possible to the work in dump wagons, wheelbarrows, or carriers, and dumped as nearly as possible in position in a 6-inch layer, as shoveling and rolling tends to roll out the stone, thereby making an excess of aggregate at one point and pure mortar at another. It should then be tamped to an even surface by a smooth iron tamper, preferably square, with 6 to 8 inch square surface, and weighing 25 to 30 pounds. Do not attempt to deposit concrete under water when there is any way to avoid it. If used in this way at all place in coarse jute bags and deposit them in layers as close together as possible and tamp hard; this prevents the loss of the strength of the concrete, and enough cement comes through the bags to bind the mass.

The proportion of mortar to aggregate will vary according to materials; in screened, crushed stone it will require nearly one-half mortar to fill voids and give the slight excess desirable.

Where the rock is used crusher run the percentage of voids is only about one-third, and if the material is clean and all stone the result is excellent and to be desired; but let me sound a note of warning here and say that crusher run, to the quarryman, quite frequently means everything in his quarry that can be got on a shovel. This means additional worry for the inspector. If you are doing your own crushing in clean rock, however, you will get excellent concrete. Many of the railroads and the United States Government have experimented in this line and recommend crusher run stone.

No rule for composition of concrete can be laid down that will fit all cases, but we have found the following successful:

For arches and water tight work, 1 cement; 1 sand; 3 stone.

For heavier walls, requiring bulk and strength, but a lesser degree of permeability, 1 cement; 2 sand; 4.5 stone.

For ordinary uses in abutments, heavy walls, paving, foundations, &c., 1 cement; 3 sand; 6 stone.

A good common concrete in gravel is, 1 cement; 2 sand; 5 gravel.

For curbing we have obtained better results by using 1 to 3 or 1 to 4 of torpedo sand than by making a weaker body and trying to face the work by plastering molds with a rich plaster. From several years' experience in all kinds of concrete work and the examination of the leading structures in this country the writer is very much down on facing concrete by plastering forms and is decidedly in favor of getting results by using smooth forms and a mixture of about 1 cement to 3 of torpedo sand.

Bulky walls, piers and abutments are often cheapened by dropping in large stone in layers in the center of the work; and where stone is cheap and hard there is no objection, if that is what you are paying for.

Concrete has a great advantage over rough masonry for all work required to be water tight, as the mortar fills in all interstices and prevents the passage of water. The recent experience with the Jerome Park Reservoir, New York, would have been avoided if the reservoir wall had been of concrete.

The cost and often almost impossibility of ramming concrete to a solid mass is a weighty argument in favor of wet concrete. After considerable experience in this line and examination of many works of magnitude we conclude that a mixture wet enough to pour is the thing. Hand tamping depends for efficiency on the "location of the boss" and the "personal equation" of the tamper.

With good materials for concrete, the next question is a good mix. To accomplish this, every particle of aggregate, large or small, should be coated with cement. The amount of water should always be under control, and the batch should be visible to the man in charge.

Since the advent of concrete a large number of mechanical mixing devices of varying usefulness have sprung into use—the drum mixer, the cylinder, the dromedary, the cubical, the continuous batch, the separate batch, the trough and the gravity, each with a great variety of patterns and patents. In nearly all large works at present the mixing is done mechanically and is certainly an advance over hand mixing. Of course we occasionally have to fall back on the shovel, but it is the exception, and the machine doesn't shirk or skimp on labor.

What mixer is best will often depend on environment, but the cubical and conical revolving mixers seem to be most satisfactory. The author himself prefers the Smith.

The forms for concrete should be well made of strong, dressed lumber, well braced. For work requiring a smooth surface we prefer matched or at least sized lumber and believe it is better than trying to spend too much time and material in plastering which may stick to the form, be knocked off by careless workmen, or separated from the body of the concrete from unknown causes. By keeping the larger material back from the form an excellent surface may be obtained. For inside stiffeners wire is probably the best, while the outside will be braced with 4 x 4 material or heavier according to circumstances.

A very important consideration in wall work is an interlocking joint for sections and an allowance for contraction and expansion at the end of each section.

The best way to accomplish this is to insert a V or U shaped timber in the end of each section, practically making a tongue and groove.

### Care in Completing Work.

Care should be taken that the material is placed in even layers; and if possible arrange the work so that each section or set of sections will be completed for a day's work, as in joining on old work it is difficult to make a good union, especially in dry, hot weather. The layers should be watched, particularly in dry weather, to keep them from drying out too fast, and sprinkled if necessary. Continuous work night and day is also recommended on large and important work.

Shoveling is a poor way to transport concrete; the larger bulk the batch is moved in the better; large barrows, carts, carriers, &c., should be employed and the concrete landed as nearly as possible in position.

All work should be tamped well to place, and if the laying is interrupted the set surface should be well wet and given a coat of neat cement before fresh material is applied.

Do not attempt to fill or brush over joints, as they will break out in jagged lines the first winter. A neat joint made by a jointing tool is better. The same principle applies to brush wash. The writer has never seen a neat job of work where it was patched up by brush wash.

In freezing weather concreting work may be carried on with fair results, but it is more expensive and requires eternal vigilance on the part of the engineer or inspector. The sand should be hot and dry, the aggregate heated, the water warm and about a pail of salt used in each barrel of water, or about the proportion of 1 to 15. If the work is carried on as above and not interrupted it will set properly, but if you stop at night, or for any other reason, and the work freezes there will be a line of separation where the fresh work is added.

## The Carnegie Schools Open in October.

Announcement is made that the first department of the Carnegie technical schools at Pittsburgh, Pa., will open in October. The department will be known as the School of Applied Science, and there will be day and night courses, providing instruction in those studies essential to a technical education.

Applicants for admission to the school must be at least 16 years old. They will be required to pass an examination in English, mathematics, science and drawing. Certificates from approved schools of high school or preparatory grade will be accepted from students without an entrance examination, but no student will be admitted who does not give evidence of a natural aptitude for technical work.

Residents of Pittsburgh will be required to pay a tuition fee of $20 a year and all other students $30 a year. The examinations for entrance will be held in Pittsburgh during the week of October 9.

Applications have already been received from 7200 persons throughout the world who are desirous of enrolling themselves as pupils at the institute. Every country in the civilized world is represented by those after learning, and most of them are men who have already reached their majorities and who desire to come to America and learn American methods of doing business. The number of applications from France and Germany exceeds those of any other country, while there is a goodly showing from Japan and Russia and a few from China. The Philippines have sent in many applications. On account of the enormous number of applications it has been decided to receive pupils from Pittsburgh and Allegheny first, then the State of Pennsylvania and the other States of the Union, leaving the foreign countries until the last.

## Building in the City of Mexico.

Reports from the City of Mexico indicate that building is in progress upon an extensive scale and includes not only the erection of new business blocks, but handsome residences of an expensive nature. A few years ago it was the general practice to build business houses out of stone and adobe, but under the changed conditions and the introduction of new construction and architectural methods, up to date business blocks are being put up which involve an expenditure of hundreds of thousands of dollars. It is stated that there are now under way in the city buildings which when completed will cost as much as $3,000,000. The transformation in the character of the buildings has afforded an opportunity for American contractors, who are doing a goodly share of the modern class of work that is now in progress, experience having shown that aside from the superior workmanship the Americans can execute their contracts with much greater dispatch than is the case with the native builders.

There are certain builders' supplies not manufactured in Mexico which are coming into good demand in that country under the new conditions that have developed within the past few years. It is not so many years ago that practically no nails were used in Mexico, the timbers being joined together by the old time scheme of wooden pegs. Enterprising American manufacturers, however, brought about the gradual introduction of nails, and as soon as it was seen that there was a demand for them nail factories were established. The changed conditions have also brought about a big demand for lumber, and as a result many lumber mills are now in operation, as well as sash, door and blind factories.

The skyscraper will probably never be known in the City of Mexico, as the hight of all buildings is limited by law to five stories. This law has been in effect a long time, and it is improbable that the hight limit will be increased, as severe seismic shocks are not infrequently felt in Mexico and buildings of greater hight than five stories would be in danger of collapse.

## Domestic Heating in Ancient Greece.

One of the English building papers contains the following relative to domestic heating in ancient Greece:

Homer describes his princes undressing themselves in the palace to kill with their own hands the sheep, oxen and swine they were to eat at dinner, roasting the entrails, and during the entertainment handing them to each other as delicacies. The repast being finished he shows them sitting for their pleasure on the piled skins of the animals they had slain and devoured and playing at games of chance, and one of them taking a pastern bone out of a basket in which it was lying and throwing it at the head of a beggar, but on missing its aim making a grease spot where it fell on the opposite wall. From this picture of the grossness of ancient manners it may be concluded that when the poet says Penelope's maids threw the glowing embers out of the braziers upon the floor and heaped fresh wood upon them he did not mean to depict his immortal barbarians burning odoriferous fuel on purpose to sweeten what must have been a vitiated atmosphere. The fire that was quickly to blaze on the hearth had to diffuse the comforts of light as well as warmth, and the fragrant logs were known to abound with the resinous material of illumination. In the heroic age they had oil and tallow in abundance, but were ignorant of the method of burning them in lamps, and the only use they appear to have made of wax was to put it in the ear to shut out sound.

Burning fuel was carried into the apartment where light was required, and sometimes placed on altars for the same purpose, and long thin pieces of lighted wood were carried in the hand when they moved from one place to another in the night. Coal, it has been thought, was known to the Greek naturalists. Theophrastus speaks of fossil substances found in Liguria and in Elis, in the way to Olympia, and used by smiths, that when broken for use are earthy, and that kindled and burned like wood coal.

The general fuel was green wood, and where that was unattainable other vegetable and even excrementitious substances were used on the hearth for combustibles. On days of ceremony it was also customary to burn fragrant substances. When Alexander the Great was at an entertainment, given in the winter by one of his friends, "a brazier was brought into the apartment to warm it. The day being cold, and the king observing the small quantity of fuel that had been provided, jeeringly desired his host," says Plutarch, "to bring more wood or incense." The supply of the precious firing appeared to the king too scanty for producing the required warmth, and if it arose from his host being niggardly of the costly fuel he hinted that some even of the common sort would be acceptable.

ONE of the improvements of the West Side of the city will be a 12-story elevator apartment house estimated to cost in the neighborhood of $800,000, which will cover an area 92 x 119 feet at the corner of Amsterdam avenue and Seventy-third street, New York City. According to the plans of the architects, Mulliken & Moeller, the exterior will be of light brick, limestone and terra cotta, and the interior will be finished in marble and tile. It will be arranged in suites for housekeeping purposes for 45 families, with four families to a floor.

THE officers of the International Association of Bridge and Structural Iron Workers announce that a strike of 50,000 housesmiths throughout the country has been averted by the National Association of Erectors of Structural Steel and Iron signing an agreement with the union for a year at $4.50 a day, the old rate. The employers some time ago announced that they would not renew the agreement and several strikes had been called.

# WHAT BUILDERS ARE DOING.

REPORTS which reach us from the leading centers of the country indicate a season of building activity which is in excess of that of any previous period for some time past. In fact, taking the records of the Building Departments of the various cities for the first half of the year, it is found that the building business is of a record breaking nature, with bright prospects for its continuance while the weather permits. A noticeable feature of the situation is the absence of any serious disturbances in the labor world through which building operations would be likely to be materially affected.

### Baltimore, Md.

During the month of June there were 191 permits issued for building improvements, estimated to cost $1,281,865. A survey of the burned district made on June 21 showed that 400 buildings were then occupied and that a dozen more were nearly ready for occupancy. In addition to the buildings already occupied 42 are under way, as shown by permits issued by Building Inspector Preston, and several new structures are being planned, but for which permits have not yet been filed. The value of all the new buildings in the burned district as given in the applications for permits is $13,023,280, and the Appeal Tax Court's valuation of them will be in the neighborhood of $17,000,000. An idea as to the character of the new buildings may be had from the following report showing the hight of the structures: One story, 35; one story and a half, 1; two story, 54; three story, 140; two story and a half, 1; four story, 117; five story, 63; six story, 25; seven story, 7; eight story, 2; ten story, 2; 12 story, 1; 13 story, 1; 16 story, 2.

### Brooklyn, N. Y.

The great growth which has taken place in the city of Brooklyn during the first six months of the year connot perhaps be better indicated than by the figures which form a part of the quarterly report of Superintendent Peter J. Collins of the Bureau of Buildings. The showing is of a most gratifying nature, for during the first half of the current year building improvements were projected calling for an outlay of $33,474,000, while for the corresponding period of last year the outlay was about $17,000,000. From these figures it will be seen that Brooklyn is extending her building operations upon a gigantic scale, and the total for the year is likely to be not only record breaking, but far in excess of anything heretofore seen in the way of new buildings in any 12 months of the city's history. The total expenditure for new buildings in 1904 was $47,000,000, and in 1903 was but $26,000,000, while going back to 1902 it is found that the amount expended for new buildings aggregated only $22,000,000.

As indicating the activity in the quarter of the year ending June 30 it may be stated that 6074 plans for buildings were filed, having a total valuation of $20,795,268, against 4272 plans for buildings, valued at $13,612,813, for the corresponding quarter of 1904. This record is all the more significant when it is considered that last year was far and away the best year in the building line that the city has ever had.

Contractors and builders all over the city and particularly in the suburbs are pushing their work vigorously so as to get the structures in shape for occupancy before the cold weather sets in.

One of the important features of the building situation in the Borough of Brooklyn, which developed since our last issue went to press, was the signing of the new arbitration agreement between the Employers' League of that city and the representatives of the labor unions. The agreement is regarded as the most important labor treaty made in that city for many years and is to continue in force until January 1, 1906. The agreement recognizes only skilled trades, and in this it follows the agreement of the Building Trades Employers' Association of Manhattan with the Building Trades unions in that borough and the Bronx. Wherever an employer is unable to find sufficient union labor after waiting 36 hours he is at liberty to employ any man he may be able to secure. Wages and hours of employees remain as at present. The Board of Arbitration is composed of two representatives from each union and each trade represented in the Employers League, and to this Board all questions as to the jurisdiction of trade and sympathy strikes and lockouts must be referred. An executive committee of the general Arbitration Board consists of 12 members, there being six of the employers and six of the men. This is a board of conciliation and all differences arising between employers and workmen shall first be referred to a committee consisting of four members of the Board of Arbitration. These four men shall select an umpire before taking up the matter in dispute, and the decision of any three members of this committee is final. No union under the new agreement can order a strike against any member of the Employers' League nor can any member of the latter lock out his employes before a decision is rendered by the arbitration committee.

### Buffalo, N. Y.

There has been no particularly striking change in the building situation in and about the city, operations during the first half of the year having been conducted upon a scale closely approximating the volume for the corresponding period of last year. Practically the only large building on which figures have lately been obtained is the Chamber of Commerce Building, which will cost between $400,000 and $500,000. There continues to be considerable activity in the construction of dwelling houses, and two-family flats are being put up in large numbers in various parts of the city. The figures issued by Deputy Building Commissioner Henry Rumrill, Jr., show that for the first six months of 1905 there were 1502 permits issued for building improvements estimated to cost $3,275,345, while in the corresponding period of last year there were 1311 permits issued for improvements involving an outlay of $3,129,863.

The labor situation in Buffalo has been most peaceful and satisfactory this spring and summer, there having been no serious differences between employer and employee during the past six months.

When the members of the Cleveland Builders' Exchange passed through the city on their way to Muskoka Lakes on their annual outing they were met at the boat and escorted through the city to the station by a committee from the Buffalo Exchange, composed of President William G. Houck, Vice-President George Hager, ex-President C. B. Jameson, John H. Black and Secretary James M. Carter, who extended greetings to the visitors on behalf of the local builders.

### Chicago, Ill.

As will be seen by the table given below building operations in Chicago for the first half of 1905 were extremely active, exceeding those of the corresponding period of 1904 by 418 structures, an increase of almost 13 per cent. in number, and involving an estimated expenditure of $11,650,000 in excess of the first half of the previous year, a gain in value of nearly 62 per cent. This large gain in expenditure is due to the erection of a number of large down-town structures, costing from $1,000,000 to $2,500,000 each, and to the permit taken in June for the buildings which are being erected in the new plant of Sears, Roebuck & Co. As a matter of fact, the money expenditure will exceed the estimated figures, as it is the habit of builders to underestimate costs when applying for permits in order to reduce the cost of the permit:

*Chicago Building Permits.—First Half of* 1904 *and* 1905 *Compared.*

| | 1904. | | 1905. | |
|---|---|---|---|---|
| | Permits. | Estimated cost. | Permits. | Estimated cost. |
| January | 279 | $2,150,870 | 345 | $1,847,700 |
| February | 213 | 1,270,810 | 269 | 3,472,700 |
| March | 600 | 2,037,830 | 665 | 6,116,655 |
| April | 704 | 4,287,250 | 866 | 7,298,300 |
| May | 687 | 3,663,050 | 775 | 4,053,280 |
| June | 809 | 5,439,700 | 790 | 7,710,520 |
| Totals | 3,292 | $18,849,010 | 3,710 | $30,499,155 |
| Average cost of building | | $5,420 | | $8,220 |

There are a dozen other large structures the permits for which are not included in the above table but will figure in the total for the second half, among them the following:

| | |
|---|---|
| CITY. | |
| New City Hall | $5,000,000 |
| Commercial National Bank | 1,750,000 |
| American Trust & Savings Bank | 1.500,000 |
| Borland Block | 650,000 |
| New Brevoort Hotel | 450,000 |
| Illinois Athletic Club | 400,000 |
| Mercantile Building | 250,000 |
| Central Electric Building | 200,000 |
| Western Packing & Provision Company | 150,000 |
| SUBURBAN. | |
| Naval Training Station, Lake Bluff | $2,500,000 |
| Morden Frog & Crossing Works, Chicago Heights | 250,000 |
| Chalmers & Williams, Chicago Heights | 200,000 |
| Kennicott Water Softener Company, Chicago Heights | 150,000 |
| Yards National Brick Company | 500,000 |

There are also several large industrial enterprises which are still on paper, but which are expected to assume definite form shortly.

The June Grand Jury made an investigation of the alleged unfair competition of what is commonly known as the "Brick Trust" and made several indictments for illegal agreements between officers of that company and labor leaders that made it difficult for competition to exist. It is thought that this investigation will quicken building operations by reducing costs to a competitive basis. A new independent brick interest, known as the National Brick Company, is equipping extensive yards in Cook County and will shortly become a large factor in furnishing brick for local operations at prices which builders hope will show a decided reduction below the figures heretofore demanded by the trust.

The completion of the great cement manufacturing plant at Buffington, Ind., by the Illinois Steel Company will assure an ample supply of Portland cement for building purposes. This form of construction is gaining great headway in this district, particularly in connection with steel reinforcement.

### Cincinnati, Ohio.

The city has been experiencing quite a boom in the building line, although just at present there is a little lull in the amount of new work that is being projected. The strike among the architectural iron workers served to delay matters for a time, but now everything is running smoothly and satisfactorily. The figures of the Building Department show that for the first six months of the current year 1,789 permits were issued for building improvements costing $5,098,005, as compared with 1,573 permits for building improvements involving an estimated outlay of $3,175,640 in the first six months of last year. In running over the figures those for March, April and May are especially noticeable, these three months accounting for $3,600,000 of the grand total for the half year ending June 30, 1905. The month of June of the present year falls somewhat behind the same month a year ago, the estimated value of the building improvements being $635,760 and $776,645 respectively.

### Cleveland, Ohio.

The annual summer outing of the Builders' Exchange was a great success and was enjoyed by some 200 members and their ladies, who left Cleveland on the evening of June 27 by the steamer City of Buffalo for the Muskoka Lakes in Canada. The evening was pleasantly occupied with informal entertainment on the boat, one of the features being the humorous stories told by Tom Hurley, a guest of the Exchange. Arriving in Buffalo the party was met by a committee from the Buffalo Builders' Exchange headed by Secretary James M. Carter and was shown every courtesy until the special train at the Lehigh Valley Station left for Toronto. At the latter place the tourists were greeted by a committee from the Toronto Builders' Exchange, who extended the hospitality of the Dominion to the builders from the States. Luncheon was served in the dining car and also at Allendale, where a new dining room has been fitted up. The run through lower Canada was very enjoyable and when the train reached Muskoka wharf early in the afternoon the members of the party felt as though they had already had a fine outing.

The Medora, flag ship of the summer fleet of the Muskoka Navigation Company, was in waiting at the wharf and all hands went aboard for a delightful cruise among the islands of the district, reaching the Royal Muskoka Hotel at 6 o'clock in the evening.

An informal entertainment in which Mrs. Charles Wells, soprano of the Euclid Avenue Presbyterian Church, and James McMahon, basso of the Second Presbyterian Church, assisted in large measure was a feature of the evening. Sammy Jasper, the newsboy tenor and protégé of the Exchange, also sang and gave some rather clever impersonations. Dancing to the music of the hotel orchestra occupied the time until midnight.

On the morning of Thursday, June 29, a trip was made on the steamer Medora to Rosseau, the most northerly point of Lake Rosseau, returning to the hotel in time for luncheon. In the afternoon a cruise was made to Port Cockburn, the most northerly point of Lake Joseph. As a special compliment to the members of the Exchange refreshments were served on this journey by the Muskoka Navigation Company. In the evening a second programme of entertainment was presented, the proceedings being directed by E. H. Towson, the first president of the Exchange. A feature of the evening was the presentation of a silk umbrella to W. F. Herman, general passenger agent of the C. & B. Transit Company, who had charge of the party, having made all arrangements for their comfort and pleasure from the time of leaving Cleveland until the return.

The departure from the Royal Muskoka Hotel was made at 10 o'clock on the morning of Friday, June 30, the return being made by the same route as the going trip. Some of the members remained in Canada over Sunday, but the great majority reached Cleveland early Saturday morning ready for closing up the week's business. The weather was delightful throughout, all conditions and arrangements were without fault and every one who participated regarded the outing as the most delightful ever conducted by the Exchange.

### Jacksonville, Fla.

A number of the leading contractors, subcontractors and dealers in building material, representing 78 business firms of the city, held a meeting at the Board of Trade on the evening of Tuesday, June 13, and perfected an organization to be known as the Builders' Exchange of the City of Jacksonville. The Exchange has been organized along lines similar to those governing associations of a similar character in different parts of the country, yet the specific object is stated to be "the encouragement and protection of the building interests in the city of Jacksonville" and to "inculcate just and equitable principles in the building business."

We understand that the organization will soon be incorporated under the laws of the State of Florida and that eventually it will put up a building of its own which will be a credit to the city.

The following officers and directors have been elected to continue until the annual meeting, to be held in January: H. H. Richardson, president; W. P. Richardson, first vice-president; F. W. Cramer, secretary *pro tem.*; J. W. Ingram, treasurer; John S. Bond, J. D. Baker, O. P. Woodcock, Joseph Schreiber, Robert McCarrel, A. H. Kent, H. F. Shore, D. L. Rathbone, A. A. Kind, D. Warrington.

The position of permanent secretary had not up to the hour of latest advices been filled, but it is the intention of the Exchange to secure an official who can devote his entire time and interest to the organization.

### Kansas City, Mo.

The month of June was notable for the value of the building improvements for which permits were issued, the figures showing a decided increase over the corresponding month of last year. While the showing is therefore highly gratifying, it would doubtless have been much more so had it not been for the practical restriction placed on the erection of frame buildings within the fire limits. During June of the current year there were 396 permits issued for brick, frame and miscellaneous buildings estimated to cost $1,021,940, as against 470 permits for building improvements costing $968,476 in June of 1904.

The figures for the first half of the current year are also highly interesting, showing an appreciable gain over the same period a year ago. For the six months ending June 30, 1905, there were 2,253 permits issued for building improvements costing $5,362,192. The most active month was March, when 578 permits were issued involving an estimated outlay of $1,528,165, although the estimated value of the improvements projected in each of the months of May and June was in excess of $1,000,000. For the first half of 1904 there were 2059 permits issued calling for an estimated outlay of $4,206,697, thus showing that for the first half of the current year the value of the building improvements was $1,155,495 in excess of those projected during the first half of last year. The outlook is most encouraging, notwithstanding a strike of the hod carriers, but thus far this has not appreciably checked building work.

### Lowell, Mass.

The members of the Builders' Exchange will hold their annual outing at the Martin Luther Grounds, Tyngsboro, on Wednesday, July 19, when a most enjoyable time is anticipated. A special car will leave Merrimac Square at 1 o'clock in the afternoon and the steamer will leave Pawtucket wharf at 1.15. As has been customary in previous years, members may be accompanied by their friends outside the organization, the idea prevailing that the greater the number of participants the more enjoyable the occasion. During the afternoon a continuous luncheon will be served.

The committee having charge of the annual outing consists of Frank L. Weaver, chairman; James Whittet and William H. Fuller.

### Los Angeles, Cal.

The total number of building permits issued during June for improvements was 764, of an estimated value of $1,525,879, which is a gain of $450,000 over the value of the building permits issued during June, 1904. Construction men and architects are of the opinion that building will continue active during the summer and fall and that the record for July will be little, if any, short of the record for June. From the outlying districts it is reported that building activity tends to increase rather than diminish. Los Angeles architects are busy with a number of plans for substantial work in various outside towns. These include a number of modern business blocks, which are becoming popular even in some of the smaller towns of Southern California.

### Milwaukee, Wis.

The prospects are very bright for a prosperous year in building and in the opinion of Edward V. Koch, Chief Inspector of Buildings, the operations of the year are likely to break all previous records. The labor situation is quiet and at present there is nothing to seriously interfere with active operations all along the line. The permits issued by the Building Department for improvements in the city during the first six months of the current year were 2225, calling for an estimated expenditure of $4,643,568. These figures compare with 1718 permits for improvements costing $3,648,961 in the first six months of last year.

The new work under way consists for the most part of frame dwellings put up by real estate speculators, one firm alone having under way something like 90 frame dwellings. There are, however, a number of brick buildings under way, permits having been issued for 20 apartment houses, averaging nine apartments of six rooms each and costing $472,000. Reports from the surrounding country indicate a busy season in the building line.

### Newark, N. J.

In his report of building operations for the first six months of the year John Austen, Superintendent of Buildings, states that 1075 permits were issued, calling for an outlay of $5,251,119, as compared with 846 permits for improvements involving an outlay of $3,347,007 in the first half of 1904. This year 983 frame buildings were contracted for, as against 667 last year, an increase of 316. The number of brick buildings this year was 308, an increase of 33 over last year's semiannual record.

### New York City.

Nothing of moment has tended to disturb the building situation since our last issue went to press, and operations are being conducted in the Boroughs of Manhattan and the Bronx under more normal conditions than have been the case for some little time past. Permits issued from day to day and week to week aggregate a total which is highly gratifying and which bespeaks in the near future a relief from the dearth of flats and apartment houses in the upper sections of the city which has existed for something like two years.

For the first half of the year permits were issued in Manhattan and the Bronx for 2384 building operations calling for an expenditure of $80,372,452, as against permits for 1448 new buildings costing $46,612,600 in the first half of 1904. These figures do not include the cost of alterations, which amounted to $8,627,159 and $6,131,747, respectively. Some idea of the degree of activity existing in the Borough of the Bronx may be gathered from the fact that during the first six months of the current year the volume of the building improvements projected and completed was $19,475,000, while in the corresponding period of last year it was $9,290,000.

### Philadelphia, Pa.

The work of improving various sections of property in the outlying wards of the city continues to result in an unusual degree of building activity and the volume of operations for the first half of the year is in gratifying contrast with that of the corresponding period of 1904, although in saying this it must not be inferred that building was at all inactive at that time. According to the figures of the Bureau of Building Inspection, of which J. H. Kessler has just been appointed acting chief, there were 4455 permits issued in the first six months of the current year covering 9451 operations and involving an estimated outlay of $20,784,220. In the corresponding period of last year there were 4210 permits issued covering 7780 operations and estimated to cost $17,364,955. The situation is such as to warrant the belief in a continuance of activity upon a scale which will make the record for the year notable.

### Pittsburgh, Pa.

Notwithstanding the friction in the building trades which earlier in the year threatened to seriously interfere with what looked like a record breaking volume of business, operations have been conducted upon a highly gratifying scale and for the first six months the value of the projected improvements shows a heavy gain over the corresponding period of last year. According to the figures of the Building Department, permits were issued covering 2301 operations estimated to cost $9,129,933, while from January 1 to June 30, inclusive, last year, permits were issued covering 2087 operations involving an estimated outlay of $6,105,515. For the first half of 1903 there were 1979 permits taken out calling for an estimated expenditure of $9,908,829.

### St. Louis, Mo.

Architects and builders would seem to have no cause for complaint in the matter of building operations in progress, as the volume is upon a record breaking scale. While the greater portion of the work involves the construction of flats and dwelling houses many permits have been taken out for office buildings and other structures intended for business purposes. According to the figures of Commissioner of Public Buildings James A. Smith, there were 3927 permits issued during the first six months of the current year calling for building improvements estimated to cost $12,320,025. This valuation compares with $6,560,023 for the improvements for which permits were issued during the half year ending June 30, 1904. A feature of the situation which has been emphasized more and more with the passage of each month has been the scarcity of competent mechanics in the building trades.

### Tacoma, Wash.

Architects and builders report that the same activity prevails in construction work that has been evident ever since the weather became favorable several months ago. The new work undertaken during June was largely of the smaller order, the percentage of residences being rather larger than for the same month last year. Prices for lumber are low and there seems to be a shortage of dwelling houses of a modern sort. There seems to be an easing off in the matter of large building projects, though some plans for large office buildings are said to be under way. Advices from the outlying districts show something of a lull in building in most directions.

### Worcester, Mass.

The secretary of the Builders' Exchange has compiled and just issued a very interesting directory of the Exchange, together with building ordinances of the City of Worcester. The object of the pamphlet is to acquaint the person into whose hands a copy may come with the Builders' Exchange and its members, as well as for guidance in the selection of labor and material in the building lines. The purpose of the Exchange, it says, " is to make membership in it a reasonable assurance to the public of the efficiency, honesty and responsibility of its members, and a careful perusal of the classified list which will be found herein should prove convincing that the organization is composed of men of this stamp." The opening pages are devoted to a presentation of the charter granted the Exchange by the Commonwealth of Massachusetts, a brief history of the organization, a statement of its aim and purpose, and an enumeration of eight cardinal principles which form the basis of all dealings with employees. Next in order is a classified list of the membership of the Exchange, interspersed among which are interior views of various rooms occupied by the organization. About half of the directory is devoted to revised building ordinances of the City of Worcester.

### Notes.

Sparta, Ga., is at present in the midst of a miniature building boom, stimulus to which was given by the fire which consumed a section of the business portion of the city some time ago.

Superintendent F. L. Brown of the Bureau of Building Inspection of the City of Scranton, Pa., issued during the month of June 128 permits for building improvements estimated to cost $349,440, as against a total valuation for June of last year of $293,560.

A small sized building boom seems to have struck Wilmington, Del., and permits are rapidly being issued for numbers of dwellings. It is stated that more than 100 houses are under construction in the Eleventh Ward, and other sections in the outlying districts are scenes of gratifying activity. It is stated that the Pennsylvania Railroad Company will soon begin work on its new station.

During the first six months of the present year permits were issued in Rochester, N. Y., for building improvements estimated to cost $2,738,742, as against $2,351,247 in the corresponding months of last year. During June of this year 151 permits were granted for buildings aggregating a cost of $502,100 as compared with 78 permits for buildings costing $867,715 in June of last year.

The strike of the carpenters and joiners in Clinton, Iowa, which resulted in the complete suspension of building activity in what promised to be an unparalleled boom, has been settled, and the local carpenters have returned to their duties, after nine weeks of idleness. The contractors agree to pay the carpenters 33 1-3 cents an hour for a nine-hour working day, but they reserve the right to employ nonunion carpenters if they so desire, though they state that they will give preference to union men so far as possible. No contract will be signed, the agreement being purely an oral one.

Building operations in Lexington, Ky., are said to have taken such a spurt lately that a brick famine has resulted, and those who wanted brick have been compelled to resort to the resources of the surrounding towns to supply the demand. It has also been instrumental in causing both brickyards, the Fayette and the Lexington, to double their capacity.

Marked activity in building is to be noted in all sections of Johnstown, Pa., and while the volume of operations may not perhaps have reached the dignity of a boom, yet there is a healthy tone in building and real estate circles which argurs well for the future. Manufacturing plants as well as many new homes are being erected.

## Law in the Building Trades.

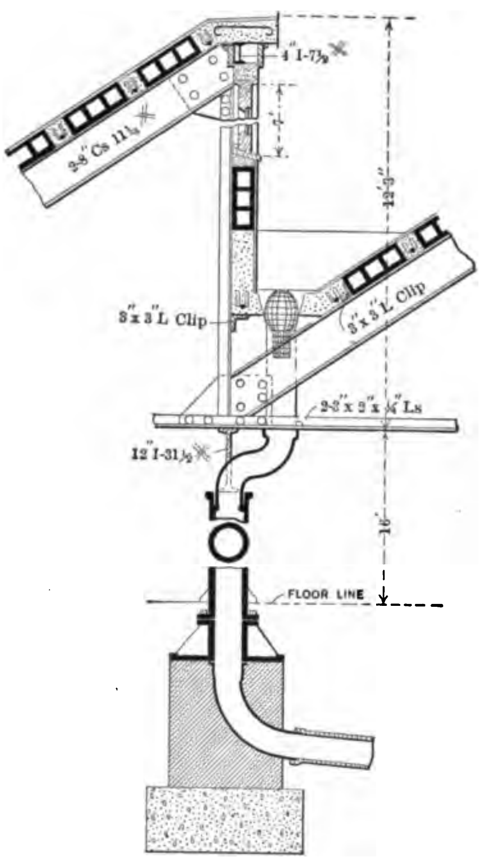
WHAT AN ARCHITECT UNDERTAKES IN MAKING PLANS.

Where an architect undertakes to prepare the plans for a large and expensive structure he covenants not only that he is possessed of the requisite skill, but that that skill shall be exercised in the work which he has undertaken. Where he brings suit to recover for the plans and the referee finds as a fact that the plans are incomplete and defective it is wrong to take as the basis for ascertaining the value of the services the amount which the plans would have been worth if they had been skillfully prepared and complete and deduct from such amount what it would cost to complete the plans and remedy the defects which they contained.—Johnson *vs.* Wannamaker, 17 Pennsylvania Super. Ct. Rep., 301.

## Building Columns to Carry Roof Drainage.

A rather interesting method of carrying off the drainage from the roof of a large machine shop in the city of Detroit is effected by utilizing the building columns that support the roof, the arrangement being shown in the accompanying engraving. As may be noted from the cut, the roof is of the saw-tooth pattern—that is, of such a form that a section through it gives a conformation of lines not unlike the teeth of a saw. In its usual form, as well known, it consists of a vertical rise, which is glazed and faces usually toward the north, and of an inclined portion which pitches from the top of one vertical rise portion to the bottom of the next vertical rise portion. One of the main objects of such a roof is, of course, that a large area can be covered by simple systems of roof trusses carried in turn by relatively light columns, with an abundance of light, which by reason of the northern exposure of the glass portions does not include direct illumination from the sun with the added heat transmitted by radiation from that source.

The building in question is one of a colony of shops recently completed for the American Arithmometer Com-




*Building Column to Carry Roof Drainage.*

pany. It is one story in hight and 320 x 126 feet in plan. It is divided into bays 16 feet 9 inches wide from center to center of the lines of columns, with the columns spaced 20 feet 10 inches on centers. The general construction and sizes of these saw teeth have proved very satisfactory. The gutters between are of ample size; the window sills are 16 inches above the highest point of gutter, to allow for heavy falls of snow, and the sashes are 7 feet high. The gutters empty in copper sumps which are connected to the interior cast iron columns. These latter are coated on the inside with asphaltum and serve as conductors. Below the sash of the saw-tooth roofs are provided small condensation gutters of copper, which connect into every column. Every other sash in the saw teeth is arranged to swing on center pivots. These are operated by geared ventilating apparatus.

The building, it may be added, is constructed of noncombustible material throughout, with brick walls, faced on the outside with a standard size paving brick, and on the inside in factory portions with sand and lime bricks, enameled five coats and presenting the appearance of enameled bricks. The floor and roof construction throughout is of the Kahn system of hollow tile and reinforced concrete. The roofs are covered with Carey's standard magnesia roof covering, with which also the gutters are lined. The building is heated with Evans, Almirall & Co.'s system of hot water heating. Pipe coils suspended from walls below the windows and from base of saw tooth directly under sash are used. The latter arrangement materially assists in keeping the gutters between the roofs free from ice and snow. The mains supplying the coils in machine shop are run just above and supported on the I-beam grillage which supports the shafting and the roof construction, no pitch of pipes being necessary in the form of heating adopted. This permits of a very neat arrangement of piping.

## Cement in Central Station Design.

The extent to which cement is at present being used in various ways in connection with the construction of walls, floors, partitions and even roofs of buildings renders unusually interesting all literature bearing upon the subject, and our readers are therefore likely to find much that is of suggestive value in the following extracts from a paper read under the above head, before the Chicago branch of the American Institute of Electrical Engineers, by E. B. Clark, and reprinted from the "Proceedings" of the Institute for April. The matter relates to the construction of a power house for the supply of power to the various mills of the Illinois Steel Company at South Chicago, and at Buffington, ten miles distant.

The foundations for the machinery and the building rest upon piles and are made of slag concrete, consisting of one part cement, three parts torpedo sand and seven parts crushed slag. The cement used for those parts of the foundation which are not exposed was of the brand known as Puzzolan; for those parts which are exposed Universal Portland cement was used. The foundations were started in the coldest weather of last winter, and the concrete, which had to be mixed with warm water and warm sand to keep from freezing in the mixer, did freeze immediately after being tamped into place. Filling was used to follow up the foundations as rapidly as they were put in place, so that the concrete was not permitted alternately to freeze and thaw as the warmer weather came on. About the middle of summer the foundation was tested by drilling a hole several feet deep into that part which had originally been frozen. It was found that it had set up to make an extremely solid and strong concrete.

Much attention was given to determining the most desirable method of floor construction, the choice finally lying between concrete slabs and fire proof tile. To make certain of the safety and conservatism of the proposed design a section of the floor was built and tested prior to the final decision as to the construction of the floor for the building and galleries. After being allowed to set 21 days this section of floor was tested by piling pig iron upon it to the extent of 500 pounds per square foot. The test slab was 7 inches thick and 15 feet span, made of concrete consisting of 1 part Universal cement, 2 parts torpedo sand and 4 parts 0.5 to 1 inch crushed limestone, reinforced with 0.5-inch steel rods spaced 5 inches apart and laid on top of No. 10 gauge expanded metal placed 1 inch from the bottom of the slab. Upon test the slab collapsed under a load of 550 pounds per square foot. An even distribution of the load over the surface was obtained by covering the top of the slab with about 4 inches of sand, upon which was piled the pig iron. Deflections were measured as the load increased. The deflection at the center had risen to about 1.5 inches by the time the slab failed. It was determined that the expanded metal was comparatively valueless for purposes of reinforcement when used in conjunction with the 0.5-inch round rods, as all the tension was taken by the rods. These rods were bent at the ends for a distance of about 10 or 12 inches through an angle of 180 degrees, thereby insuring that they would not pull out at these points. It was found necessary to bend the rod through 180 degrees, and not through 90 degrees; for those which were bent only 90 degrees showed a very decided tendency to crack the concrete at the corners and then to pull out. Round rods were used in preference to twisted or notched or any other form of rods designed to prevent slipping or pulling out of the concrete, and for two reasons: First, the round rods are far cheaper; second, it was decided that nothing was gained by preventing the rods from pulling out of the concrete, provided they were properly fastened at each end. The mixture used in all the floor construction was 1 part Universal Portland cement, 2 parts torpedo sand and 4 parts crushed limestone, 0.5 to 1 inch mesh. The shoring under all floors was permitted to remain 28 days before removal. In the engine room floor, for the very long spans, some floor beams were used, but in all cases they were entirely covered with concrete to give thorough fire proofing.

The roof of the engine house was constructed of concrete laid in place as is usual for sidewalks. In each bay a removable wooden frame was secured to the structural roof chords in such a way as to permit of ready removal by knocking out wedges after the roof was in place. A thin layer of cement mortar, consisting of cement and sand, was placed on the top of this wood work support. The function of this thin layer was to give a smooth coat for the finished interior of the roof. The expanded metal reinforcement was laid immediately on top of this preliminary coat and was covered with about 2 inches of concrete of about the same mixture as was used for the floors. On top of this was placed a thin layer of rich mixture, which was given a sidewalk finish on the side exposed to the weather. After 28 days the wooden supports were removed from the inside by knocking out wedges and were lowered to the engine room floor. The roof made in this way developed cracks after drying out. These cracks were filled by pouring into them a thin grout consisting of cement and sand. The result was to stop all leaks and insure a roof which was cheap and thoroughly fire proof. It has the disadvantage of being heavy and requires rather heavier roof trusses than does a tile or slate roof; it is very strong and is not damaged by men walking upon it or by falling pieces of stone or other materials. The latter consideration is an important one in the case described because the station is located near blast furnaces, which, unfortunately, have the habit of throwing stone and ore out of the top at times. The advantage of using expanded metal on such a place as a roof rested entirely in the economy of labor in handling the material.

## The Country Planing Mill.

In view of the recent discussion in the Correspondence department of this journal as to the manner in which much of the mill work is turned out at the present day, it is interesting to note the comments of a writer in a late issue of the *Woodworker* who takes up the subject of the country planing mill and directs attention to some points that are worthy of consideration. Among other things, he says:

Going back to the usual country shop where they do small jobs and take their time to do it, charging according to the time, they are usually satisfied and don't care to progress, as it requires too much effort. In many of these shops it is next to impossible to get two lots of flooring that will match exactly. Ceiling does not show as badly, as the bead breaks the surface. If you wish to miter a mold, you hardly ever can use two runs without hand work to make them fit. One reason, probably, for the flooring being uneven is the shape of the bed from wear, and partly the knives, for the same reason. Few of them ever think to change the knives from the top to the bottom head, in this way keeping them fairly square; they either grind off the long side or grind the knife on a bevel.

To be profitable such a shop should have a good 12 or 14 inch matcher, which will answer for wide base or any mold over 8-inch, then use an 8-inch outside molder for other molding. The good, heavy machine is best for all purposes and will increase rather than diminish the business. If you have first-class machines and do first-class work, then you need a good 30-inch double surfacer with outfeeding roll; it is cheaper in the long run. When you get a good outfit of such machines, including a heavy self feed rip saw, get a first-class man to look after them. He can usually find among the men one or two that can be trained to do first-class work easier than he can get some of the so-called machine hands that have had poor training. I find by experience that it is almost impossible to make a first-class workman of one that has been carelessly trained, as his old tricks will crop out continually when least expected, while a green man, if carefully trained, will give good results.

We have arrived at the day when the speed of cutter heads cuts quite a figure, as the work is smoother and cleaner and quantity greater, but in order to get the speed you must have a solid machine to stand the strain. Most country shops run their machines too slow all the time, sometimes for lack of power, sometimes for saving wear and tear on engine and bearings, I guess; at least I can find no other reason. Too many keep their machines so buried in shavings and dirt that half the bearings are forgotten, and feed gears and out-of-the-way journals get badly cut. If the machines went up to a live speed the plant would go up in smoke some day from a hot bearing.

To sum it all up, a country mill should be run on the same business plan as the best plant in the country. A perusal of the leading trade papers would go far toward bringing about such a result.

## Beech as a Flooring Material.

The once despised beech of the forest is fast coming into its own as a flooring material, and already ranks in third place as a material for the making of hardwood floors. In quantity of output maple stands in first place, and the oak output is fast increasing to a good second position in volume of production. While the milling qualities of maple are very difficult, rendering the expense of floor making from it very high, beech is almost an ideal hard wood in its working qualities, says a writer in the *Hardwood Record*. Beech is not quite so dense a wood as maple and its wearing qualities are not equal to it, but for many purposes it has all the advantages of its higher priced prototype, and possesses some advantages of quality not held by the other wood.

It is doubtful if handsomer flooring can be obtained from birch, cherry or even mahogany than can be secured from strictly red beech, which is the heart wood of the tree. The sap or white portion of the wood is not to be despised, but the heart portion is infinitely its superior in wearing qualities and in its ability to resist decay.

Beech is now being produced in thicknesses of from ⅝ to 1½ inches, from both Michigan and Wisconsin stock, as well as from Tennessee and Kentucky growth. The wood growing in the two different sections is very similar, save that the Southern wood is not quite so free from dark streak defects as its Northern prototype. Beech seems to stand better as a floor material than it does as a finishing wood. In this latter use it is quite prone to check and split, especially when used in pieces of considerable width. Beech flooring can be obtained for approximately the same price as soft wood floors of yellow pine, white pine or spruce of common grades, and from its superior quality is reaching a wide and rapidly increasing distribution. The several flooring plants at Cadillac, Mich., are the chief producers of beech flooring in the North, while the big flooring plant at Nashville, Tenn., is a large maker of flooring from the Southern growth.

AN 18-story structure which will contain two stores and a number of lofts is about being erected near the corner of Fourth avenue and Twenty-fourth street, New York City, on the block immediately north of that occupied by the Metropolitan Life Insurance Company's building.

## Reformatory Sheet Metal School.

The following communication from J. S. Dougherty, instructor in sheet metal work in the Illinois State Reformatory Trade School, Pontiac, Ill., and presented in a recent issue of *The Metal Worker, Plumber and Steam Fitter*, contains much that is interesting to those connected with the building industry:

I have read with interest what has lately been said about sheet metal workers, apprentices and trade schools, and, thinking the matter might be appropriate, I am sending a photograph of our sheet metal working shop, Fig. 1; also one showing some of the work done by the pattern cutting and sheet metal class of the Illinois State

*A Reformatory Trade School.—Fig. 1.—View in Sheet Metal Shop.*

Reformatory Trade School at Pontiac, Fig. 2. This work was done by members of the second year class. The picture gives a good idea of the irregular forms for which the boys are required to develop patterns and then construct them from sheet metal to prove the accuracy of their drawing. They are given instruction in the use of drawings, in practical geometry, projection drawing and the development of surfaces. They make all of the tinware used in this institution, and everything that is required to be made of sheet metal, such as kitchen utensils, heating and ventilating pipes, conductor pipe and elbows, gutters, valleys, ventilators, skylights, tin and slate roofing, cornice work, &c. This gives the boys a great variety of work and much practical experience, such as they would receive in the best shops on the outside.

It should be mentioned that this work is done for institution purposes only. Under the State law creating the Reformatory and prescribing its management, the institution is required to teach the inmates some useful self supporting employment. The industrial and grammar schools of the institution have made remarkable progress in the past three years, under the efficient management of the present superintendent, M. M. Mallary. Owing to the recent Convict Labor law passed in our State, the productive industries have given way to industrial and literary training schools, which have been brought to a high standard of excellence by the superintendent. The Reformatory is now a great technological training school, in which more than 25 practical and recognized trades are taught to over 800 young men, two-thirds of whom have no regular vocation in life and no special desire for one.

Superintendent Mallary undertakes not only to give them a trade by which they can live, but to awaken in them an ambition to continue to exercise such trade after leaving the institution. Many of the boys graduate as journeymen, but more frequently the time is too short to make them more than advanced apprentices. This knowledge is gained in less time than an outside shop would have spent in imparting it, and the apprentice, if he will, can soon attain a market value as a mechanic.

Trade schools should be established in all of our large cities, where a young man could be placed under competent instructors and taught the trade of his choice.

A MAGNIFICENT MANSION to cost a half million dollars, more or less, is being erected at Arden, Orange County, N. Y., for E. H. Harriman, the well-known railroad man. The work involves among other things the blasting out of 9000 cubic yards of rock before the foundations can be laid. A derrick 60 feet high and having a capacity for hoisting 15 tons has been erected to remove the stone after the blasting has been done. The architects of the new mansion are Carrere & Hastings of New York City.

## American Fire Proof Construction in London.

Americans are sharing in the London building boom. No less than four large modern hotels are under construction and contemplated in addition to a great number of office and warehouse buildings. In connection with this boom British architects and builders are adopting to a considerable extent American methods of steel frame and fire proof construction. The National Fire Proofing Company has been successful in securing a number of contracts for fire proof work in these new buildings and has recently made a test in London of its patented reinforced terra cotta floor arch construction. This test was made under the direction of the British Fire Prevention Committee.

The fire resisting floor arch construction which was tested consisted of hollow tiles of burned clay material, with a metal reinforcement in the form of a wire truss. This arch was supported by steel I-beams, spaced at proper distances to safely sustain the superimposed load to be carried. The requirements of the British Fire Prevention Committee are very rigid, consisting of a fire test of four hours at a temperature of 1700 degrees, after which water is applied to the under side of the arch. Such a test of the construction described was made on June 28 and was entirely successful. The result of the test was satisfactory to the authorities and assures a large amount of fire proof floor construction in London by this method. The hollow tile reinforced floors are claimed to be absolutely fire proof and at the same time are much lighter and stronger than other systems heretofore used in London.

## The Value of Lightning Rods.

According to a French writer, the original idea of a lightning rod was a device which would allow atmospheric charges to escape slowly to the ground, but, in fact, the action of the device is generally otherwise. Discharges are sudden and severe and have apparently an oscillatory character. M. Chavannes has conducted experiments on a laboratory scale with a view of studying

*Fig. 2.—Examples of Work Done.*

the effect of sudden oscillatory discharges, using for this purpose high tension transformers. These experiments have given the following results: The surface of a lightning conductor is as important as its cross section. The ohmic resistance of the conductor is of little importance. Breaks in the continuity of the conductor are of small consequence. The self induction of the conductor should be as small as possible. Induction between the lightning conductor and neighboring circuits may give rise to discharges in these circuits and offer a resistance to the discharge of the main circuit. A house covered with a metal roof is analogous to a condenser and may set up resonance phenomena.

The following rules should be observed wherever possible: All lightning protective apparatus should be placed exterior to the building. The rod, the conductor and the ground plate should be placed in a straight line. The coefficient of self induction should be sensibly zero. While it is not always possible to arrange the different parts of the lightning rod in a straight line, unnecessary bends should be avoided. M. Chavannes believes that when the question has been studied thoroughly and the necessary conditions more fully understood the real value of lightning rods will be recognized and that by means of them the accidents due to atmospheric discharges will be greatly reduced.

## Trade School for Metal Working at Solingen.

About two years ago, reports United States Consul Langer, Solingen, Germany, the practicability was discussed of opening a special trade school for metal working at Solingen, in which talented young people might have an opportunity to work out for themselves new designs and models and suggest new ideas for the many sided products of Solingen. With the energetic aid of some of the large manufacturers and the granting of the necessary means by the city Common Council such a school was opened in October, 1904, with a force of experienced instructors under a director who is a practical and highly educated man. He takes hold of the work with animation, and with the aid of several able assistants is intent on making the school a model one as well as of value to local industry.

The number of entrance applicants was so large that a great part could not be considered and it is already necessary to look for larger quarters. An inspection shows that the school contains apartments for drawing, modeling, a working room for engravers and chiselers, a special room for the models and an apartment for the director. In the room for drawing the walls are decorated with plaster cast models, drawing plates of castings and exhibition work of pupils, consisting of models of various scissors, spoons, sword scabbards, designs for doors, locks, &c., some of them made to order for manufacturers who are interested and all executed in an attractive manner. Special interest was attracted by a new model for shears and an artistic advertising placard. Busy hands were active in the modeling room copying from plaster cast models and from nature. In the engraving line very good work is being done.

It may be well to say that it is hoped that the different manufacturers of weapons will loan the school models, with the object of inspiring the students with new ideas, and also that the instructors and scholars shall be allowed to visit the factories, some of which have already lent a helping hand in this respect and placed models, neatly arranged in cabinets at the disposal of the school.

## Trade School at Reading, Pa.

For some time past the project has been discussed by the members of the Carpenters' Union of Reading, Pa., of establishing a technical or trainng school for the benefit of its members, many of whom have long expressed a desire for an opportunity of advancing themselves so as to be qualified to take positions as foremen on large building operations. A committee which has had charge of the project has so far completed its arrangements as to announce that more than 100 books from building and architectural publishing firms have been secured, and that a course of instruction will be given in the fall and winter months which will prepare men to take responsible places. They will be instructed in the reading of blue prints, the preparation of specifications, the making of estimates of cost and other matters of interest along these general lines. The sessions of the school will be held two evenings of each week, and it is probable that some of the foremen with wide experience will be among the instructors. It is stated that for several years past the union has been urging the School Board to establish a trade school in connection with the Boys' High School, and hope has not been abandoned that something will be accomplished in the course of time.

## Ancient Painted Tiles.

The use of painted tiles for decorative effects dates back as far as 3300 B. C., the walls of the palaces of ancient Egypt being covered with them. The Persians, again, modeled pictures in low relief upon the narrow edges of large flat bricks built into the walls of houses in their capital of Susa; the Louvre, in Paris, contains the original of one such frieze representing a procession of black archers with dresses and armor colored in brilliant enamels. The knowledge of enameled pottery lingered on in Persia through all the great changes of empire, and Persian workmen, or Arabs trained by Persians, carried the art of tile making and painting far and wide, until their characteristic effects of blue, green, purple and white were familiar in countries as distant as Spain and India. As used in Mohammedan mosques, says an exchange, the decorations were applied more in the form of tiles than of bricks. Large surfaces were covered with the regular courses of tiles in repeating patterns or with ornament broken up into panels.

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PHOTO BY ELLISON & BENOIT.

RESIDENCE OF MRS. JAMES E. THOMAS, CUMMINGS ROAD, ABERDEEN DISTRICT, BOSTON, MASS.

C. H. BLACKALL, ARCHITECT.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED

THE BUILDERS' EXCHANGE.



DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR

232-238 WILLIAM STREET, NEW YORK.

SEPTEMBER, 1905.

## Perspective Drawing for the Builder.

In this age of advancement, when the tendency is constantly upward and onward, one is apt to discover that more and more is being required of the ambitious builder if he desires to keep not only abreast of the times, but in the van in his particular field of labor. If of a discerning mind he is very apt to perceive that one of the stepping stones to his success is a knowledge of the principles of perspective drawing, for it will assist him to assume the *rôle* of architect should occasion require it or should he desire eventually to become a member of that profession. It will render him valuable assistance at a moment when such service is most needed or when, as often happens, a draftsman of such ability cannot be readily obtained, thereby rendering him in a measure independent. As affording valuable suggestions along this line of study, we present in our current issue of the paper the first installment of a series of articles on the subject of perspective drawing as applied to the requirements of the builder. While there remains much that could be said which would be of interest to the advanced student or to such as might wish to adopt that branch of drawing as a profession, yet the treatment which the subject has here received will be found, we think, adequate to the wants of such as would make ordinary use of it. The foundation principles, as commonly understood and exemplified in the "plan above" method, are explained in such a manner that their application to any object or any part thereof can be easily made. This is followed by an explanation of a shorter and later method in which measurements on receding lines are first set off to scale on a horizontal base line and are then so projected as to develop a plan in perspective, above which the desired view is finally erected. Parallel perspective, as applied to interiors, is demonstrated by means of several illustrations. The perspective of curved surfaces and circles, a department of the subject too often neglected, is treated in its essential features, and its application to the arch is illustrated. Those of our readers who are interested in the technical side of carpentry can doubtless derive valuable information from a careful perusal of the series as the installments are presented from month to month.

## The Training of Apprentices.

It is pleasing to note the growing change of attitude on the part of men in different lines of trade toward the apprentice. It is but a short time since he was neglected and failed to receive the instruction which he had a right to expect in return for his period of service. That all tradesmen have not yet been influenced by the change for the better is unfortunate. Skillful workmen were not being recruited as they should be, because such practical education as the apprentice was getting did not qualify him to be a useful member of the working corps and because the more intelligent and desirable class of young men found a better appreciation of their interest and energy in other fields than in the trades where their services are greatly needed. That the change has occurred is shown in the desire of leading and competent tradesmen to see that the obsolete apprenticeship system is substituted by some method of training which will result in the young men becoming first-class workmen when their term of service under instruction expires. Such tradesmen are identified in the maintenance of training schools and take part in the work of instruction. The young man who has had the advantages of a modern school education can grasp the theories and underlying principles of the most difficult trades very quickly in a school which provides competent instructors. The handicraft of any trade is quickly acquired when the best methods of doing work are described and when the opportunity of seeing it done by skilled men is afforded. This is the character of instruction that is most needed. Those who have a real interest in the welfare of the apprentice favor giving him an opportunity of becoming acquainted with all of the different branches of his trade, rather than confining him to that work in which he shows highest proficiency or making him only a specialist in one branch. If the present trend of trade education continues there will be no difficulty in securing the entrance of the desirable class of men to the different trades.

## Good and Bad Building Associations.

There are in the United States, as well as in Great Britain and on the Continent, many thousands of homes owned by occupants who would never have held title to them had it not been for building associations, known in some parts of this country as co-operative banks. On the other hand, there are many poor men who have found their savings wiped out by investment in another class of association, which builds upon the reputation of the old time strictly business co-operative bank by using a suggestion of the other's name and inveigling the man of small means to invest his money in what is, if not entirely a swindle, surely a speculation of the wild-cat variety. The co-operative bank upbuilds the welfare of its members by compelling a regular payment, after the manner of an insurance premium, a fixed payment each month being necessary, the amount being determined by the depositor, and either 5 or 6 per cent. being paid on deposits. This is the first step. When the depositor has thus accumulated a little capital and has secured a piece of land then the bank loans him money, taking as security his deposit and a mortgage on the real estate, and lending 20 or 30 per cent. more on the value of the property than a savings bank is permitted to in States where the banks are under wise and conservative State control. The mortgage is paid off through a continuation of deposits, so that the home place finally becomes unencumbered. The payment of the mortgage is encouraged rather than discouraged, which latter attitude must usually be that of the savings bank, because of the difficulty in securing a sufficiency of real estate mortgages for the investment of the accumulating savings of depositors. This class of institution has grown very rapidly in America since it was adopted from Europe 75 years ago. For the average man of small income it is probably one of the best ways to secure a home, because it compels thrift by a system of fines when deposits are not made as agreed. Each year sees the various associations with increasing business, and such an increase means a growth in the number of homes owned and not rented. Naturally the workman who owns his home is the more apt to be a valuable employee because he will not think of migrating. The moving habit in home making is liable to have a sister habit in frequent changing of employment. The other kind of a building association sells stock. There are first-rate companies doing a business of developing and selling land. And there are companies capitalized for a great many times the value of the land that is owned, basing their arguments of value on what may be expected in the future as the land becomes more valuable, but never ceasing to sell stock no matter how much their outstanding securities may be, as compared to the money needed for continuing the development and the selling of land. Many people have mixed the two forms of building associations, and it would be well to thoroughly distinguish between them before investing. Many employers of labor encourage confidence of their employees in matters relating to the disposal of savings. Where it is possible to give advice concerning building associations much good may be done in putting the word of warning where it will do good.

## Needed Legislation in School Architecture.

Some interesting points touching needed legislation in school architecture were discussed in a paper read by C. B. J. Snyder before the National Educational Association at Asbury Park in July of the present year, and as the author is Superintendent of School Buildings in Greater New York, his views are of a nature to command more than usual attention. He pointed out that the last 25 years had witnessed a complete change in the design and methods of construction of buildings, both public and private, throughout the entire country, and that the attention of the commercial world was first fixed upon the possibility of an increased return of investments through the reduction in fire hazard and of maintenance through the free use of fire resisting materials, the logical development of which was the "skyscraper" with its incombustible walls, floors, partitions and stairways. Almost simultaneously loss of life through fire in places of public assemblage created the demand that such buildings should also be built of fire proof materials, with numerous stairways and exits.

The influence of this movement was felt by the school authorities of several of the larger Eastern cities, who reached the conclusion that if these improved methods of design and construction were profitable from the commercial standpoint they could also be applied to the public school buildings. The immediate result of this was to remove from the hands of the carpenter and builder the designing of school buildings and place it in the hands of trained architects, as the new requirements called for special skill in planning and construction to meet the new conditions.

The word "legislation" has a formidable sound and when it is applied to school house design and construction there are two or three points, the author states, upon which he would seek to obtain "the indiscriminating power of the all compelling law."

1. Requirements as to the lighting and size of class room, also ventilation, or the supply of a given number of cubic feet of fresh air per person per minute and the removal of vitiated air.

2. Stairways, exits and fire escapes—their size, number and construction.

3. Boiler, heat and vent flues, smoke, steam and hot air pipes—their location and construction.

Health is placed of first importance and this includes the conservation of the physical and mental energy of the child. Both experience and investigation show most clearly that nothing as quickly and surely saps the mental vigor of a child at study as bad air. Class rooms should be designed to afford 15 square feet of floor space and 200 cubic feet of air space for each pupil, with windows opening to the outer light and air and of an area equal to not less than one-fifth of the floor space.

The second item, that of stairways, exits and fire escapes, comes next in importance and has to do with the security or safety of adults as well as the children in case of fire or panic. There has been expended under my supervision, says the author, "upward of $1,200,000 to correct defective stairways, exits and fire escapes in the public school buildings in the city of New York, and it will require nearly as much more before the job is complete, 90 per cent. of which could have been saved if the buildings had been properly planned. It is not so much the hight of tread and width of riser in a stairway that need cause trouble and apprehension, but it is the presence of circular stairways, winders or diagonal steps at the point of change of direction in a stairway. These in themselves are bad enough, but of equal importance are the number, width and location of the stairways, which should be regulated by the greatest number of individuals which may be called upon to use them from any one point at a given time. The location of stairways with reference to their accessibility in an assembly hall and the rapid dismissal of those gathered there by widely separated exits are of as much importance as the number of stairways.

Each stairway and its inclosing walls should be of fire proof materials shut off at each floor by fire proof partitions and doors fitted with automatic springs and checks. The building is not only made safe for use, but the noise of operation of the school is reduced to a minimum and the interior is made more comfortable in cold weather, with a less consumption of fuel.

One of the simplest and best forms of fire proof stair treads is of oak or maple planking secured to an iron plate. They will endure fire and water and yet give a secure footing for the firemen long after slate and other similar materials have been shattered from their effects.

All exit doors should open outwardly and no door should open immediately upon a stairway, but upon a proper landing of a width at least equal to that of the door.

These requirements would not bother the school boards where the need is only for a one-story building, but when a community has reached that period of growth where two, three or four story school buildings are required it has also reached the point where it can and should be brought to recognize the advantage of proper design and construction.

The third item of location and construction of boiler, heat and vent flues, smoke, steam and hot air pipes has to do with the safety of the pupils, but also goes further and protects the taxpayer against loss of his investment in the construction of a school building. However, from a purely comercial standpoint no school board can afford to assume the risk of erecting a non-fire proof school building of more than one story in hight. But the time is not yet ripe for them to willingly adopt any such idea save in the three or four largest cities in the country.

The inclosing brick work of all boilers and furnace flues should never be less than 8 inches thick at any point and in almost every case the inside 4 inches should be of fire brick laid in fire clay for a distance of 25 feet from the source of heat; all other smoke flues should have not less than 4 inches of brick work and be lined from bottom to top with terra cotta or cast iron flue linings.

No joist, beam, floor or wood work of any description should be placed within 1 inch of the exterior of any boiler, furnace or other smoke flue. Wood furring should never be nailed to a chimney breast, but the work should be studded off so as to keep a clear space of 1 inch.

Similar instructions and increased distance between the wood work and steam, hot air and other pipes should also be observed. The majority of fires are ascribed to defective flues, when in reality the real trouble arose not from the character of the brick work as executed by the mason, but from the fact that the carpenter insisted on hugging the flues close with wood work and not hesitating to nail furring, sheathing and studding directly thereto, and at the roof frequently cutting out the brick work and inserting blocking for his framing. The disaster is sure to come sooner or later.

# HOUSE OF CONCRETE BLOCK AND FRAME CONSTRUCTION.

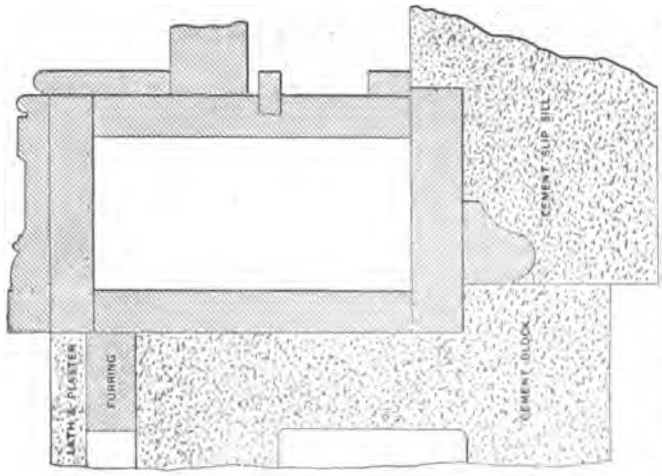
IN view of the growing popularity of hollow concrete and cement blocks in building construction we have taken this month as the basis of our half-tone supplemental plate a semicolonial residence, the first story and foundations of which are built of hollow concrete blocks, while the second story and attic are of the ordinary frame construction. The elevations, floor plans and details presented upon this and the pages which follow afford an excellent idea of the general arrangement and finish of the building, while the half-tone supplement plate made directly from a photograph taken especially for our purpose gives an idea of the appearance of the completed residence.

Front Elevation.—Scale, ⅛ Inch to the Foot.

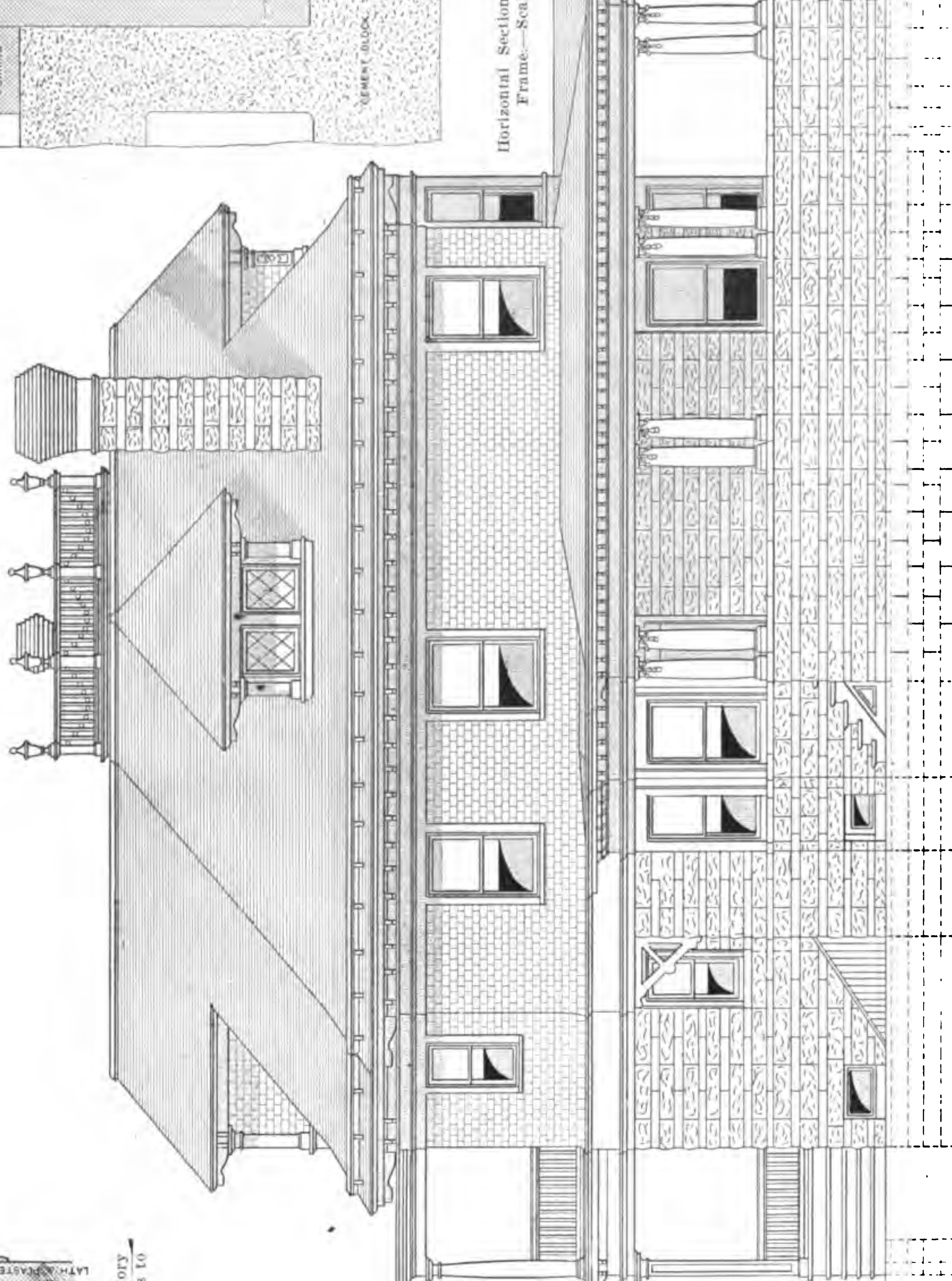
*House of Concrete Block and Frame Construction.—J. A. Oakley & Son, Architects, Elizabeth, N. J.*

Noticeable features of the exterior are the broad veranda extending entirely across and around one side of the house, the shingled effects of the second story, the dormers and the deck roof. The rooms on the main floor are separated by a wide hall, from which rises, near the center of the house, the main flight of stairs. On the second floor are five sleeping rooms, a bathroom, toilet room and numerous clothes closets, while in the attic are a bedroom and clothes room and a large space for storage purposes.

According to the specifications of the architects, J. A. Oakley & Son, Elizabeth, N. J., the cellar bottom is covered with 4 inches of concrete composed of 1 part Portland cement and 3 parts clean, sharp cinders, on top of which is a 1-inch coat composed of 1 part Portland cement and 3 parts sharp sand. The cellar, it will be noticed from an inspection of the basement plan, is divided into laundry, coal bins, heater room, cold storage room, &c. The laundry is fitted with a three part Alberene stone wash tray combination and a servant's closet fitted with a John Douglas "Leader" porcelain water closet. The house is framed in the usual manner, the outside wall studs being doubled at all window and door openings. The frame section of the house is sheathed with ⅞ x 9 inch North Carolina pine boards placed horizontally and driven up tight. On the sheathing is placed two-ply tar paper well lapped at the joints, this in turn being covered with 18-inch white pine dimension shingles laid 5 inches to the weather. All timber used in the building, except where otherwise specified, is of hemlock. The first and second floor joists are 3 x 10 inches, the third-floor joists 2 x 8 inches and the ceiling joists 2 x 6 inches, all set 16 inches on centers. The outside wall joists are 2 x 4 inches, set 16 inches on centers. The rafters of the main roof are 2 x 6 inches and of the dormers 2 x 4 inches, set 20 inches on centers. The plate on top of the first-story wall is 4 x 6 inches, laid on flat. The girders, as indicated on the basement plan, are 6 x 8 inches and in one piece. The partition studs are 2 x 3 and 2 x 4 inches, set 16 inches on centers. The corner and angle posts are 4 x 6 inches, the veranda and stoop joists 2 x 10, set 20 inches on centers; the veranda girders are 6 x 8 inches and the rafters 2 x 6 inches, and the veranda and stoop ceiling joists are 2 x 4 inches, tied to rafters in the center. The roofs of the main house and dormers are covered with 18-inch sawed

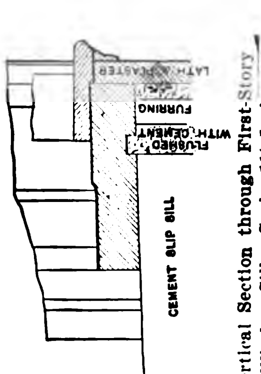



Horizontal Section through First-Story Window Frame.—Scale, 3 Inches to the Foot.

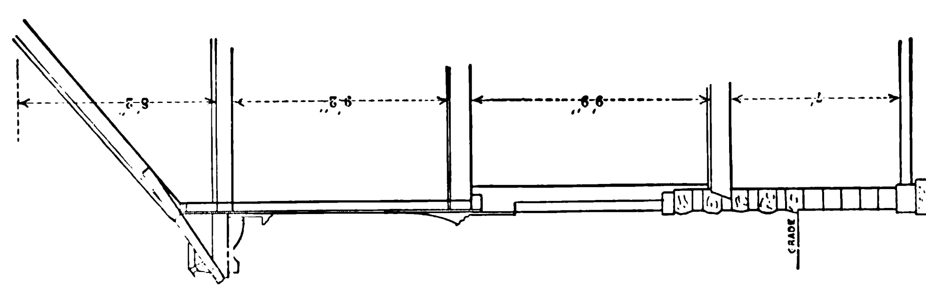


**Side (Left) Elevation.—Scale, ⅛ Inch to the Foot.**

***House of Concrete Block and Frame Construction***




Vertical Section through First-Story Window Sill.—Scale, 1½ Inches to the Foot.

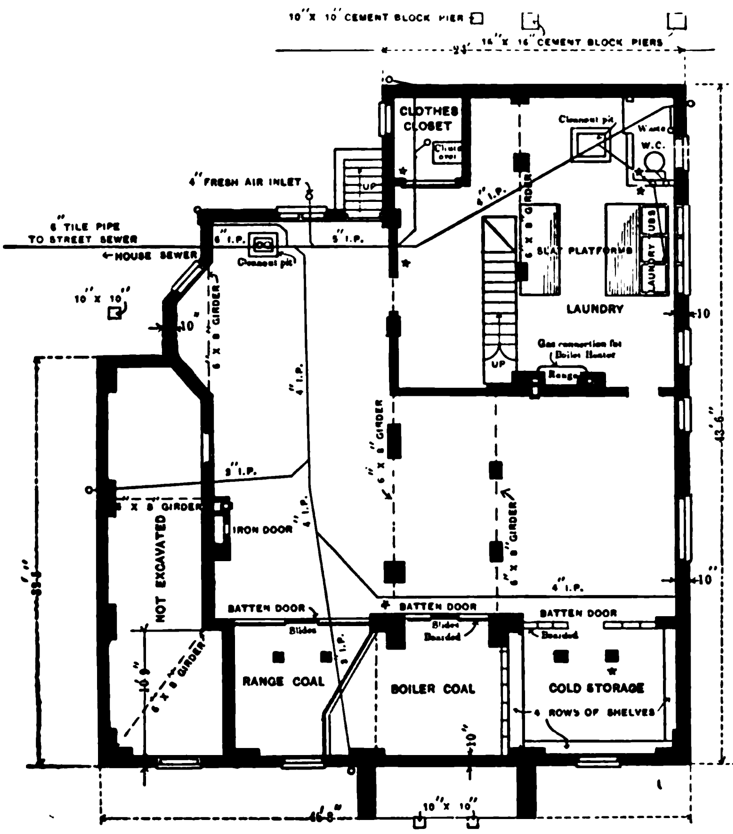



**Section.**
**Scale, ⅛ Inch to the Foot.**

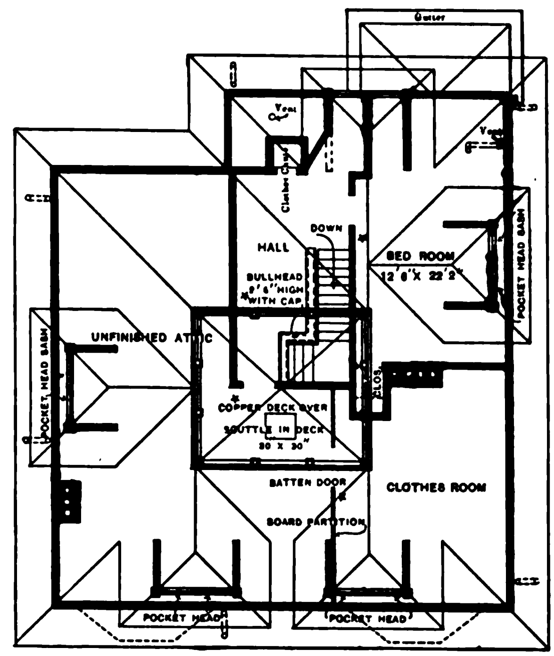
red cedar Perfection shingles exposed 5 inches to the weather and laid on 1 x 2 inch shingle lath. All hips are run up " Boston " style.

The veranda floor is tongued and grooved ⅞ x 4 inch

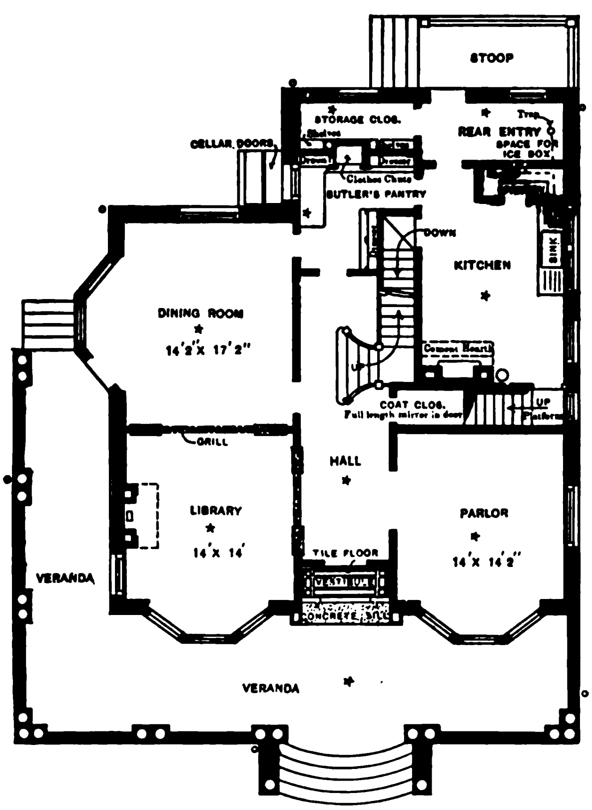
tapered to 6 x 6 inches at the top. The veranda roof, rear balcony floor and roof are covered with 12-ounce canvas laid on sheathing boards, which were first treated to a coat of lead and oil, the canvas being put on while the paint was wet. Upon the canvas floor of the balcony is a two-part portable slat floor made of 1 x 2 inch dressed slats placed on battens 1 inch apart. The side walls and ceilings, except where otherwise specified, are covered with a good coat of Adamant Mfg. Company's wall plaster, and a coat of hard finish composed of lime, putty and Calcine plaster.

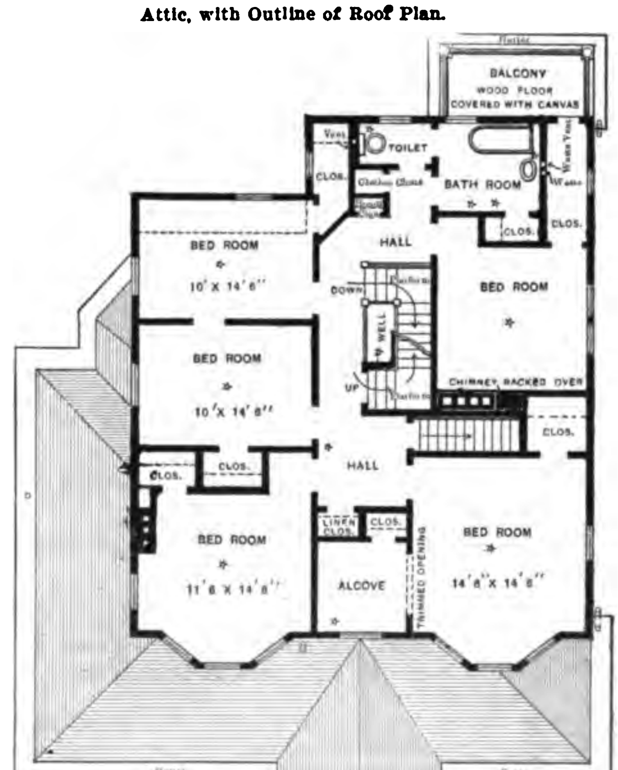



Basement.




Attic, with Outline of Roof Plan.




First Floor. Second Floor.

*House of Concrete Block and Frame Construction.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

Washington fir, with joints laid in white lead. The ceiling of the veranda, stoop and balcony is ½ x 3 inch tongued and grooved pine boards, blind nailed. The veranda has 12 x 12 inch built up columns of white wood tapered to 11 x 11 inches at the top and having turned base and caps. The balcony columns are 8 x 8 inches

The floors throughout the building are ⅞ x 3 inch tongued and grooved comb grain North Carolina pine laid in courses, blind nailed and with a row of 2 x 3 inch hemlock bridging in the center of each span of joists. There is also a row of bridging in the center of each partition on the several floors.

The main stairs have quartered oak treads and closed paneled strings, the strings and risers being of chestnut. The main newels are 7 x 7 inches, with model caps and sunken molded panels, the other newels being 6 x 6 inches.

The side walls of the kitchen to a hight of 5 feet from the floor are lined off to represent 3 x 6 inch tile and show bonded joints, the remaining portion of the side walls and ceiling of the kitchen and kitchen pantry being of stamped steel plates. The kitchen is fitted with a No. 258 Provident brick set range connected with a 40-gallon hot water circulating boiler, also an Alberene stone sink with drain board.

The tile floor of the bathroom rests on a foundation of concrete composed of 1 part Portland cement, 2 parts sharp sand and 5 parts 1-inch crushed stone, which is laid on a ⅞ x 9 inch rough floor, cut in between the joists, and 6 inches below their tops. The bathroom and toilet room have a sanitary base 6 feet high which is so set that the side wall covering finishes down on top of the tile. The side walls and ceiling of both rooms are of stamped steel plates. The bathroom is furnished with a 5-foot roll rim porcelain bathtub decorated outside with a white finish, a porcelain enameled lavatory, 13 x 18 inch bowl and a 22 x 33 inch slab. The second floor toilet room is fitted with a John Douglas Gloria siphon jet porcelain water closet with quartered oak seat, cover and tank, the latter being lined with copper. The plumbing is of the open type and all exposed pipes and fittings are nickel plated.

The house is piped for gas and wired for electric lighting and telephones, there being one of the latter in the kitchen, laundry, second hall and third-story bedroom, all arranged so that there is no opportunity for any "cross talking."

The outside finish is of Washington fir, that of the parlor, bathroom and toilet room is white wood, while the balance of the house is No. 1 selected chestnut.

The wood work in the parlor, bathroom and toilet room has a coat of shellac and two coats of white paint with a coat of enamel, the last coat of paint and the enamel being rubbed with pumicestone and water to a dead finish. The balance of the wood work on the first and second floor has a coat of Wheeler's filler, also two coats of Elastica varnish, each coat being cut with steel wool, with a top coat rubbed to a dull finish. The third-floor wood work has a coat of paste filler and two coats of Elastica varnish.

All the outside wood work, except the roof shingles and the veranda and stoop ceilings, has three good coats of pure linseed oil and white lead. The roof shingles have a coat of creosote and stain, put on after all other work on the building had been completed. The veranda, rear stoop and balcony ceilings have a coat of filler and two coats of spar varnish. All the copper work has two coats of metallic paint. The side walls and ceilings in the kitchen, kitchen pantry, bathroom and toilet room have two coats of paint, and the tile work in the kitchen below the steel ceiling plates has a coat of varnish sizing and two coats of paint with a finishing coat of enamel. The canvas covered roofs have three coats of paint.

The residence here shown is situated at the corner of Cherry and Stiles streets, Elizabeth, N. J., and was erected for George L. Hirtzel. The contractor for the mason work was Charles Eilbacher of the city named, who in turning out the blocks of which the foundations and first story were constructed made use of two Winget concrete hollow block machines built by the Winget Concrete Machine Company, Columbus, Ohio.

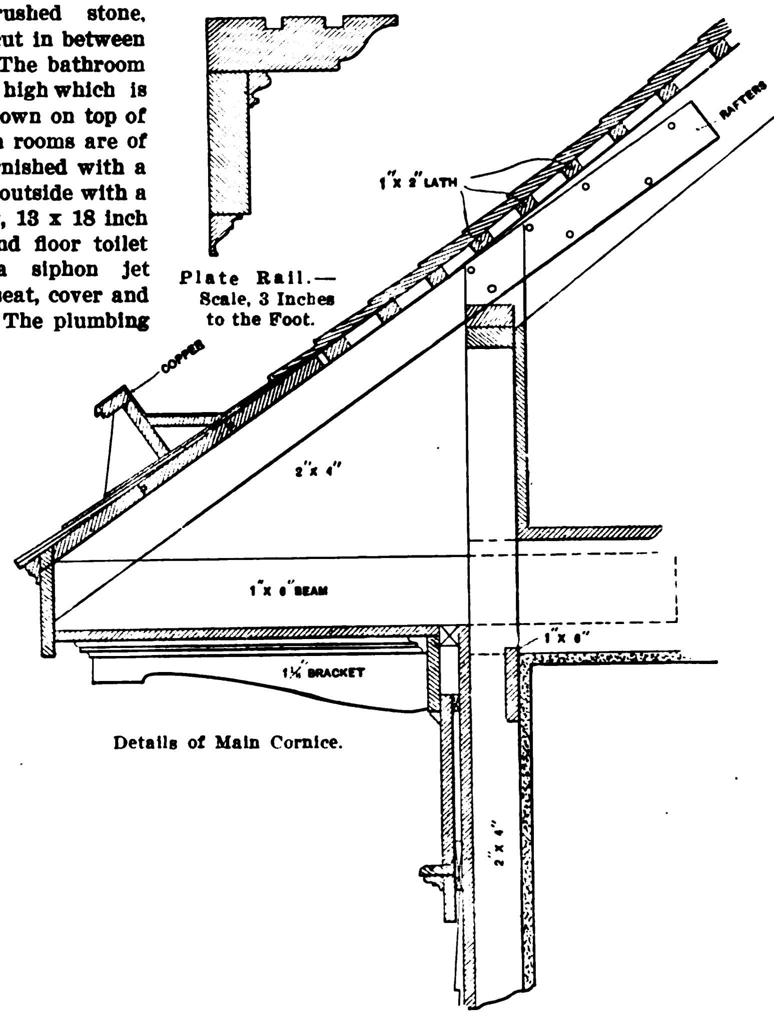
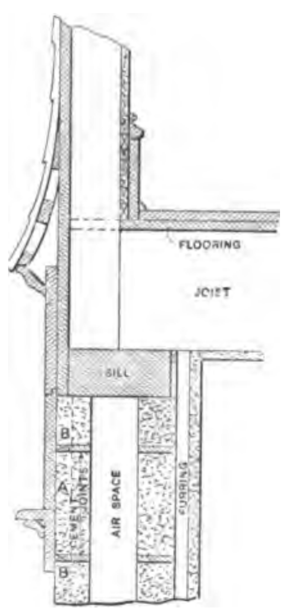



Plate Rail.—
Scale, 3 Inches to the Foot.

Details of Main Cornice.




Detail of Belt Course at Second Story.

*House of Concrete Block and Frame Construction.—Details.—Scale, ¾ Inch to the Foot.*

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THE site for the new Cleveland Hippodrome at Cleveland, Ohio, has been secured at a cost of $1,000,000. Plans for the new building will be drawn very shortly and the contract for the iron and steel structural work will be let in time to begin the actual work of construction soon after January 1. The structure will be about 200 x 278 feet, the stage being 110 x 164 feet. The theater will be the largest in the United States, seating 6000 people, and will have three galleries with inclines in the place of stairways.

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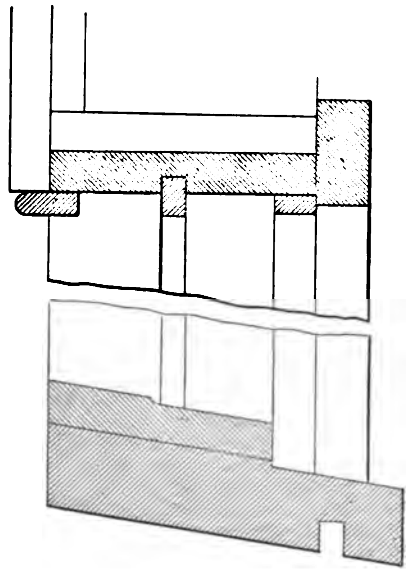
THE plans for a new railroad station to be erected in Allegheny, Pa., have recently been approved by the officials of the Pittsburgh, Fort Wayne & Chicago Railroad, the estimated cost of the new building being placed at $250,000. The plans call for a handsome structure of brick and stone of the Flemish type and unlike any other station built in that vicinity.

## Pitch of Roofs.

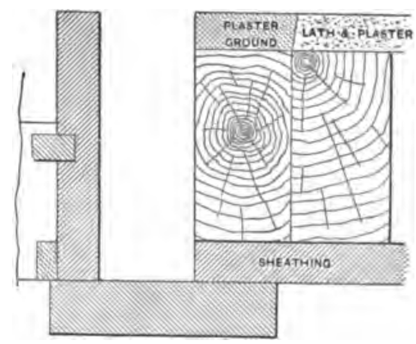
The question as to the correct pitch which shall be given to a roof when covered with a certain material is one which frequently confronts the builder in a way to prove more or less perplexing, for well he knows that trouble is likely to ensue if the "fall" is less than it should be. With a view to aiding those in the trade who have more or less roofing to do, the St. Paul Roofing, Cornice & Ornament Company has issued a table giving the minimum pitch of roofs in inches to the foot for the following kinds of roofing materials:

| | |
|---|---|
| Asphalt and composition | ½ |
| Tin | 1 |
| Corrugated iron | 3 |
| Sheet iron | 3 |
| Copper | 2 |
| Lead | 2 |
| Thatch | 6 |
| Shingles | 4 |
| Slate | 4 |
| Tiles, terra-cotta | 4 |

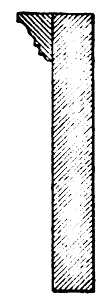
From the above it will be seen that tar and gravel roofs require the least inclination or fall, and of the more common materials shingles, slate, tiles, &c., are among those requiring the most.



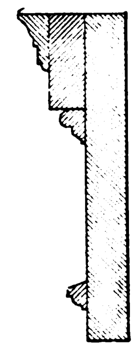
Details of Head and Sill of Second-Story Window Frames.—Scale, 3 Inches to the Foot.




Horizontal Section Through Second-Story Window Frame.—Scale, 3 Inches to the Foot.



Head Casing on Second and Third Floors.

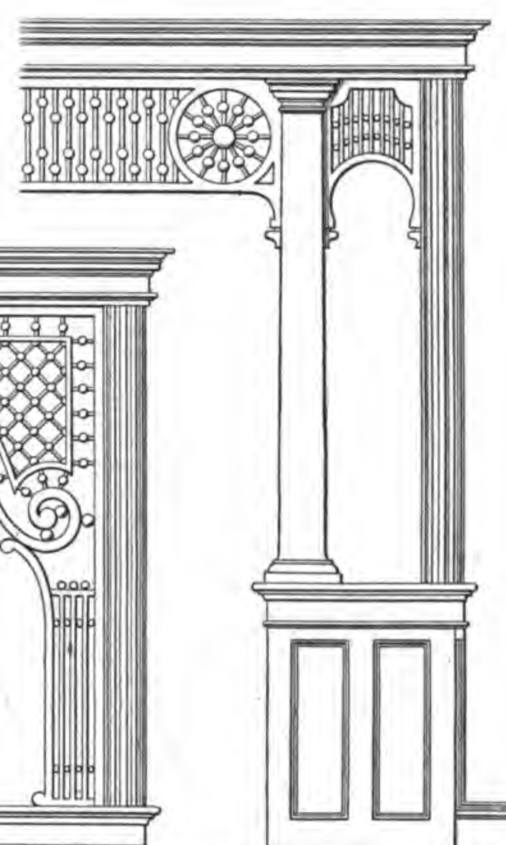


Head Casing on First Floor.

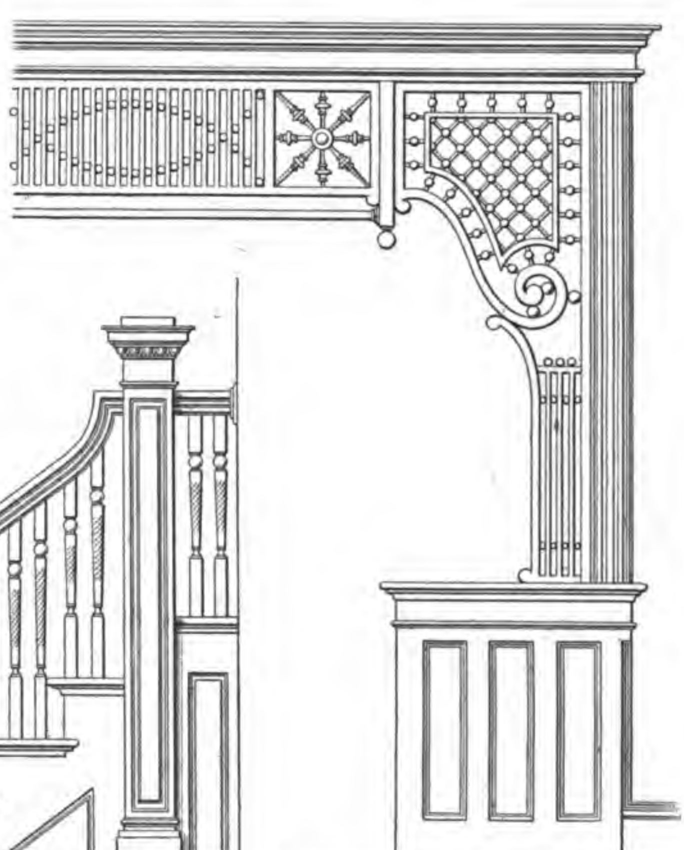
Scale, 3 Inches to the Foot.

Hand Rail.—Scale, 3 Inches to the Foot.

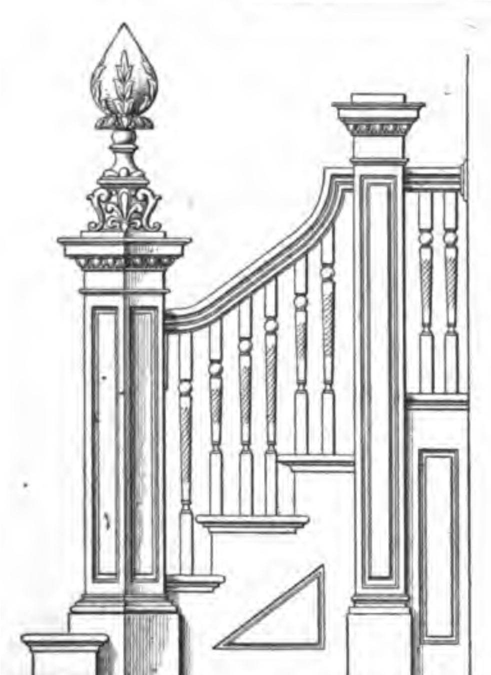
Detail of Casting.—Scale, 3 Inches to the Foot.



Trimmed Opening Between Library and Hall.—Scale, ½ Inch to the Foot.



Trimmed Opening Between Library and Dining Room.—Scale, ½ Inch to the Foot.



Detail of Main Stairs.—Scale, ½ Inch to the Foot.

*House of Concrete Block and Frame Construction.*

# Meeting of Concrete Block Machine Manufacturers' Association.

Supplementing the brief report of the meeting of the association which appeared in our last issue, it may be stated a resolution was adopted that a committee of five be appointed to draft standard specifications for the manufacture of concrete building blocks, and that this committee be instructed as far as possible to co-operate with insurance people to the extent of drafting such specifications as are made and approved. The committee thus appointed consisted of the following: O. U. Miracle, Minneapolis, Minn., chairman; J. P. Sherer, Milwaukee, Wis.; Frank L. Dykema, Grand Rapids, Mich.; S. L. Wiltse, Jackson, Mich., and P. B. Miles, Jackson, Mich.

The Committee on Constitution and By-laws rendered its report, which was adopted.

### Qualities of Concrete Blocks.

Various papers of interest, as mentioned in our last issue, were read and discussed bearing on the concrete block question, one of the more important being that of E. T. Cairns of the National Fire Protective Association, who among other things, said:

The statement is often made that concrete is "absolutely fire proof." That is a rather rash statement to make about any building material. Many things which do not burn are far from fire proof. It took the public several years to learn that cast iron and steel, while, of course, noninflammable, are not fire proof and have to be very carefully protected against heat when used in building construction. Stone has long been known as utterly incapable of resisting fire of any importance. Bricks are commonly regarded as the nearest thing to fire proof in building construction and as they are now understood that is doubtless true; nevertheless, even bricks fail under extreme exposure and are frequently so damaged in appearance or strength as to be practically ruined. Down at the laboratory we actually melted bricks in a test furnace a few weeks ago. Hollow tile does not burn, but it has its faults as a fire proof material, one of the most serious of which is that in severe fires one side of its shell sometimes heats up so much more rapidly than the others that the unequal expansion causes the block to break apart. Furthermore, in the form at present in use it is difficult to bond it together rigidly enough to stand extreme fires.

Concrete is subject to some of the weaknesses of these other materials and also has some troubles peculiar to itself, but in discussing these limitations I do not mean to imply that concrete may not be quite as fairly entitled to the nominal term "fire proof" as any of these others. I should very much like to be convinced that it has a little better claim, but it is not only fair but positively necessary to the proper and successful use of the material that its faults as well as its virtues be as fully understood as possible.

The integrity of a concrete block depends absolutely on the cement used in it. If that cement, which is a crystalline substance in which water is an important part, dehydrates or gives up its water of crystallization at a low temperature its ability to bind the sand or aggregate together is lost early and the block will collapse. Now, at just what temperature different cements will thus fail and how rapidly that failure will progress inward in a block set in a wall are not yet known so far as we have found out. Perhaps we shall find that this is not a serious matter, but it is a point which must be demonstrated. Hollow concrete blocks must in some measure share the weakness of hollow tile blocks as to liability to break from unequal expansion of the different sides. I doubt if any one knows yet just how serious a matter that may be, but the experience with fire at Geary, Okla., about two years ago, which some of you will remember, seems to have demonstrated both the above points if my information is correct.

Another question is the possibility of making a good substantial joint by means of ordinary cement mortar between two blocks of concrete and whether these joints will hold well under fire.

Then a real and vital difficulty after these other questions may have been satisfactorily disposed of is the problem of insuring good workmanship in the manufacture and erection of the blocks. This, it seems to me, is the point that calls for your most careful consideration. Can we in any way govern the use of the machines sold over the land to all sorts of men so that the blocks turned out will contain the proper quality and proportion of ingredients? Perhaps you will say that that difficulty is only the same in this business as in every other. It seems to me, however, that it is different for the present in that the purchasers of the product and even architects in charge up to this time have had so little experience with cement blocks that they cannot tell by inspection what the quality is as can the purchaser of more staple goods. Furthermore, they are not buying blocks often enough so that if they find by use that a certain block is deficient they can change to some other make with only small loss. Doubtless the men engaged in the manufacture of cement blocks will average up pretty well with business men in general, and it is reasonable to look for about the same proportion of people who will stoop to dishonesty in measure or quality when competition seems, in their judgment, to require it. This is one of the difficulties which cannot be solved in a laboratory, but which must either be settled by you who control the block machines or left to the slow process of time to develop the discriminating judgment of the public. I trust it will not be left entirely to work out its own solution in time, but that this or some other organization will make a serious effort to formulate and enforce a standard of quality for concrete blocks which will take them out of their present uncertain classification and place them where insurers and the insured may have reasonable ground for confidence in them as fire resistive material.

In closing I beg to assure you of the independence of the position of insurance companies on the question of building materials in general and cement blocks in particular. They do not take sides in any controversy between rival interests save as they can logically demonstrate the superiority from their point of view of either side of the question. We have no commercial interest in any system of construction except the one, whatever it may be, that occasions the least loss by fire, and you will find prompt recognition of all the claims to superiority in your materials which you can demonstrate in a logical, practical way.

A vote of thanks was tendered Mr. Cairns for the paper read by him and the interest he had shown in the subject of insurance as relating to concrete blocks.

During the proceedings of the second day J. P. Sherer of Milwaukee gave an interesting talk on "Coloring of Concrete Blocks," and P. B. Miles of Jackson discussed "The Architect," pointing out that while at first many architects were opposed to the cement block, they are now fast coming into line as they find the demand for the material indicative of gaining popularity. Sid L. Wiltse of Jackson presented some comments on concrete block insurance, his views being incorporated in a very interesting paper.

### Election of Officers.

After the several papers had been discussed the members went into executive session for the election of officers, which resulted as follows:

President, J. F. Angell, Columbus, Ohio.

Vice-President, O. U. Miracle, Minneapolis, Minn.

Secretary, Sid L. Wiltse, Jackson, Mich.

Treasurer, C. C. Huston, Columbus, Ohio.

The meeting then adjourned until June next, subject to the call of the Executive Committee.

INADEQUATE FACTORY VENTILATION is the subject of the complaint made by Daniel McAbee, State Factory Inspector of Indiana, after returning from an extended trip throughout the State. In schools as well as factories the conditions are hazardous, and the State Department will take active steps to find a remedy. It is expressly stated that the ventilation is not of special importance during the warm weather, but during the cold season it is especially so, and the lack of it entails a condition dangerous to the health of the occupants both of factories and schools. This matter has been given attention in other States, notably in New York, where they have secured a compulsory ventilation law for school buildings, but public sentiment as a whole has not been aroused to the point that State Legislatures are forced to consider seriously the question of well occupied or crowded quarters.

# PERSPECTIVE DRAWING FOR THE BUILDER.—I.

BY M. M. SLOAN.

WHILE it is the province of the architect to prepare the drawings and specifications for a building that is to be erected, it is the custom in many localities for the builder to assume the role of both architect and contractor, and he is therefore frequently called upon to make the necessary working drawings. Very often the elevations will show, to the mind trained in reading them, the general design and proportions of a building, but the client not so well versed in the reading of drawings is at a loss to fully grasp the appearance of the finished structure. The picture of a building appeals so strongly to most owners that it will frequently influence them in the placing of their work with the architect or the signing of a contract with a builder, and the latter who can show the prospective owner or client by means of a drawing or sketch the appearance of the finished structure always has in it a powerful ally.

In looking down a long street, an arcade, or hall, all of the lines extending away from the eye appear to converge so that in the extreme distance the street, arcade or hall seems to be narrower than in the foreground. If one stands looking at the corner of a large building with many irregularly sized window openings and pilasters he will notice that the windows and pilasters apparently become narrower as they recede from the eye on both sides of the building. Not only are the distances between the vertical jambs and faces thus lessened, but the ground apparently slopes upward and the roof downward, so that the extreme edge of the building appears much shorter than the edge in the foreground. So accustomed, however, is the eye to this phenomenon that no notice is taken of this distortion and confusion naturally exists when an attempt is made by one unfamiliar with the principles of perspective to portray on paper an object or structure so that it will satisfy the eye.

While the principles of perspective are not difficult, they are not commonly understood, and even when they are indifferently understood the work of laying out a true perspective requires some little time and accuracy. It has been the custom, therefore, with not only builders, but also mechanical draftsmen, in depicting objects or structures to the laymen to draw such objects by a kind of mechanical perspective which is called "isometric."

This system of drawing is applicable to the representation of small and simple objects, and has an advantage in that every line in the drawing may be laid off to scale.

In order to explain the extremely elementary principle of isometric drawing or perspective, let us assume that one has before him the mechanical drawing represented in Fig. 1. At A is shown a plan view, while B shows the elevation of the object which it is desired to depict. It consists of a cubical block with a cubical corner removed. To the layman undoubtedly the mechanical drawing would be unintelligible. But if he were shown the drawing presented in Fig. 2, without doubt the form of the object would immediately be clear to him.

In the construction of Fig. 2 any base line, as *a b*, is chosen, and the vertical line *c d* laid off equal by scale to the hight of the cube. If the edge of the T square coincides with the line *a b* and a 30-degree triangle is used to draw the lines *d e* and *d f*, these latter distances may be laid off by scale equal to the length of the sides of the cube. The lines *c g* and *c h* may be drawn with a 30-degree triangle, and again the lines *h i* and *g i*, the points *h* and *g* being obtained by extending vertical lines upward from the points *e* and *f* until they intersect the lines *c g* and *c h*. Then to represent the cubical space taken out of the corner of the block, it is necessary to draw the lines *l m*, *l n*, making them and *l c* equal to the dimensions of the sides of the removed cubical space. By drawing the verticals upward from *m* and *n*, the intersentions *m'* and *n'* are obtained, and then by drawing 30-degree lines from *n* and *m* toward *c*, and from *m'* and *n'* toward *o*, the outline of the removed space is obtained and entire figure complete.

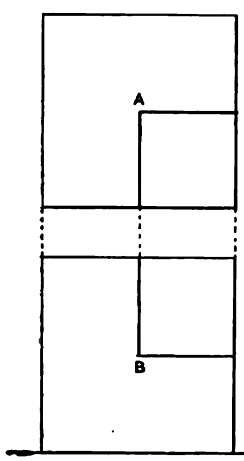



Fig. 1.—Elevation and Plan of a Cube Having a Cubical Corner Removed.

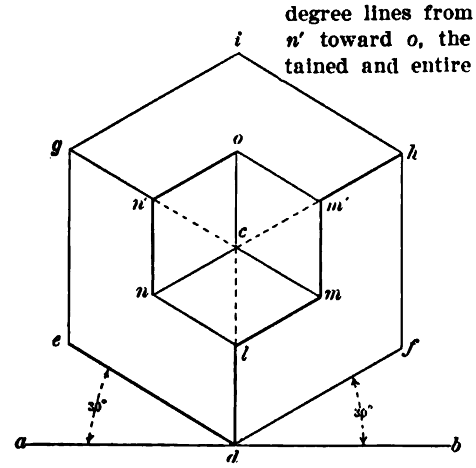



Fig. 2.—Isometric Perspective of the Cube Shown in Fig. 1.

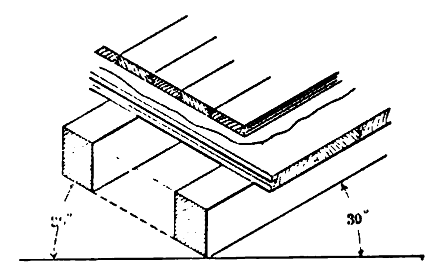



Fig. 3.—Isometric Perspective of a Section of Floor.

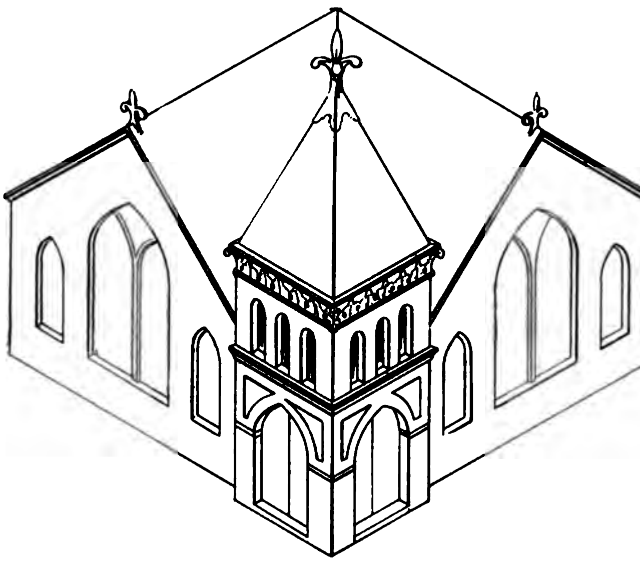
*Perspective Drawing for the Builder.*

Isometric perspective, which is really no perspective at all, is useful to rapidly and mechanically show the general appearance of small objects or structures, and it is frequently used to explain quickly by a sketch particular features of construction. How clearly it will illustrate certain subjects is shown in Fig. 3, which shows a section of the floor of a mill. Such drawings, while they clearly show the elementary forms which they are used to illustrate, do not show these objects as they really appear, and therefore isometric perspective applied to the details of a large building would be entirely inadequate and would so distort the structure that no reasonable idea of its appearance or proportions could be obtained.

To illustrate that isometric perspective is not adaptable for architectural purposes, Figs. 4 and 5 are presented. Fig. 4 shows the outline of a church constructed upon isometrical lines, while Fig. 5 gives a true perspective of the same building. A comparison of these two views illustrates the superiority of true perspective over isometrical.

There are several methods of laying out perspective drawings, each having its peculiar advantage. It is the purpose in this series of articles to treat only upon those methods which would be of most value to the builder in representing such buildings as he would be likely to construct. Before proceeding with any of these methods, however, a few elementary principles should be studied, and when these principles are grasped one should not have the slightest difficulty in laying out a drawing that will illustrate exactly the appearance of a building in any position.

Let it be required to represent in true perspective the cube shown in Fig. 1. Suppose that a transparent screen *s s s s* is interposed between the eye of the observer and the object as shown in Fig. 6. If lines be carried from the corners of the object in its position at A to the point of sight, P, passing through this screen, points would thus be obtained in the screen at *a*, *b*, *c*, &c., corresponding to *a'*, *b'*, *c'*, &c., and by connecting these points a true image of the object would be described on the screen. The drawing paper upon which the sketch is to be laid out is regarded as the screen upon which the image of the object is observed, and this screen is always designated as



Figs. 4 and 5.—Comparison of Isometric and True Perspectiveof a Church.

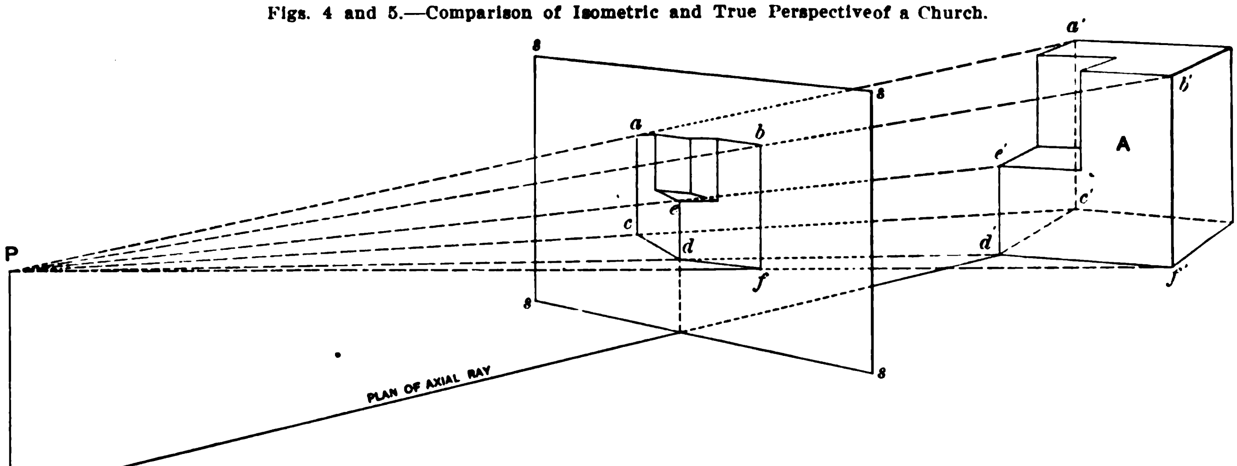



Fig. 6.—Diagram Illustrating the Projection of True Perspective.

*Perspective Drawing for the Builder.*

the *picture plane*, while the eye of the observer is called the *point of sight*, or if referred to in plan, the *station point*.

If one looks straight ahead at a wall or other surface of considerable breadth and hight he will observe that the eye cannot take in more than a limited amount of the surface. The normal "range of vision" or the angle made by lines drawn from the eye to the extreme points at which details may be observed is known as the *angle of vision*, and the amount or area of detail included in this angle of vision is designated in perspective drawing as the *field of view*. Again, a horizontal line drawn through the screen at a hight above the ground equal to the hight of the eye of the observer represents on the picture plane the interception of a horizontal plane which, owing to its position in line with the point of sight, cannot be seen on the top or bottom. This line is designated as the *horizon* line, and is an important line in all perspective drawing, as will be subsequently shown.

AN important decision has just been handed down by the Supreme Court of North Dakota, which holds that a supervising architect has the same right to file a lien on a structure for which he has made plans and specifications and superintended the construction as has a contractor or mechanic who labored on the building. While this only applies to architects within that State, it should have a bearing in other States where the courts are not so enlightened in regard to the "laborer worthy of his hire" position of the profession.

## New York's New Theatres.

After several interruptions and a long delay work was recently resumed on the foundations at the northwest corner of Broadway and Forty-fifth street, New York City, where a new theater is to be erected. According to the plans drawn by Architect George Keister, 11 West Twenty-ninth street, the building will cover an area 75 x 125 feet, will be five stories in hight, and its style of architecture will be Moorish, somewhat resembling the well-known Casino at the corner of Broadway and Thirty-ninth street. The exterior will be of brick and terra cotta, with elaborate entrances. The building will cost in the neighborhood of $800,000, and the theater will have a seating capacity of 1240. In addition to the theater the building will contain offices and a bank. The Phœnix Iron Works has the contract for the steel work.

Another playhouse, to cost in the neighborhood of $200,000, is to be erected on the north side of Sixty-fifth street, a short distance west of Broadway, and will be known as the Arcade Theater. It will be a four-story fire proof structure, and will be erected in accordance with drawings prepared by J. B. McElfatrick & Son.

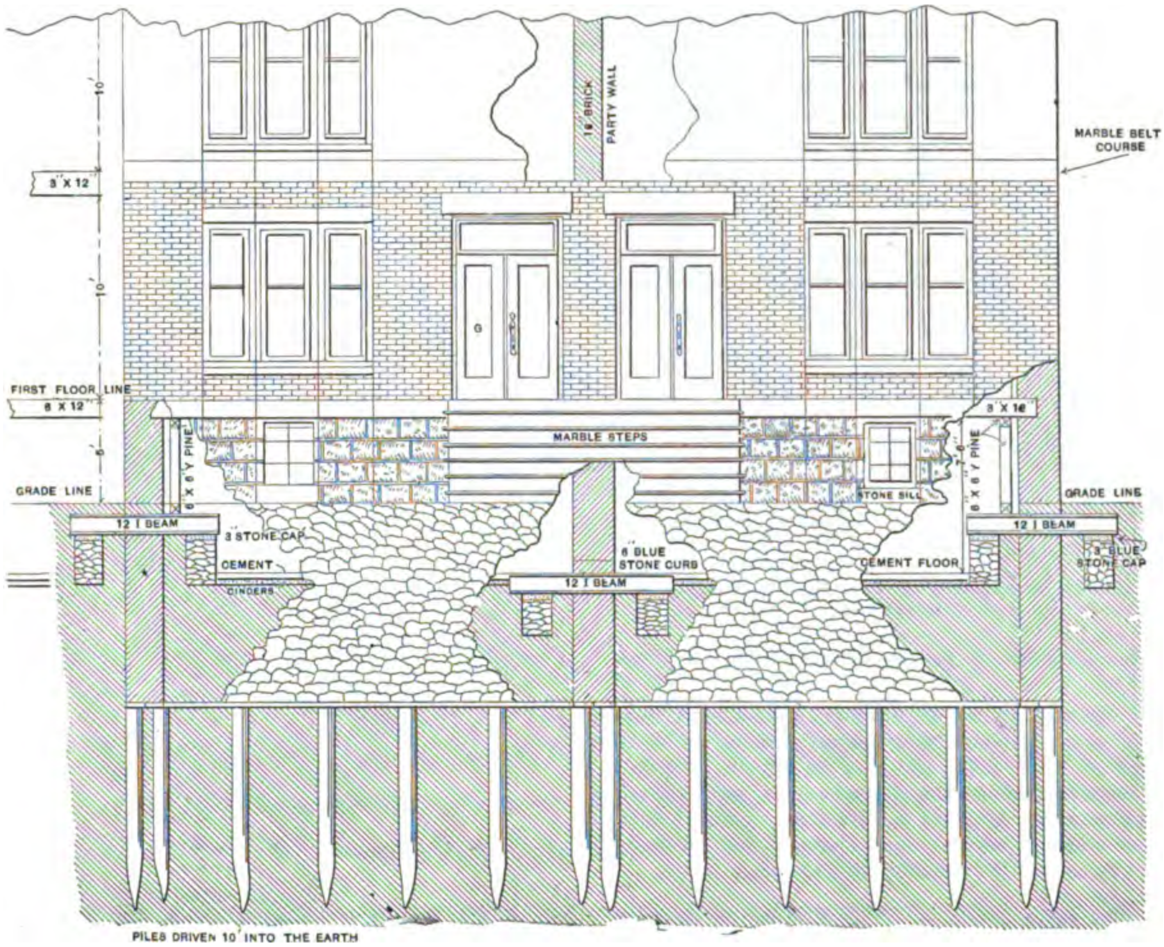
IT is reported that Tacoma, Wash., is to have a concrete chimney that will be 300 feet in hight and 450 feet above sea level.

# STRENGTHENING THE FOUNDATIONS OF BRICK DWELLINGS.

PECULIAR jobs of work in connection with the building business are always interesting to a large class in the trade, affording as they do much that is of suggestive value to builders in different sections of the country, and although they may not be called upon to execute a contract which is in all essentials identical with the one described, yet they may obtain from it hints which in a case of emergency may prove highly serviceable. A piece of work which is something out of the usual order was recently executed in Philadelphia where two brick houses were provided with somewhat novel foundations in order to prevent the further settling of the buildings. The work was done by John J. Brown of Germantown, Philadelphia, who furnishes us with the following particulars:

The buildings were put up 40 years ago on North Broad street, Philadelphia, upon ground through which a large creek passed, spreading its waters over a wide area and making that particular section a wet and marshy place. It remained this way for years until the time was ripe for improving that portion of the thoroughfare. In order to build on this piece of ground it was found necessary by reason of the condition of the earth to drive piles, as after repeated attempts it was discovered to be impossible to secure a good foundation in any other way. I was told by an old resident that at the time the houses were erected it was necessary to dig out the soil to a depth of 6 feet below the level of the cellar, after which piles were driven down to a depth of 10 feet more before finding a solid bottom. On top of the piles was placed heavy 3-inch plank and then the foundation stones were laid. It is the opinion of the Philadelphia Building Department that at the present time the plank on top of the piles has decayed and caused the settling of the buildings which has been noted, and in this I fully agree. There is some settlement taking place all the time, and the question naturally arose how to prevent its continuance. Several builders were invited to submit plans as to how the difficulty might be overcome, and I conceived the scheme indicated by the drawings sent herewith, which may prove of interest and benefit to many readers of *Carpentry and Building*. I might say that my scheme was accepted as being not only the best way out of the difficulty, but by far the most economical manner of saving the buildings and at the same time strengthening the foundations.

Since the buildings were originally erected many changes have taken place in and around the section of the city in which they are located. Streets have been opened and sewers have been built, thereby draining the surrounding swampy area and making a good hard dry soil. After I had taken careful soundings and satisfied myself that the condition of the ground insured the safety of the execution of my scheme I made the necessary drawings and figured the cost for the owner.




**Front Elevation of Lower Stories of Buildings, Showing Method of Strengthening the Foundations.**

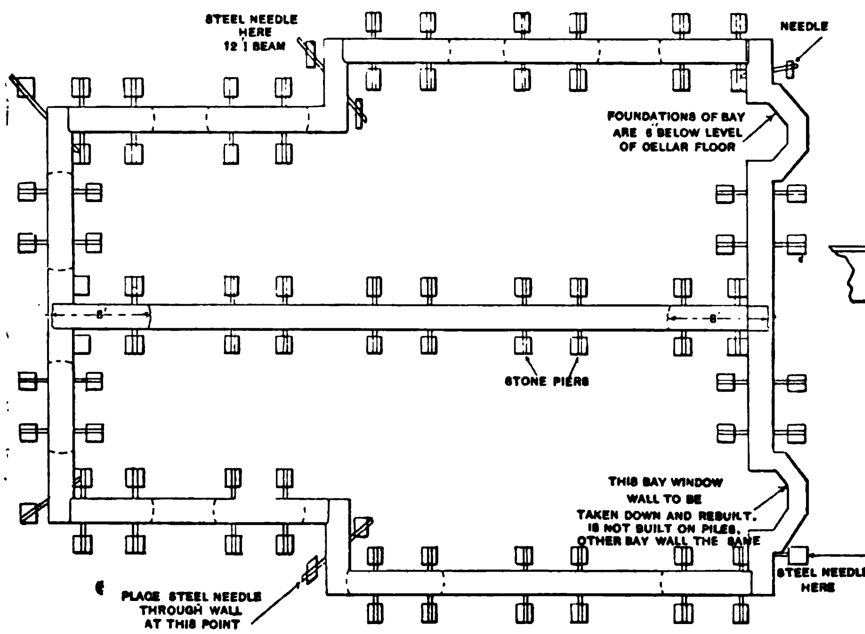
***Strengthening the Foundations of Brick Dwellings.***

Among the drawings you will note a front elevation of the lower stories of the two buildings, with portions of the walls broken away so as to show the general scheme adopted. The piles driven 10 feet into the earth are shown and on top of them the 3-inch plank constituting the basis of the old foundations.

The plan of the cellar or basement shows the position of the numerous piers which I put down with the steel needles so as to distribute the weight of the buildings on new bearings and therefore relieve the great pressure on the piles. I built piers as indicated both in the elevational view and in the detail of the new underpinning. I put 12-inch I-beams through the walls for needles, the latter being below the surface of the cellar floor at the line of the party wall and resting on blue stone caps. I then slid on top of the steel I-beams a 6-inch blue stone cap, which went in under the wall as shown in the detail.

The plan view gives an idea of the points where the steel needles were inserted. The wall was wedged up tight with iron wedges driven in with a sledge hammer to take the weight, while at the side walls the piers in the cellar were built up only high enough to conform with the piers outside of the buildings, as shown in the elevation. The joist along the sides having weakened somewhat, they were strengthened by placing 6 by 6 inch yellow pine stringers on top of the steel needles and under the joist, while 6 x 6 yellow pine posts were cut in between.

An idea of the cost of the job can be gathered from the statement that the stone work and masonry with the necessary amount of excavating amounted to $100; blue




**Plan Showing Arrangement of Steel Needles.—Scale, 1-16 Inch to the Foot.**

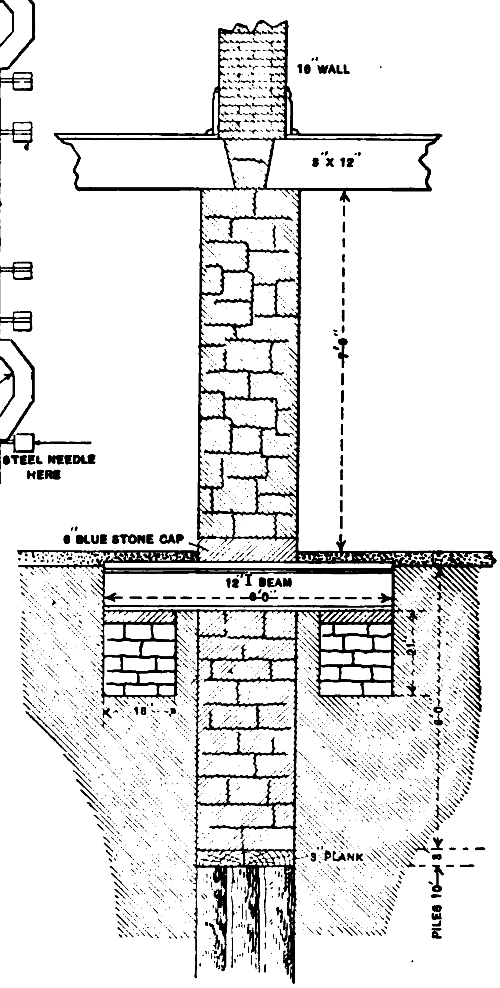
*Strengthening the Foundations of Brick Dwellings.*

stone curbing and cap, $220; steel I-beams, $138; lumber and carpenter's labor, $80; cement and sand $35; miscellaneous labor, $125; patching up cement work in cellar floor, $30; cartage, $10. To this amount should be added 10 per cent. for builders' commission. I would be glad to have readers express their views of this job and tell how they would have solved the problem.

## Estimating the Cost of Painting.

The subject of estimating is one of never ending interest to all connected with the building business. This is due in large measure perhaps to the fact that there are so many ways of doing work, but more particularly to the fact that upon this particular phase of the business depends the question of profit and loss on a contract. That the painter has his own difficulties when wrestling with the matter of estimating the cost of labor in connection with certain work is evident from some comments by "Veteran" in a recent issue of the *Painters' Magazine*. While the correspondent in question discusses the subject from the standpoint of the painter, yet what he has to say is of a nature to possess more or less of suggestive value to the carpenter and builder, and we therefore present his views herewith:

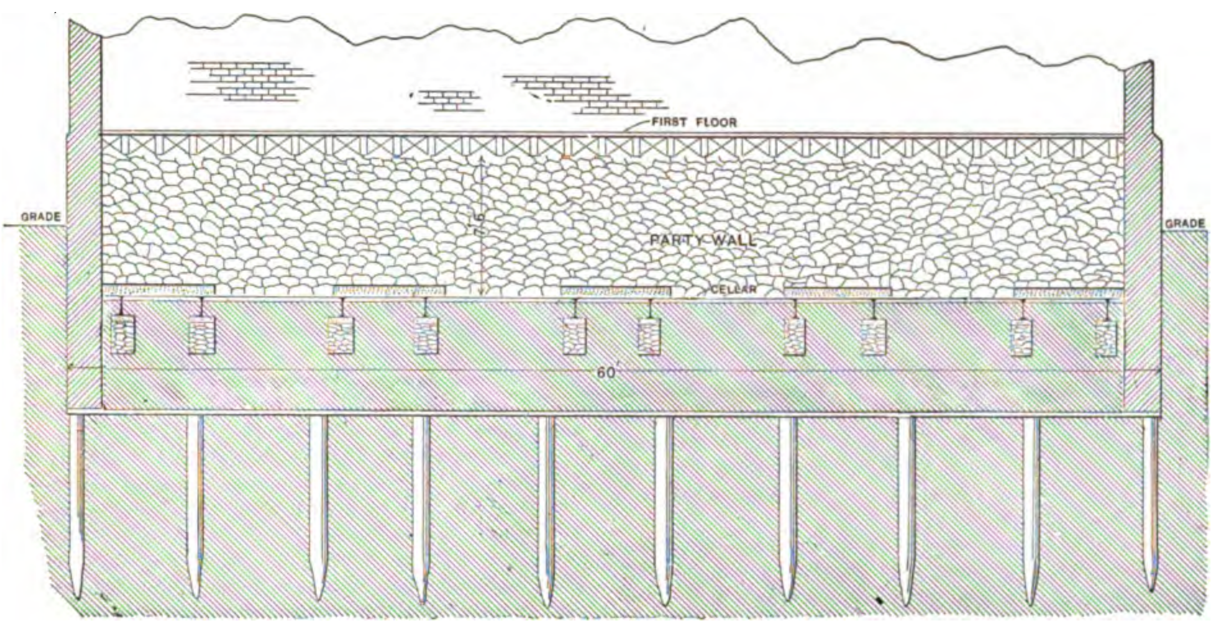
Talking of estimates, I asked a carpenter the other day if he could estimate on the labor required for any given job, and he said that he found it impossible. Even under apparently similar conditions there is often a great variation in cost. He told me that he had built two houses in Newark from the same set of plans and close together. The same gang of men worked on the two houses, going from one to the other. He kept an accurate account of the time and material used in each house, and while the material used in the two houses was practically the same, the labor in one house cost $300 more than in the other house and there was no way to account for it, for the men apparently worked as faithfully on one house as on the other. But you know very well that it all depends on how a man happens to be feeling how much work he will accomplish. One day a man can do a good quantity of work, while the next day he may not be feeling right up to the mark and will accomplish very much less. And where a gang of men is at work much will depend on the way the foreman happens to feel. If he is in good spirits and is well, he will keep the men keyed up to the mark and everything will go ahead finely, but if he happens to feel out of sorts the whole work will




**Detail of the New Underpinning.—Scale, ½ Inch to the Foot.**

drag. No matter how carefully we may figure the cost of labor, either on a new job or on an old one, it is largely guesswork.

This brings up the question how you can figure the difference in cost or the comparative cost between the inside and outside of an ordinary frame house, where you have three-coat work. In measuring up I make no allowance for openings, and, judging by my experience, I find that in the average modern house, taking the usual number of closets, windows and doors, the amount of labor on the inside just about balances that on the outside. I don't count my treatment for floors, or any elaborate grill work, wainscots, painting or kitchen walls, bathroom walls or elaborate dressers and other fittings in the pantry; these I estimate extra—but I am speaking only of the usual work found in the average house. I have estimated very carefully and have found that I can come very close to it by counting that the labor on the inside will be the same as that required for the outside, for average three-coat finish. Of course, when it comes to rubbed and polished work and finish of that kind, it is another proposition. But I find it is important not only to read the painting specifications, but to look closely at the carpenter's and the mason's specifications. Often we have plans brought in here with the painting specifications only, and although the architect has worked over them for weeks he expects us to give him an estimate in two or three hours. In such a case it is largely a question of guesswork. At best there are lots of things, such as picture moldings, that are difficult to figure. In figuring I make no allowance for openings and count the blinds extra. I measure the girth of a cornice—or if the building is an old one I count the boards—and I double it up to allow for the cost of painting the brackets. I always count the cornice as coming to the foot of the brackets, even where they run down on the weather boards. It is a fact that no two painters figure on a new building exactly alike. Four men, all paying the same wages and intending to use the same materials, should not vary very much, yet they will, because they do not figure the same way. The easiest thing to figure is the cost of painting a tin roof. Now I think this whole question of estimating is one of the most interesting and important things in the trade, and in my opinion it would be a good idea if your readers would write their views on the subject and let us have the methods of different men from all over the country for comparison. Why, we could arrive at information that way which would be of the very greatest benefit to the trade from Maine to California, which we never can get at if every man continues to keep his own methods to himself. Every painter knows well enough that there is a lot of cutthroat competition due to ignorance of the proper method of figuring in advance the cost of the work, and if you could only stir up the trade to a general experience meeting on this subject I think we would accomplish one of the greatest benefits that the trade could have.




Vertical Longitudinal Section through the Foundations and Cellar.—Scale, 3-32 Inch to the Foot.

*Strengthening the Foundations of Brick Dwellings.*

A LAW is now on the statute books of Illinois making it an offense punishable by fine or imprisonment or both for an employer of labor who has a strike at his plant to omit in any advertisement for help an explicit statement to the effect that there is a strike at his plant and that the new labor is required to take the place of strikers. A number of attempts have been made by the Illinois Employers' Association and other employing bodies to bring this one-sided law to a test, but in every case the State has failed to prosecute offenses or has nonsuited bills. This policy was pursued apparently with the co-operation of the labor organizations, which wished to keep the law on the statute books as long as possible, even though satisfied that a test would make it unconstitutional and void.

## Use of Concrete Influenced by Labor Troubles.

In a recent discussion of the influence of labor disputes upon the use of concrete in building construction a writer in the *Inland Architect* points out that these troubles have been a most potent factor in bringing this material again into popularity among building contractors. The stone masons, he says, who had formerly almost a monopoly of the business of constructing foundation walls have not always, as it seemed to the contractors, been perfectly reasonable in their demands, and the quarrymen, without whom their work could not go on, were even more liable to misunderstandings with their employers. At last the latter, in despair at the losses to which they were subjected by alternate strikes in these two trades and encouraged by the reduction in cost of cement, began to turn again to the use of concrete, not only for footings, but for foundation walls. The ordinary contractor's concrete of ten or fifteen years ago would have been a very unsuitable material for retaining walls on account of its inequality of composition, due mainly to bad mixing, but good concrete is a very different affair, and, under the stimulus of self interest, contractors have studied the subject until careful and intelligent preparation of the materials, aided by the well designed mixing machines now available, has so far taken the place of the ignorant methods formerly in use that reasonably good concrete for foundations can now be had anywhere at a price which compares favorably with that of stone work.

Considering the superiority of good concrete over stone work in the qualities required in foundation walls, in resistance to the pressure of the earth, in imperviousness to moisture and in the smoothness of the inner and outer surfaces, there can be no doubt that the new material will be more and more extensively employed and that the characteristic ingenuity of Americans will adapt it to an increasing number of uses. Already building blocks of concrete, made on the spot by portable machines, have come into use in many places instead of brick. Being molded with hollow spaces, they make a light and nonconducting wall, as well as a strong and impervious one, and seem destined not only to take an important part in American construction, but to influence the artistic development of American architecture, which cannot be more fruitfully employed than in adapting design to new materials.

# CONVENTION OF MASTER SHEET METAL WORKERS.

THE National Association of Master Sheet Metal Workers, which was organized at Philadelphia in February of the current year, held its first annual convention in Milwaukee on August 9, 10 and 11. From the interest taken in its deliberations, the papers read and discussed and the by-laws, principles and resolutions adopted the association gives promise of being a conservative and useful trade body. As indicating the scope of its work it is interesting to note the following principles which were formulated by the Board of Directors at a meeting in Washington in May, this year, and which were adopted by the convention by a rising vote:

1. We are opposed to the manufacturers and jobbers selling direct to the consumer and shall use all fair means to break up the practice and shall give our preference in buying to those houses which sell to the trade only.

2. We are opposed to strikes and lockouts, believing all difficulties between employer and employee should be adjusted by arbitration without cessation of work.

3. We favor the elimination of the restriction of apprenticeship, believing that every boy in America should have the opportunity to learn a trade.

4. We believe it will be to the mutual advantage of employer, employee and skilled mechanic to have the open shop system.

5. We are opposed to the further shortening of the hours of labor or restricting the amount of work that the mechanic should perform. To these principles we pledge to each other our earnest support and co-operation.

The following resolutions were also unanimously adopted:

That the secretary of each local association shall notify the president of any imposition or injury to the business of any member. The president shall thereupon call a meeting of the directors or submit the matter to them by mail, according to his judgment, and their decision shall be final and each local association shall receive notification through the secretary.

That the National Association of Master Sheet Metal Workers use its best thought to discover means of educating and elevating apprentices so that they may grow to be more useful men, better citizens and more valuable employees, with resulting honor and profit to their parents, themselves and to our country. That a committee of five be appointed to make such recommendations to the next convention, in Milwaukee, as will cover this feature.

The reading and adoption of the charter, by-laws and principles occupied practically the whole of the first session. One of the features of the forenoon was the passing of a vote of thanks to *The Metal Worker, Plumber and Steam Fitter* for the invaluable assistance it had rendered in establishing the association.

On the morning of the second day papers were read and discussed on "Terne Plate for Roofing," "The Sheet Metal Worker of To-day and Twenty-five Years Ago" and the "open shop" question.

On the afternoon of the second day the members were entertained at dinner at Lake Pewaukee, making the trip on trolley cars.

On Friday morning the reading of papers was continued and included one on the "Possibilities of Hot Air Heating" and another on "The Sale of Material to Those Not in the Trade."

The election of officers resulted in the following choice:

President, Edwin A. Seabrook, Camden, N. J.

First vice-president, Paul L. Biersach, Malwaukee, Wis.

Second vice-president, William Earley, Philadelphia, Pa.

Third vice-president, J. A. Pierpont, Washington, D. C.

Fourth vice-president, George Mast, Indianapolis, Ind.

Secretary, W. H. Bernard, Norfolk, Va.

Treasurer, E. W. Richards, Philadelphia, Pa.

After the officers were elected the Committee on Resolutions made its report, and the following among others were adopted:

That the association is deeply indebted to its national officers for the grand accomplishments under their administration.

That the trade in all its branches is under great obligation to our secretary, W. H. Barnard, for having conceived the idea of this association and his tenacity of purpose which has resulted in the successful establishment of our association of which we are already proud.

That it is the policy of the National Association to merit public confidence by entering into no agreements to control prices or restrict competition and by conforming to the constitution and laws of the United States.

That the association is deeply grateful to those in the wholesale trade who have given sympathetic support to our association movement and for the encouragement of their traveling representatives to render valuable assistance in extending it, and that we reciprocate by favoring them with our orders.

The convention adjourned after accepting the invitation to meet next August in Indianapolis, Ind.

## How to Heat the Home.

Norman Whitelaw, a well-known heating and ventilating engineer of Chicago, has published a book entitled "How to Heat the Home," which is intended primarily for the use of the contractor, giving, as it does, in small compass the information which is needed for the selection and installation of both steam and hot water heating. The book is divided into two parts—steam heating, embracing the first 86 pages, and hot water heating, the next 80 pages—and each part is complete in itself, data of importance to both sections being repeated in the second section. The book is logically and very conveniently arranged, the various elements of each system being taken in order and discussed intelligently.

Under steam heating the author advises the use of the low pressure gravity return system and gives rules and formulæ for the installation of such system, both for direct-indirect radiation and indirect. Diagrams are given for one-pipe circuit, one-pipe relief, one-pipe overhead and two-pipe systems. Rules for estimating heating surface, radiator connections, &c., are given. The basement, first floor, second floor and attic floor plans are given for a typical residence installation and data for estimating costs in the preparation of a bid, as well as the proper wording of a contract.

Under hot water heating different types of boilers are described, and the same systems of radiation are carefully outlined. Here, too, are given elevations and floor plans of typical installations. The book is profusely illustrated with engravings showing types of boilers, radiators, valves, fittings, pipe tools and accessories. It is handsomely bound in semiflexible buckram and is printed on heavy paper in a most attractive manner. It is a book in which every steam and hot water engineer and fitter will find more or less to interest him.

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SOME interesting statistics have just been compiled by the New York Fire Insurance Exchange touching the number of strictly fire proof buildings to be found in the leading cities of the country. In the totals school houses, libraries, courthouses and other public buildings have been omitted; neither is there any report from the city of Baltimore. The figures cover 22 cities and show a total of 2968 buildings. Of these 1389 are in the Boroughs of Manhattan and the Bronx and 113 in the Borough of Brooklyn, thus indicating that practically one-half of the fire proof buildings in the United States are located within the boundaries of Greater New York.

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AN indication of the activity in building which has prevailed in the Borough of the Bronx is found in the great demand for union bricklayers and the reports that speculative builders are paying 75 cents an hour, or 5 cents an hour more than the rate called for by the union scale.

# COOLING THE NEW YORK STOCK EXCHANGE.

DURING the hot, depressing weather of the summer the Stock Exchange, located on Broad and New streets, with an "L" extending through to Wall street, New York City, is artificially cooled. When it is understood that this cooling work includes the large board or trading room of the building, with its 1,200,000 cubic feet of space, its 10,879 square feet of glass surface and its occupation during busy times by 1000 persons, and that fresh air is continually supplied to the room at a rate of nearly 42 cubic feet of air per minute for each of these thousand persons, an idea of the requirements of the problem of maintaining a relatively low indoor temperature and a relatively low indoor humidity may be apprehended. The plant stands as the largest of its kind ever attempted and requires no less than 450 tons refrigerating capacity in the machinery by which the cooling and humidity regulation is effected.

The temperature in New York City during summer has risen as high as 100 degrees F., but is rarely higher than 85 degrees, and a perusal of some late records of the local weather bureau indicates that the average temperature during the summer months is not much above 70 degrees. What gives to the New York summer temperature its particularly trying quality is the high percentage of moisture in the air, this being not infrequently as high as 93 to 97 per cent., with temperatures in the neighborhood of 75 degrees. As compared with this, the interior of the board room is maintained at temperatures of 10 to 14 degrees below that of the outside air, with a humidity that averages about 55 per cent. The plant was designed by Alfred R. Wolff, consulting mechanical engineer, of New York City, and from his drawings and other data in his possession the following description and analysis are obtained.

The cooling of the air and its reduction in humidity are accomplished by drawing the air, which is taken from out of doors, through banks of pipe coils through which is circulated a cold brine solution. This succeeds in so reducing the temperature of the air that it loses its capacity for holding moisture, which is accordingly deposited upon the pipes in the form of frost. Though the air may rise in temperature slightly in its passage through the ducts of the building from the refrigerating coils to the points of inlet into the rooms, it is not in the presence of water and therefore enters the rooms dry as compared with the conditions out of doors. The air circulating system is simply the fan system of ventilation, in which the steam heated tempering or heating

**Interior of the Board Room of the Stock Exchange.**

*Cooling the New York Stock Exchange.*

coils needed for winter are replaced by a similar group of brine cooled coils. It is to maintain the brine at the desired temperature that the refrigerating plant, installed in the cellar of the building, is required. Besides the board room there are over 440,000 cubic feet of space in stories under ground level which are also supplied with refrigerated air. These would otherwise be oppressively hot, not only from the fact that they cannot be cooled by winds, as the upper stories of a building can, but also from the fact that they are more or less exposed to the heat generating property of the steam boilers and steam actuated machinery distributed about the cellar.

The New York Stock Exchange building, which has been completed a matter of two years, occupies the site of the old building, but is considerably larger. It is carried on a caisson foundation which was sunk a distance of 54 feet below the curb level in order to secure a firm foundation, and the entire space inclosed by the caissons, which are made to serve as a retaining wall against the inflow of the relatively soft soil, is utilized for office

each supplies a ramifying system of overhead hidden ducts. These distribute to air boxes behind the perforations in the decorative ceiling, shown in the view of the board room, and the air thus issues into the room through inconspicuous openings. Entering through numerous small openings at relatively low velocity and distributed over the ceiling, the air descends gradually toward the board room floor, where it finds its escape through register openings communicating with flues and ducts of the exhaust ventilating system.

In calculating for a plant of this description, especially of its magnitude, a number of questions arose that had no comparable precedent to aid in solution. Not only must the heat transmission through the walls of the building from outdoors be taken into account, but the heat producing property of the individuals must be considered and also that of the electric lamps. It will be particularly interesting to show in some detail how much refrigerating capacity is required, in the case of the board room in particular. One of the exacting requirements of this room lies in the fact that at each end there is a large unprotected expanse of window glass, as shown in the photograph mentioned, each glass window being 51 x 92 feet, supported by a structural steel frame work.

The heat transmission through the outside walls is

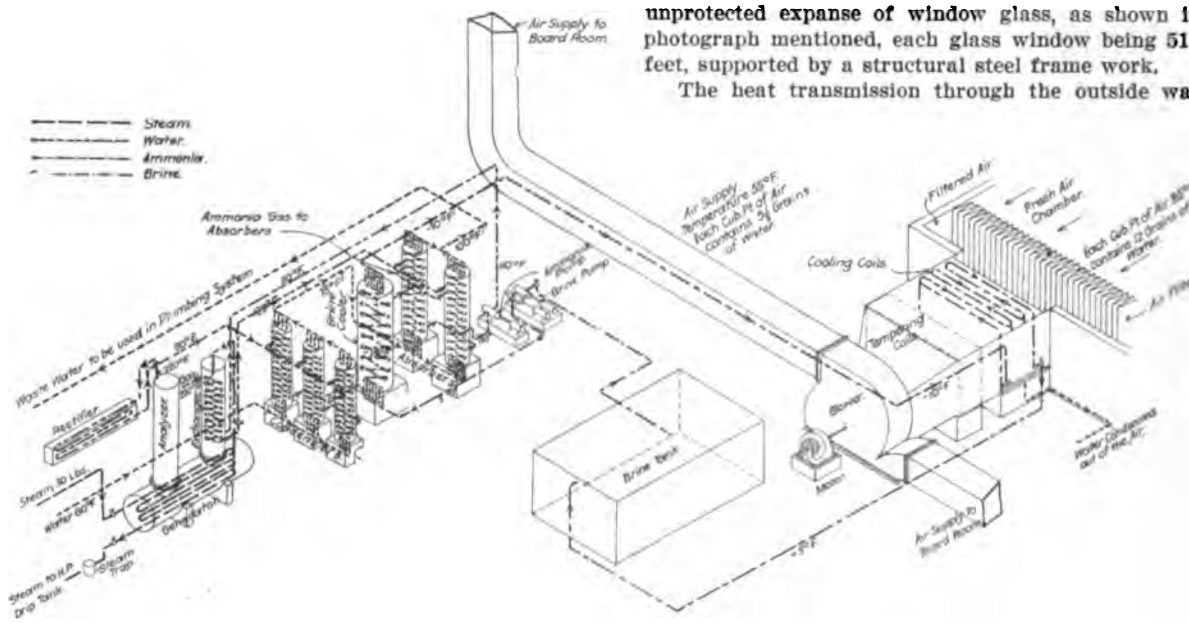


Diagram Showing Manner in Which the Air for Ventilation is Cooled.

*Cooling the New York Stock Exchange.*

and other purposes. Below the board room floor, which is the main floor level, there are three stories for office occupation, and a fourth, or cellar, given over entirely to the mechanical plant of the structure. From cellar bottom to the roof there are 14 stories. Through a part of this extends the board room, which is 110 x 139 feet in plan and 78 feet in inside hight. The ventilation of the building is entirely mechanical, with the use of both plenum and exhaust fans, and the different parts of the building are distinct so far as the ventilating systems are concerned. One fresh air fan in the cellar serves the board room, while a pair of exhaust fans at roof level handle in part the exhaust from the room. The air is taken mostly at the roof level and conducted down a large air shaft to the cellar, where it is passed through a long line of cheesecloth filters, arranged in the usual zigzag fashion.

Along the inside of these filters are distributed the various fresh air fans required for the different parts of the building, and one of these is that belonging to the board room. In the filtered air space on the suction side of the fan are placed the tempering coils and cooling coils. These groups of pipes are independent, so that the air is driven through both sets of the coils, no matter which set is in use. The fan, which is a Sturtevant centrifugal blower, has a double discharge and all the air for the board room passes through the two large ducts which are led from it.

The accompanying diagram of the refrigerating machinery shows the fan with the two ducts mentioned. Each of these ducts is connected into a flue, both of which rise to the level of the ceiling of the board room, where

calculated on the basis of the air outside being at 85 degrees and the air inside at 75 degrees. In the accompanying table is shown the calculation of the amount of heat that is added hourly to the air in the board room. The first item is the aggregate area of the two glass windows, and the transmission of heat is placed, for the 10 degrees range in temperature, 85 to 75, at 12.5 heat units per square foot per hour. The second item is the area of the doors in the outside walls, which walls, by the way, are the two in which are the large windows. The rest of the area of the two walls is the third item and is regarded as equivalent to at least a 54-inch brick wall. The fourth item is the skylight in the ceiling of the room, which is the only other exposed wall surface.

HEAT ADDED HOURLY TO THE AIR IN THE BOARD ROOM IN HOT WEATHER.

| | B. T. U. |
|---|---|
| Window surface, 9,855 square feet at 12.5 B. T. U. | 128,200 |
| Doors, 168 square feet at 14.5 B. T. U. | 2,440 |
| Outside wall, 7,369 square feet at 0.7 B. T. U. | 5,270 |
| Skylight, 1,024 square feet at 11 B. T. U. | 11,264 |
| | 142,174 |
| Allowance for heat from the sun through the windows, 20 to 25 per cent | 32,826 |
| Total transmission through walls | 175,000 |
| Animal heat from 1,000 persons at 400 B. T. U. | 400,000 |
| 120 lamps at 250 B. T. U. | 30,000 |
| | 605,000 |
| Factor of security, 10 per cent | 61,000 |
| Total heat from all sources | 666,000 |

It will be noted that the total number of heat units found by this circulation is increased by an amount which is roughly between 20 and 25 per cent., to allow for the heat from the sun through the windows.

The animal heat from each person is placed at 400 heat units per hour, which is a figure worth emphasizing. This gives for the 1000 occupants of the board room a total heat producing medium of 400,000 heat units per hour, far greater than the transmission through the walls. The design also provided for 120 lamps, which are charged with giving off heat at the rate of 250 heat units per hour each. To provide for unforeseen contingencies the calculated total amount of heat was then increased by 10 per cent., this factor, for the want of a better definition, being called the factor of security. This shows that the board room will, under the conditions assumed, receive 666,000 heat units per hour, which amount of heat must be carried away by the air circulated through the room in that time.

The problem then is to ascertain how much air will be needed. As it was desired to maintain a temperature within the board room of 75 degrees, it was determined to deliver the air into the room at 60 to 65 degrees and to proportion the brine coils so as to cool the air to 55 degrees, allowing for an increase in temperature of 5 degrees in the passage of the air through the ducts of the air supply system. Every cubic foot can thus be heated from 60 degrees, its temperature on entering the room, to 75 degrees, its temperature on leaving it, in absorbing the heat supply. To heat 1 cubic foot of air 1 degree requires about 0.0178 heat unit, so that to heat 1 cubic foot 15 degrees will require $0.0178 \times 15 = 0.267$ heat unit. For the 666,000 heat units to be disposed of some $666{,}000 \div 0.267 = 2{,}500{,}000$ cubic feet of air will be required per hour. (As a matter of interest it will be noted that this is a sufficient amount of air to give ventilation at the rate of 41.67 cubic feet per person per minute for the 1000 occupants).

To determine the number of tons refrigerating capacity required to cool this amount of air from outside temperature to the temperature at the cooling coils we proceed as follows: Changing water at 32 degrees into ice at the same temperature requires the abstraction of 142.2 heat units per pound of water. Theoretically, to make a ton of ice, this means $242.2 \times 2000 = 284{,}400$ heat units. If this 1 ton of refrigeration effect is to be obtained over a day of 24 hours, it means that the equivalent for one hour is $284{,}400 \div 24 = 11{,}870$ heat units—that is, about 12,000 heat units. The 2,500,000 cubic feet of air must be cooled from the outside temperature at 85 to the temperature in the cooling room at 55 degrees, or 30 degrees. It has just been shown that 1 cubic foot of air to be warmed 15 degrees takes up 0.267 heat unit, so that in cooling twice this range, or 30 degrees, it will require the abstraction of twice this amount, or 0.534 heat unit. For the total quantity of air $2{,}500{,}000 \times 0.534$ heat unit must be abstracted per hour to cool it 30 degrees, which product is equivalent to $2{,}500{,}000 \times 0.534 \div 12{,}000 = 111$ tons refrigerating effect.

Besides cooling the air itself, however, some heat must also be absorbed in order to cool and condense the moisture in the air. The amount of moisture contained in the air at 85 degrees F. and at 85 per cent. humidity (that is, the outside air) is 0.00154 pound per cubic foot. That contained in air at 55 degrees and at 100 per cent. humidity (the air naturally leaving the refrigerating chamber in a practically saturated condition) is 0.0007 pound. The difference in these two figures is 0.00084 pound, which is the amount that must be condensed. For the given hourly amount of air this represents no less than $2{,}500{,}000 \times 0.00084 = 2100$ pounds, to be handled per hour. This amount of air must be cooled 30 degrees, so that the cooling of the moisture requires 63,000 heat units to be abstracted per hour.

The moisture must not only be cooled, but it must also be condensed, which operation requires the withdrawal of about 1000 heat units per pound, so that for the 2100 pounds 2,100,000 heat units are involved. The total heat abstraction required per hour being thus 2,163,000 heat units, the equivalent in tons of refrigeration per day is $2{,}163{,}000 \div 12{,}000 = 180$ tons.

The remarkable fact is thus brought out that the refrigerating capacity needed for cooling the moisture contained in the air and for absorbing the latent heat in changing it from vapor to liquid is over 50 per cent. greater than that sufficient to effect the cooling of the air alone. This makes a total of nearly 300 tons refrigerating capacity for the board room itself. When the underground rooms were taken into consideration, and a small allowance was made for the refrigerated water that is circulated throughout the building for drinking purposes, it was found that a 450-ton plant would be needed.

Another interesting calculation that may be explained relates to the resulting humidity in the board room. The air leaves the refrigerating chamber, as stated, in a saturated condition, each cubic foot holding at the temperature there obtaining 0.0007 pound. This gives a total of 1750 pounds of water delivered into the air of the board room per hour by the air supply. To this must be added the moisture given off by the 1000 persons. Each individual is credited with the ability to produce 1-15 pound per hour. This makes a total of 66 pounds, or all told an inflow of 1816 pounds of water per hour in air at a temperature of 75 degrees. At this temperature air in the saturated condition can hold 0.00134 pound of water per cubic foot, so that if the air were saturated at the room temperature it would carry through it in one hour's time 3350 pounds. The actual quantity, it will be seen, is but 55 per cent. of this maximum amount.

The type of refrigerating machine installed is that known as the ammonia absorption class and was furnished in three units, each of 150 tons capacity, by the Carbondale Machine Company, Carbondale, Pa. It will be out of the question at the present time to describe the general working of this machine, but in the diagram already referred to the various parts are indicated and the paths that the steam, water, ammonia and brine take, together with normal temperatures that they may assume, are shown. The interesting feature is that the machines utilize exhaust steam sent to them from the electric lighting engines of the building. Water for condensing or liquifying the gaseous ammonia, for accelerating the absorption of the ammonia after it has become gaseous and taken up heat from the brine and for other uses is obtained from the city water mains. After it is passed through the refrigerating machinery it is pumped to tanks on the roof, to be used throughout the plumbing fixtures of the building except for drinking purposes. The diagram shows how the brine pump draws from the brine tank, which is more or less of a reservoir holding a considerable quantity of brine at a low temperature, the pump driving the brine through the brine cooler and thence through the air cooling coils, from which it is discharged to the brine tank, completing a closed circuit. It may be added that the brine circulating main is 8 inches in size.

The brine coils are made up of 1¼-inch galvanized iron pipe and those for the board room comprise about 20,000 linear feet, or 8700 square feet of surface. The 300 tons capacity needed for the board room are equivalent to the hourly transfer of 3,600,000 heat units from the air to the brine, which amount for the 8700 square feet of coil surface means a transfer of 415 heat units per square foot of surface per hour. The frost that collects on the outside of the coils is melted after the brine circulation is stopped and a 16-ounce copper drip pan is furnished underneath them with waste connections for disposing of it.

The architect for the Stock Exchange Building, which is one of the architectural adornments of New York, was George B. Post. The piping, duct work and fans were installed by the Baker, Smith & Co., New York, and the chief engineer of the plant is J. H. Dally.

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A SMALL house has just been built on the roof of the "Fuller," or, as it is better known, the "Flat Iron," Building, at Broadway, Fifth avenue and Twenty-third street, New York City, the materials being angle iron and terra cotta blocks. It is to be occupied as the drafting room of the Fuller Construction Company, which owns the building.

# CORRESPONDENCE.

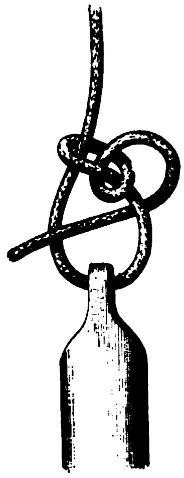
### Full Name and Address Necessary.

We have often called the attention of our readers to the necessity of signing their communications with full name and address so that if occasion should make it imperative we could reach them direct instead of through the medium of the Correspondence columns. Many times a question is raised which it is desirable to amplify or make more explicit before publishing, and the only way of doing this is by dealing direct with the correspondent making the inquiry. The full name is never published except at the request of the writer, all communications being given under initials only or some *nom-de-plume* is used, according to preference.

We make this announcement for the benefit of those correspondents who have submitted queries for the attention of the practical readers but who have omitted to give either their names or addresses.

### Knot for Tying Sash Cord.

*From* HEE H. SEE, *Brockville, Ont.*—In answer to "Old Reader," Evanston, Wyo., I would say that almost



*Knot for Tying Sash Cord.*

any kind of a large knot will answer for tying cords to sash weights provided the weights are cylindrical, with a small hole down through the end and a large one through them sideways to take in the knot. In performing the operation take the cord in the hands as if one were going to tie a single knot, but instead of making one loop make two or three before putting the end through. If, however, the weights are cast with an eye on the end for fastening this kind of a knot will not answer, because it will make the weight hang sideways and will most likely rattle on the sides of the box as the cord revolves in going up and down. In this case I use a knot like that shown in the inclosed sketch, but of course drawn tight. I have left it loose in order to show its construction. It is tied as follows: Take the cord and thread it through the eye of the weight, then up and around and behind the standing part in such a way as to form a simple slip knot. Pull this knot tight and tuck the end of the cord through between this knot and the weight, then slip the knot down to the weight and you are done with it till the cord breaks.

### Effect of Copper on Iron Conductor.

*From* C. J. W., *Berkley, Va.*—I would say for the benefit of "C. H. T.," Norfolk, Va., whose letter appears on page 217, August issue, that copper and another metal in contact when damp or wet induces chemical action, and there is no known remedy for the trouble indicated by his query. The only safe way is to have one metal throughout. The correspondent could reduce the action to a minimum by inserting a rubber or porcelain collar ½ inch thick between the two metals, but even then, when water was flowing so as to make a connection between the two metals the chemical action would be in full force. This will also make it doubly dangerous during an electrical storm. It makes no difference whether the copper is first or last to receive the water, for as soon as water connects the two chemical action is established. I have known copper cornices fastened with iron nails and covered by slate to leak in a few weeks owing to this very cause. The action on all metals is not exactly the same, but they all are deteriorated in a short time. Mild steel is acted upon the quickest and cast iron is made into mush.

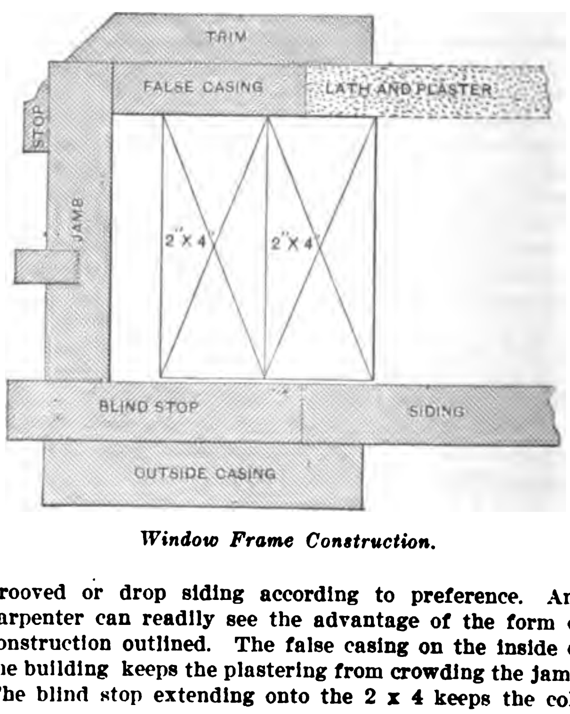
*From* M. I., *Hamilton Canada.*—I read the inquiry of "C. H. T." in a recent issue with considerable interest, having worked in the old country and in the United States before locating here. If a copper leader discharges on a tin roof it is a question of time when the leader succumbs to the electric or chemical action which takes place. This is most severe at the point of contact. I have known copper roofing to be connected with tin flashings and *vice versa*, and the destructive action prevented by the use of a strip of oil paper between the two metals, so that at no point actual contact was made. There are many public buildings which have copper leaders discharging into cast iron pipes at the bottom, the cast iron standing the rough usage which it is likely to meet near the ground better than would the copper conductor. In such instances the iron is too thick for the destructive action to make any serious trouble, particularly when the joint between the copper and the hub of the iron pipe is made by means of Portland or some other cement, which prevents the direct contact, which is troublesome. I think that "C. H. T." need have no occasion to worry about the early destruction of the cast iron from its receiving the copper conductor pipe.

### Details Wanted of Carpenters Tool Box.

*From* W. H., *Cincinnati, Ohio.*—I would like to have some practical reader furnish a detail of a carpenter's tool box in the shape of a suit case—one that will stand the road. There have appeared in the past illustrations of several tool chests, but they are not of just the variety I have in mind, and a further contribution on the subject would seem to be in order.

### Window Frame Construction.

*From* APPRENTICE CARPENTER, *Fort Morgan, Colo.*—I send a sketch showing a horizontal section through a window frame which may be used with tongued and




*Window Frame Construction.*

grooved or drop siding according to preference. Any carpenter can readily see the advantage of the form of construction outlined. The false casing on the inside of the building keeps the plastering from crowding the jamb. The blind stop extending onto the 2 x 4 keeps the cold from coming in through the groove in the siding. The sketch shows a construction for windows without weights.

### The Pitch of Roofs.

*From* C. M. R., *Riverside, Cal.*—Referring to the subject now being discussed under the above title it occurs to me that the Royal ventilator office boy must have written that answer to "Subscriber" which appeared in the issue for August, for either he or Sargent, the manufacturer of steel squares, must be terribly off. I quote from Sargent in Hodgson's work, "The Steel Square and Its Uses":

"The run of a rafter set up in place is the horizontal measure from the extreme end of the foot to a plumb line from the ridge end. The rise is the distance from the top of the ridge end of the rafter to the level of the foot. The pitch is the proportion that the rise bears to the whole width of the building. Thus:

"A run of 12 to a rise of 4 = 1-6 pitch.

"A run of 12 to a rise of 6 = 1-4 pitch.

"A run of 12 to a rise of 8 = 1-3 pitch."

I would recommend the study of the steel square to all wood workers.

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*From* HEE H. SEE, *Brockville, Canada.*—I foresee that the discussion under the above heading is destined to be as long drawn out as "What Constitutes a Day's Work For An Able Bodied Wind Bag," so I hasten to get in my little say before it is too late. I have in my possession a work called "Nicholson's Dictionary of the Science and Practice of Architecture," &c., written by Peter Nicholson, and on page 298, Volume II, he says: "PITCH, in building, the vertical angle of a roof or the proportion between the hight and span, as when the hight is one-fourth, one-third or one-half the breadth of the building." He has more to say on the same subject, but you will notice "the proportion between the hight and span."

Pitch, like the term "penny" for nails, was a word used by the old builders and while we continue to use it we must use it as they did. I heartily agree, however, with "Experienced Builder" in the August number, and think it much more simple to say "so many inches rise to the foot run," and if this could only be made a standard it would do away with a lot of squabbles and mistakes.

There is one little thing that seems to puzzle a lot of people in connection with the term quarter pitch, half pitch, &c. They seem to think that for every different span you will get a different inclination of roof. They cannot see, for instance, how you can be sure that one-third of 27 feet will give you the same inclination as one-third of 20 or 25. I have had people who ought to know better argue this matter with me.

### What Constitutes a Two-Story House.

*From* CRITIC, *Cincinnati, Ohio.*—In reply to the Texas correspondent who inquired in the December issue as to what constitutes a one, a one and three-quarter and a two story house, I beg to say that in the common acceptation of the term a one-story house is a building where the roof comes down to the floor, if there be any, of the attic, and where there is no room to put in windows between the ceiling of the first floor and the plate.

A one and three-quarter story house is a building having one full story, and in addition three-fourths of that story measured from the second floor to the under side of the rafters and as much more running up on the pitch of the roof as may be required for the hight of the ceiling.

A one and one-half story house is one where the plate is some distance above the floor of the attic with a room for a short window between the plate and the floor.

A two-story house is one in which the plate is high enough above the sill to make two full stories of any hight required, but may be unevenly divided.

In reply to his inquiry if there is any standard in these matters, the writer would say that he knows of none. The correspondent also asks if a building with 10-foot walls and an attic is designated as a one and one-half story house, and if a building with 16-foot walls and two floors under one roof is classed as a two-story house. A 10-foot wall would be high enough for a one-story house, as at the least calculation the clear space of the first-story rooms should be 8 feet, then counting 1 foot for the space between ceiling and floor above would leave only 1 foot extending above that on which to place the plate for the rafters. A 16-foot wall could be considered sufficiently high for a two-story house providing the ceiling of the first floor was not more than 8 feet and the head room of the second story extended a trifle up the rafters. There is no rule as to what hight of wall constitutes a story, but there must always be sufficient space between floor and ceiling for a person to stand erect without touching his head. A story, by which I mean the space between the floor and ceiling of a room, may be anywhere from 8 to 16 feet or even more. The extreme, however, is more often found in buildings intended for public purposes rather than in the ordinary dwelling.

The questions raised by the correspondent in Texas would seem to afford excellent opportunity for an interesting discussion, more especially if readers in different sections of the country will give their interpretation of the terms involved.

### Durability of Washington Fir.

*From* ARCHITECT, *Portland, Ore.*—When a sill is used as either a mud sill or a wall plate we always use cedar wherever a decent job is wanted. Fir is very susceptible to dampness and dry rot. If dried with carbolinium it will last a great deal longer. For some years past the railroads have used fir treated thus for ties, and I have noticed that the rails are more apt to sink into the wood when so treated. What the real life is under these circumstances cannot be told, for they have not been treated that way long enough to tell definitely.

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*From* W., *Oregon City, Ore.*—It gives me pleasure to say a good word for Washington and Oregon fir, both the same in quality and size. To answer satisfactorily the query of the correspondent in Texas I would say that Washington and Oregon produce three kinds of fir trees in all their large forests. I speak from 20 years' acquaintance with the construction business here. Locally in both States the fir is named red fir, yellow fir and white fir. There is a difference to an observer in the shade of the bark and form of the leaf. The red and yellow fir is used largely in all heavy construction work, railroad bridges and trestles, mill and dock sills, girders, joist, studding, &c., for all classes of wooden buildings. The life of the firs mentioned for sills and dock piles is especially good if the trees are cut down in the fall or winter. A year ago I repaired a large dock and found piles (great numbers of them) that had been in use for 17 years and were still sound. Others were rotted on the surface from 1 to 2 inches deep—what we call the sap. Fir if kept dry and ventilated will last an age. We have taken down many old structures of the '49's and '52's and found the sills yet sound. The timbers were hand hewn and whip sawed as the case happened to be. Where those old building foundations and sidings were poor the sills were in places rotted, so you see with ordinary precautions the fir will last from 20 to 100 years, I judge. Fir keeps its shape well and works easily in building.

Now comes something strange, but true, and I am only one of many who have noticed it. We have found red and yellow fir boards cut from the same tree. The red fir has a reddish cast in its natural finish and is heart grained, while the yellow fir has quite a yellowish cast, is closer grained and works soft and nice almost like white pine. The latter fir makes our very best exterior and interior finish on this coast, doors included. There are localities here where the red and yellow fir qualities blend so perfectly throughout the whole tree and even many trees that we have what is called the Noble fir, so-called by a Scotch botanist of some note, who sojourned in Oregon for quite a length of time many years ago. The Noble fir is the finest and grandest tree we have in the Northwest. It makes the best of masts and spars for ships, perfect timbers, elastic and of great strength. It also makes the finest flooring, ceiling, finish and doors in our market, firmer than the yellow fir. The white fir is not appreciated here. It makes fine interior finish and is easy to work, but the paper mills use much of it for pulp.

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### Transforming an Old Church Into a Town and Masonic Hall.

*From* F. W. O., *Black River, N. Y.*—I have been called upon to fix over an old church so that the first floor of the building may be used as a town hall and the second floor as a Masonic hall. The size of the old building is 36½ feet by 50 feet 7 inches and I intend to build on an addition at the rear as indicated by the plan which I inclose. I intend to take the gable roof off the old church and add a story for the Masonic hall, covered with a flat roof of tarred felt. I would like to have the problem referred to Mr. Kidder for his criticism as to whether the plan of construction indicated by the sketches inclosed is sufficiently strong to carry the second floor without using posts in the center of the first story, as we want this to be free and clear if possible. If my truss is not strong enough and cannot be made strong enough without using iron girders, what size girders will it be necessary for me to use, or the number of pounds per foot?

The second floor must be deadened in some way not too expensive. I would like to have some practical reader make a sketch of the first and second floors and front elevation indicating his method of construction. The building will be sheathed and clapboarded and have a wooden cornice.

I have been a subscriber to *Carpentry and Building* for the past three years and have not before sent anything for publication. I do not know whether I have given all the information necessary regarding the building, but might mention in addition that it is to be plastered inside throughout. Over the stage on the second floor I would like to have a dining room if the plans will permit.

*Answer.*—The drawings of our correspondent were submitted to Mr. Kidder, the well-known consulting architect, who furnishes the following by way of comment:

The general scheme of construction shown by "F. W. O." is perfectly feasible, but the belly rod of the girder must be larger, and have more drop. As I have frequently stated, the total depth or hight of the girder measured from center of rod to top of beam must be at least 1-10 of the span to obtain the necessary strength with anything like economy.

The strain on the rod is found by multiplying the length of the load at W, Fig. 4, by the quotient obtained by dividing the length of the dotted line B by the length of the vertical line C. In this case B is 134 inches and C is 36 inches, therefore the stress in the rod or rods, equals $W \times \frac{134}{36} = 3.7\ W$. The length of the line C should be measured between the center of the rods and the center of compressive stress in the beam. For floor girders of from 24 to 30 feet span the center of compressive stress may generally be taken at 3 inches down from the top. In this case the writer figured that it could be taken as high as 2½ inches from the top. When the struts are placed at the third point of the span, the load W will be one-third of the total load supported by the girder, including its own weight.

The load on the girder equals the span multiplied by the distance between centers of girders, and this product by the weight per square foot.

For this building the span is practically 30 feet, and the distance, center to center of trusses, 11½ feet, or the floor area supported equals 345 square feet. The weight per square foot is made up as follows:

| | Pounds per square foot. |
|---|---|
| Floor joists | 4 |
| Double flooring | 7 |
| Plastering | 10 |
| Truss | 4 |
| Live load | 80 |
| Total | 105 |

Multiplying the floor area, 345 x 105, we have 36,225

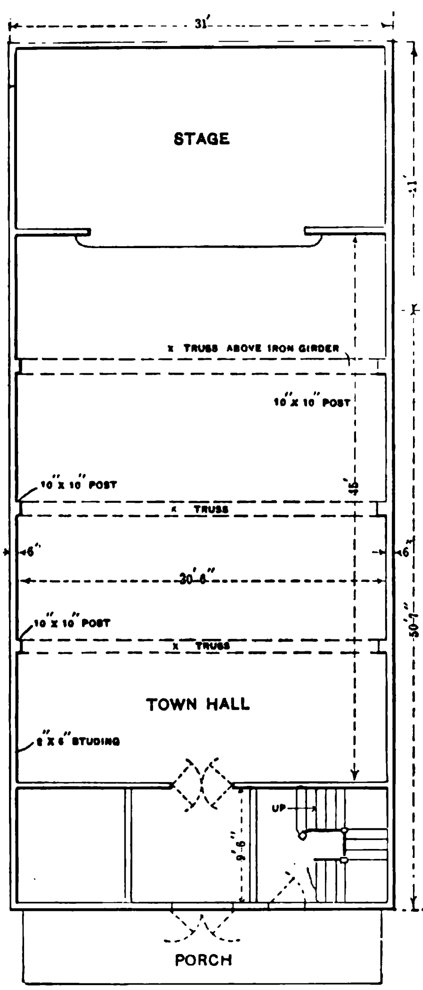


Fig. 1.—Plan.

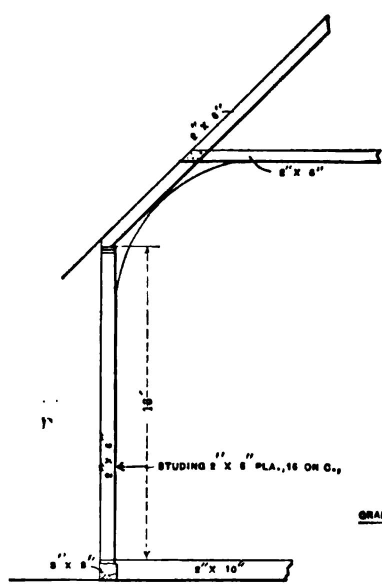


Fig. 2.—Section of Old Church.

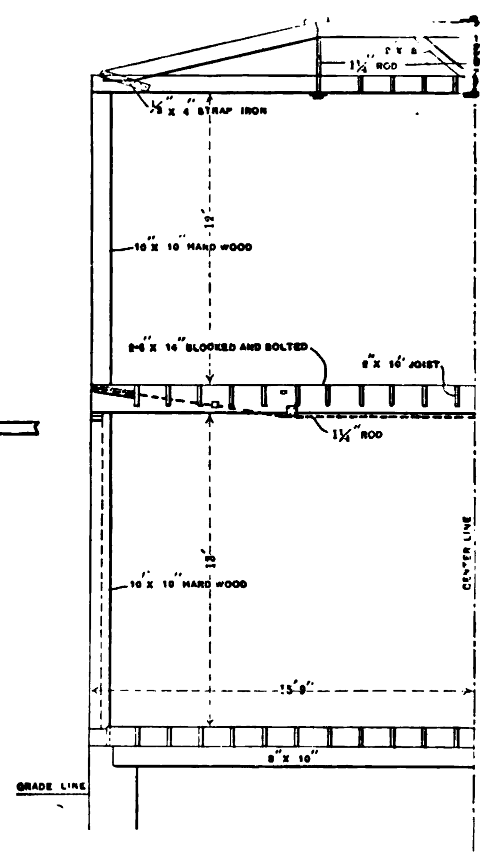


Fig. 3.—Section of Truss.

*Transforming an Old Church into a Town and Masonic Hall.*

pounds as the total load supported by the girder. The load at W will be one-third of this, or 12,075 pounds, and the tension in the rods will be 12,075 x 3.7, or 44,678 pounds. This will require two 1⅜-inch rods with upset ends, or if the screw ends are not upset, two 1⅝-inch rods. The dimensions given in Fig. 4 are the least that the writer deems it safe to use for the support of a lodge room or hall. For ordinary living rooms the live load could safely be taken at 40 pounds per square foot, or even less, which would very much reduce the tension in the rods.

In both Figs. 5 and 6 the tie beam is intended to be built up of three 2 x 8 planks, each layer being composed of one plank 24 feet long and one 7 feet 6 inches long, the layers to be bolted together with ½-inch bolts as shown.

If a single stick of timber 31 feet 6 inches long can be obtained, it need not be larger than 6 x 6 inches.

The objections to the truss shown by the correspondent are that the inclination of the main strut is too flat, and the center brace should run in the opposite direction. The trusses shown by Figs. 5 and 6 will cost but a little if any more than that shown by the correspondent.

The writer believes that the most efficient deadening

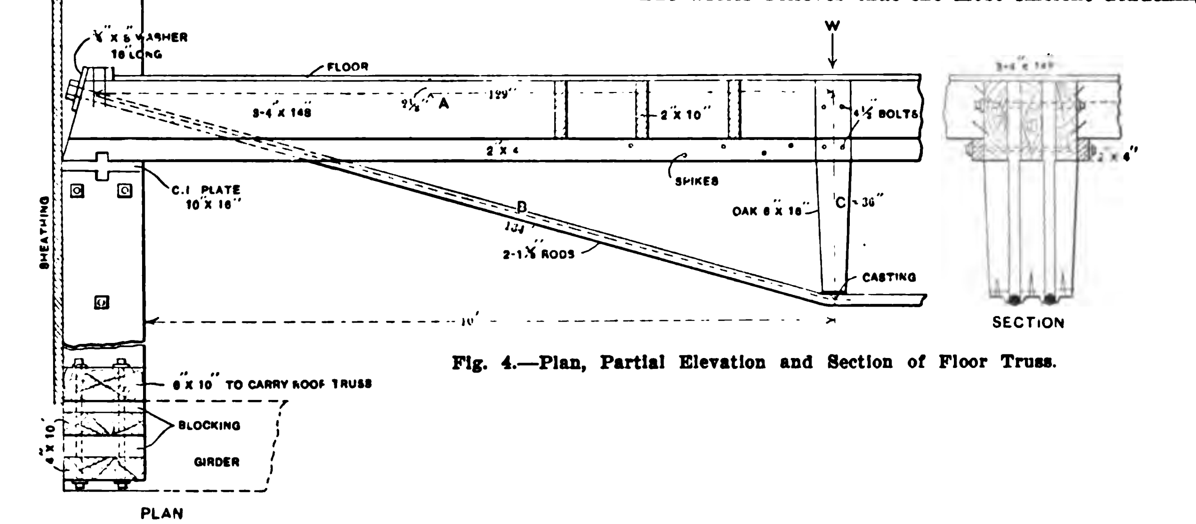
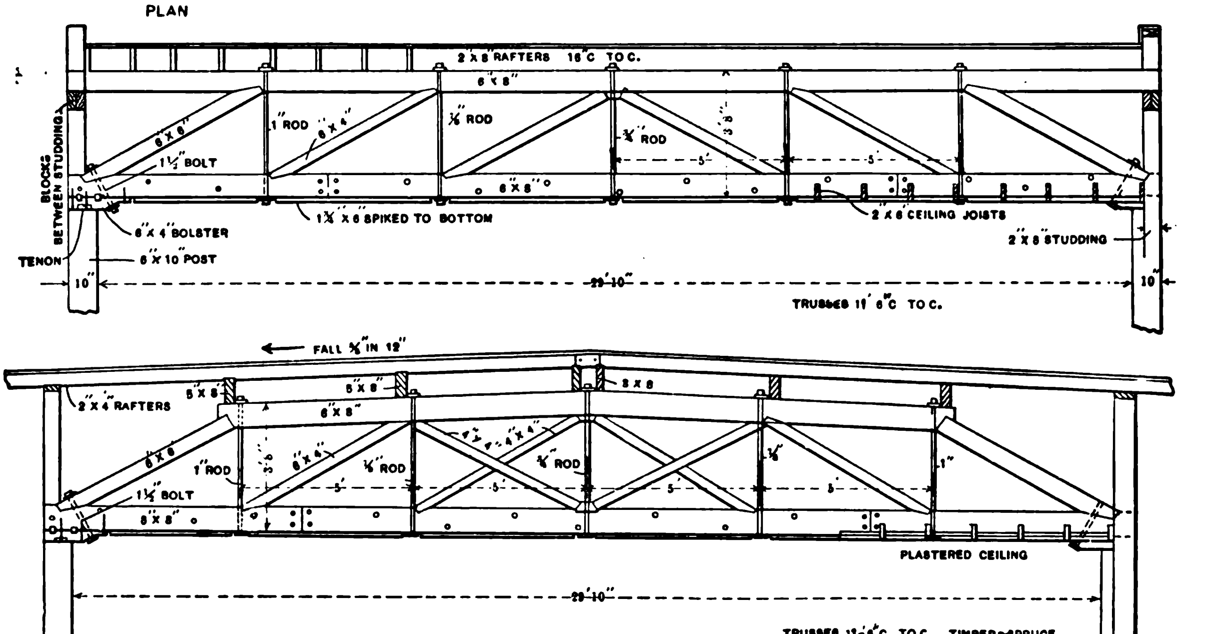



Fig. 4.—Plan, Partial Elevation and Section of Floor Truss.




Figs. 5 and 6.—Trusses for Flat Roof Covered with Tar and Gravel.

*Transforming an Old Church into a Town and Masonic Hall.*

To support a load of 36,225 pounds with a steel beam will require a 20-inch 65-pound steel beam, which would probably cost fully twice as much as the trussed girder. For supporting the girder the writer would recommend that two 4 x 10 inch timbers be used, and a 6 x 10 inch post be run up beside them to support the roof truss, as it is not necessary that the latter shall be directly over the girder. The 4 x 10 and 6 x 10 posts should be blocked apart and bolted together, as shown in Fig. 4.

For supporting a roof I would recommend a light truss, as shown in either Fig. 5 or Fig. 6.

If the roof pitches from front to back of the building, then the trusses should be built as in Fig. 5, the truss nearest the back end being of the hight shown (3 feet 8 inches), and the others increasing in hight with the pitch of the roof.

If the roof slopes toward the eaves, then the trusses should be built as shown in Fig. 6, all of the trusses being alike.

for the second floor will be found in Cabot's Quilt, double ply.

### Some Phases of Icehouse Construction.

*From* J. S., *Hammondsport, N. Y.*—Two years ago I built an icehouse 18 x 24 feet in size, with 14-foot posts, using 2 x 10, lined with tarred paper. Both sides of the 2 x 6 outside studs were sheathed with hemlock. I also lined with paper and sheathed with hemlock the outside frame and covered it with Novelty siding. The roof is half pitch, with collar beams lined with paper and sheathed with hemlock. I placed a lattice window in each end to create a draft, but the man for whom I put up the building said it was too tight, so he had two holes cut in the ceiling, which in my judgment was a great mistake, inasmuch as they will allow the hot air to rush in. I also had a plank floor in the bottom, which he removed, and this year he had the ice laid directly on the ground. I wanted him to paint the building white to refract the heat, but he did not do it. I would like to know who is right in the matter.

*Note.*—With a view to starting a discussion on the subject raised by our correspondent above we submitted his communication to Frank M. Hamlin, Lake Villa, Ill., whose comments in the past on icehouse construction have attracted so much attention, and have the following:

In regard to the construction of the walls as mentioned by "J. S.," I would say they are as near right as can be made, but if he had furnished a sketch of the walls his ideas would have been more clearly understood. I will state right here that the main object in the construction of the walls of an icehouse is to make them from sill to plate perfectly air tight, or as nearly so as possible. The object of the sawdust packing, as shown in the constructive details in connection with my article in the May issue of *Carpentry and Building*, is to stop any circulation of air through the wall, while at the same time it retards the passage of heat from the outside. The felt paper also acts as a stop for the passage of air from the outside.

I cannot say that I regard it of any benefit to line the underside of the rafters or the collar beams when the ice is protected by a covering of hay or other similar material.

As to the ventilators at the gable ends, I would say that it is very necessary to have the space above the ice well ventilated, and a window with slat ventilator placed high up in each gable is a very good way to obtain the desired results. In some cases we have put the ventilators on the roof, but in this section of the country the snow in winter sifts into the house through them, and unless they are closed tight will rot the covering and damage the ice. The hay covering should be placed at least 2 feet thick on top of the ice.

I think the correspondent has about the right idea in regard to the painting, as a light surface reflects the heat of the sun and a dark one absorbs it. I hope that more of the readers will feel disposed to offer comments on this subject as it is a very interesting one, and a free discussion of it cannot fail to bring out points which will prove of value to many in the trade.

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### To Find the Length of a Rafter.

*From* MORRIS WILLIAMS, *Scranton, Pa.*—I have been placed in a fix by your correspondent, "W. F. P.," Berea, Ohio.

When writing the few articles on "Framing Roofs of Equal and Unequal Pitch," I placed before the reader three different methods to find the length of rafters.

1. By measuring the diagonal of the run and rise on the steel square with a 2-foot rule where the measurement on the rule would give the length of the rafter by considering the inches as feet.

2. By stepping along the rafter timber a number of times equal to the number of feet in the run.

3. By multiplying the bridge measure in inches of whatever pitch is employed by the run in feet.

Either method will give the exact length of a rafter.

In the June issue "W. F. P.," Berea, Ohio, doubted the accuracy of the third method, and in the issue following there appeared my explanation, which unfortunately conveyed the idea that his doubts were well grounded.

In the August issue I am brought to task by "W. S. W.," Sterling, Kan., and placed before your readers as a reprobate having left my first conceptions.

"W. S. W." correctly explains the principle involved in the bridge measure method, every word of which I heartily indorse.

The roof I had under consideration in my articles on "Framing Roofs of Equal and Unequal Pitch" was one having two unequal pitches—one rising 12 inches to the foot run, and the other 18 inches.

The length of rafter for the first will be found according to the third method by first ascertaining the bridge measure of 12 and 12 by means of the square and a 2-foot rule. The bridge measure will be 17; then multiply 17 by 12, the run, as follows: $17 \times 12 = 204$ inches = 17 feet, which is the length of the rafter.

To find the length of the rafter that rises 18 to the foot run, we place the 2-foot rule across the square from 18 on blade to 12 on tongue; the rule will measure $21\frac{5}{8} \times 8$, the run, = 173 inches = 14 feet 5 inches, which is the length of the rafter.

It will be observed that the bridge measure in this case does not give the length of rafter as it did in the other case; and that because we are using figures on the square other than those of the run and rise—namely, figures that represent the rise to 1-foot run.

It will also be observed that this method merely saves the time it would take to step along the rafter timber a number of times equal to the number of feet in the run, which is the most common method in use by carpenters to determine the length of rafter timbers.

Many carpenters make use of the square root method to find the length of rafters, and of all methods it gives the best results inasmuch that it guarantees unmistakable exactness.

The principle is that of finding the hypotenuse, or long side, of a right angle triangle where the base and altitude are known. The rule is to add the squares of both base and altitude, and extract the square root of the sum.

For example, we take the rafter that rises 18 to the foot run. The run of this rafter is 8 feet and the rise 12 feet. To find the square of 8 we multiply it by itself, as follows: $8 \times 8 = 64$, and the same with 12—the square of which is 144. The sum of 64 and 144 = 208. The square root of 208 is found by the following arithmetical figuring:

```
     1)  208  (14.422
         1
    24)  108
          96
   284)  1200
         1136
  2882)   6400
          5764
 28842)   63600
          57684
```

The quotient being 14 feet and 422 decimals of a foot. The decimal is reduced to inches by multiplying it by 12; $422 \times 12 = 5064$ inches, which makes the length of the rafter by this calculation a little over 14 feet 5 inches.

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### The Refrigerator in Modern Dwellings.

*From* C. A. WAGNER, *Port Jervis, N. Y.*—I have read with much interest the comments of "X. Y. Z." in the August issue and in regard to icing the refrigerator from the outside I would say that my plans as originally submitted show that provision was made for doing this, but it was overlooked in some way by the engraver when the cuts were prepared, as were also some other minor points. This I do not consider any fault of mine and I hope to see in the next issue mention of the fact that I provided an ice door for icing the refrigerator from the rear porch. If "X. Y. Z." will kindly call on me at any time, I will convince him that I have the only really dry-air refrigerator on the market and of my own design and make.

I always have placed my refrigerator in the kitchen, and about 6 feet away from the range, while others have been placed in the basement, cellar or entry, and keeping tabs on the amount of ice used have found that there was but slight difference. If "X. Y. Z." will come here I will show him in short order what I call a refrigerator, but he must not put his judgment on the cheap zinc lined boxes now on the market, as I would not give any of them house room. I have no box that makes its own ice, but I have one that will save ice to the extent of one-third less than any other as ordinarily constructed and can very easily convince the most skeptical.

*Note.*—A careful scrutiny of the blue prints shows faintly indicated a door for placing the ice in the refrigerator as stated by our correspondent, but it was overlooked by the engraver and its omission in the finished cut was not noticed until we received the letter above.

# WHAT BUILDERS ARE DOING.

THE figures which are available covering the building operations in the city of Boston during the first six months of the year indicate a remarkable increase in the volume of operations as compared with the corresponding period a year ago. In the case of brick and stone buildings the improvement is very nearly 100 per cent., while in the case of wooden buildings it is in the neighborhood of 30 per cent. As shown by the books in the office of the Building Commissioner the greatest activity occurred in the months of April and May, this being the season when operations involving new work are in expanding volume. During the first six months of this year permits were issued for 561 buildings, of which 231 were brick or stone and 330 were of frame construction. In the corresponding period of last year permits were issued for 362 buildings, of which 119 were brick or stone and 243 were of frame.

The annual statement of the Building Department of the city of Boston for the fiscal year ending February 1 last shows 775 buildings to have been completed in that period, valued at $14,767,000, while for the previous year 736 buildings were completed, valued at $18,242,500. It is proper to state in this connection that the figures issued by the department cover only buildings actually completed during a given period and the actual rather than the estimated cost of the work.

The commission on the hight of buildings in certain sections of Boston has submitted a report in the form of an order in which it determines the hight of structures within the district designated as "B." In this district on streets exceeding 64 feet wide buildings may be erected to a hight equal to one and one-quarter times the width of the street, and if situated on more than one street the hight is to be gauged by the widest street, but not to exceed 100 feet. In the case of irregular open spaces the width for building purposes is to be the width of the widest street entering such place. No building shall be erected to a hight greater than 80 feet unless its width on each street on which it stands shall be one-half its hight.

The Structural Building Trades Alliance was formally organized at a meeting of representatives of various unions on the afternoon of July 23, when the following declaration of principles was adopted:

"1. The establishment of local and international boards of arbitration to settle disputes as they arise without having to resort to strikes.

"2. When necessary to give international sympathetic support to all trades affiliated where local boards fail in their efforts to adjust difficulties.

"3. To safegard, protect and watch over the interests of the organizations affiliated.

"4. To protect the autonomy of the several trades represented.

"5. To keep agreements with employers inviolate.

"6. To avoid and discourage strikes and to prevent international strife and friction in the building trades industry by substituting arbitration in settlement of trade disputes.

"7. To oppose the formation of dual and rival bodies, demand their complete annihilation, and assist only such unions as are affiliated with their respective national and international unions conforming to this declaration of principles.

"8. To encourage and maintain fraternal relations with existing recognized central bodies, and to emphasize t e necessity of a centralization of organized wage earners."

R. H. Bradford of Electric Workers' Union No. 103 was elected president *pro tem.*, John H. Carr of the Structural Iron Workers vice-president and John F. Kennedy of the Sheet Metal Workers secretary. No other officers will be chosen until the election of permanent officials after all the unions hoped for have sent delegates to the alliance meetings.

Committees on by-laws and constitution and to address the various union meetings on the value of the new organization were elected.

### Cleveland, Ohio.

During July there was a perceptible increase in the amount of new work projected as compared with the same month a year ago, the number of permits issued being 525 and 398, respectively, calling for an estimated outlay of $1,076,515 and $732,485.

Important action affecting the labor question in the building field has just been taken by the building trades section of the United Trades and Labor Council in the appointment of a committee to revise the constitution of the Building Trades Council, which it is stated will result in provisions being incorporated in it to prohibit more than one or two unions going out on strike at the same time. The committee appointed to revise the constitution is composed of H. D. Thomas, business agent of the United Trades and Labor Council; Thomas Wilson, business agent of the Painters' Union; W. E. Gunn, business agent of the Sheet Metal Workers' Union; Thomas Roberts, business agent of the Plumbers' Union; Christopher Kohler of the Marble Workers' Union; Thomas Joyce, business agent of the Steam Fitters' Union; August Palutze, business agent of the Laborers' Union, and A. W. McIntyre, business agent of the Electrical Workers' Union.

### Chicago, Ill.

While the value of the building improvements for which permits were issued during the month of July did not vary materially from the figures of the corresponding month last year, there was an appreciable increase in the number of buildings projected and the number of feet of frontage which they covered. While this apparent equilibrium exists for the moment, it is felt among architects and builders that with the large number of projects contemplated there is likely to be increased activity during the next few months, so as to swell the total for the year to satisfactory proportions. The figures for the month of July show that permits were taken out for 768 buildings, having a frontage of 18,869 feet and estimated to cost $3,778,390, as against 623 buildings, having a frontage of 16,298 feet and costing $3,765,000, in the same month of last year.

### Los Angeles, Cal.

The figures issued by Building Inspector Backus show a steady growth of the building movement in the city and indicate a volume of business for the year which is of a most gratifying character. The number of permits taken out during July was 691, calling for a total estimated outlay of $1,304,108, as against 568 permits for building improvements valued at $1,094,404 in July of last year. While a large part of the improvements projected during July consisted of one and two story dwellings, there were permits taken out for several flats and apartments houses, and as compared with previous years the current figures for July hold the record. During the first seven months of the year there were issued 5155 permits for improvements valued at $8,916,613, compared with 3839 permits for improvements valued at $6,636,060 in the first seven months of 1904.

### Lowell, Mass.

During the past few weeks several matters have materialized which, though not of special general interest, are of much importance locally. The present outlook gives promise of a steady and substantial growth far exceeding that of recent years. The most important of the new enterprises is the location in Lowell of the Shaw Machine Company, recently organized with a capitalization of $300,000. The company has purchased 20 acres of land fronting on the main tracks of the Boston & Maine Railroad and will erect thereon an extensive plant, modern in construction and equipped with the best and latest improved machinery, the plans having been prepared by Architect Gridley of Pawtucket, R. I. The Mawhinney Shoe Company has decided, thanks to the enterprise of Mayor Casey, to locate its new factory in Lowell and has commenced the erection of an extensive plant. Four of the large corporations are now adding substantial buildings to their already extensive plants. The Lowell Gas Light Company is putting in the foundations for a new building of concrete construction, the contract having been awarded to Cyrus Barton. General building is about equal to that of former years, and the expectation is that much new construction will be required to provide for the influx incident to the new industries.

### Omaha, Neb.

The building operations for the month of July in Omaha were upon a scale without a parallel in the history of the city, the percentage of increase as compared with July of last year being 460, and for the seven months of this year as compared with 1904 the figures of increase are equivalent to 138 per cent. The previous best month was August, 1887, when the boom was at its hight. According to Chief Clerk Grotte of the Building Department the value of the improvements for which permits were issued during July of the current year was $1,045,650, as compared with $185,775 in July last year. For the first seven months of this year the valuation was $2,525,249, while in the same period last year the figures were $1,064,395. In fact, the building improvements for the first seven months of this year are practically $500,000 in excess of those of the entire 12 months of last year, while in 1903 the total value of the building improvements projected was $1,071,057 and in 1902 their valuation was $1,300,836.

### Philadelphia, Pa.

The activity in the construction of dwellings and the consequent improvement of suburban sections of the city continues on an expanding scale and operations during the month of July show a gratifying increase as compared with the same month last year. According to the report of the Bureau of Building Inspection there were 854 permits issued in July, covering 1491 operations and calling for an estimated outlay of $2,790,155, as against 747 permits, covering 1164 operations and having a valuation of $2,533,090, in July last year. During the month just closed permits were issued for 766 two, three and four story dwellings, to cost $1,559,790, and for 11 manufacturing plants, estimated to cost $270,550. There were 328 permits issued for alterations and additions, involving an outlay of $517,000, and 243 permits for miscellaneous buildings, involving in the aggregate an outlay of $118,680. The Second Ward leads for the month with an expenditure of $323,875, followed by the Fortieth Ward with $307,665, the Thirty-fourth Ward with $242,380 and the Thirty-third Ward with $231,495. Of the total estimated outlay called for by the permits issued the four West Philadelphia wards contributed $924,145.

### Portland, Ore.

The building outlook for the fall is pronounced good. Contractors and builders have been busy for several months past and they claim that the prospect is for a continuance of the present activity for several months to come. In the downtown district a number of new buildings are to be put up, including an eight-story building for Wells, Fargo & Co., a four-story brick store and office building to be erected by Wm. Fliedner, the remodeling and altering of a building owned by the Beck estate at a cost of $15,000, a three-story brick building to be erected by the Women of Woodcraft and two three-story apartment houses to be erected by Mrs. Cardwell and Edward Holman respectively. Modern flats, which have heretofore been rather scarce in Portland, are now being put up in considerable numbers.

### Rochester, N. Y.

The members of the Builders' Exchange have just moved into their new quarters on the fourth floor of the German Insurance Building, the suite consisting of five large rooms. New furniture has been installed and every convenience provided for the transaction of business and the comfort of the members. When everything is in order it is thought that the exchange will have quarters equal to those of any similar organization in the State. The Rochester Exchange was organized in 1888 and the present officers are Fred. Gleason, president; F. C. Lauer, first vice-president; F. L. Hueghes, second vice-president; J. Austin Young, secretary, and Richard Williamson, treasurer. The office of the secretary adjoins the new quarters of the exchange.

The building situation in the city shows a fair amount of work in progress, and while the record for the month of July falls somewhat behind that of the corresponding month a year ago, the figures for the seven months show an increase of nearly $300,000 over the first seven months of 1904. Much of the work planned during the month named consists of dwelling houses ranging from a low figure up to $13,000.

The Rochester Builders' Exchange entertained about 25 members of the Buffalo Exchange the latter part of July, the visitors making the trip from Buffalo in automobiles. The visitors were met at Batavia by a delegation from Rochester, and after dinner the run was continued to the city and thence to Ontario Beach. The return was made by way of Geneseo and the Genesee Valley.

### San Francisco, Cal.

Although many other lines of trade showed a falling off owing to the hot weather and the vacation season, the amount of building undertaken in July was fully up to the average of the previous months of the year. The tendency toward expensive office, hotel and store buildings was more marked than previously and some very large contracts were let during the month for steel, stone and brick. Builders report that while there is more than the normal amount of work under way as far as heavy construction is concerned, there is less activity in the erection of dwellings and in general of buildings averaging between $1000 and $3000 in cost than there was a year ago. Nevertheless there is a good steady demand for new residences and, as heretofore, practically all of the available workmen are employed. The labor situation is in a healthy state and no labor troubles are expected during the coming fall and winter. The fact that there are now more empty buildings in the city than for several years past would seem to indicate a coming reaction in construction work. Some builders, however, claim that as it is only the antiquated and old style buildings that are vacant it is by no means certain that the demand for new modern office and store buildings is satisfied. As a matter of fact practically all of the new buildings are rented as soon as completed.

In the suburban districts building still shows an increase month by month over the building of last year. Suburban building continues to be largely of fine new residences, averaging from $5000 to $10,000 in cost; but there have also been some large office and store buildings undertaken in Oakland and Berkeley during the summer.

### Seattle, Wash.

Building construction undertaken during July shows a large increase over the work for the month preceding, permits having been issued for a number of large and costly buildings, including two 12-story office buildings, one for the American Savings Bank & Trust Company, to cost $300,000, and one for Judge Thos. Burke, to cost $250,000. Both of these buildings are to be of reinforced concrete construction. During the first half of 1905 the total value of the building permits issued in Seattle was $3,537,249, as compared with $4,371,067 for the first half of 1904 and $3,437,053 for the last half of 1904. Contractors are of the opinion that the record for the whole of the present year will considerably exceed that of last year. They claim that there is a large amount of work in sight for the remainder of the year and that general conditions indicate that the building work undertaken during the remainder of the year will be equal to that of the first six months. Builders report that the construction of a good class of residences has been a marked feature this year, and that although the number of residences built has been less than it was for the same months last year, it has shown a considerable improvement in the quality of the buildings. The building of business blocks is steady, and as practically all of the business property of the city is rented there seems to be no danger of overdoing this line of construction work.

### Tacoma, Wash.

Builders report that work has progressed satisfactorily throughout the summer. The contracts let during July were about up to expectations, and according to the plans now in the hands of architects the present activity will continue throughout the fall. More dwellings have been erected in the city during the past seven months than in any other similar period of time. Large fire proof construction work is not particularly noticeable this summer, though several large buildings have been undertaken during the past few weeks and several more are to be begun before the end of the summer. The steady increase of population and the favorable conditions prevailing in building materials cause an active demand for residences and the building of these will probably continue the chief feature of the situation throughout the remainder of the building season.

### Notes.

At the recent semiannual meeting of the Builders' Exchange League of Pittsburgh, Pa., W. W. Campbell was elected assistant secretary, vice Thomas Lane, resigned. Mr. Campbell is in reality the active secretary, performing most of the duties connected with the office. Reports received at the meeting from the various affiliated interests showed a generally satisfactory condition of affairs, with prospects unusually bright for a record breaking year.

The stockholders of the Builders' Exchange Building Company of Baltimore, Md., held a meeting July 10 and elected the following directors: James A. Smyser, E. L. Bartlett, William Ferguson, B. F. Bennett, Joseph H. Hellen, John L. Lawton, P. M. Womble, George W. Walther and Hugh Sisson. The following day the board organized by choosing the following officers for the ensuing year: James A. Smyser, president; John L. Lawton, vice-president; B. F. Bennett, treasurer, and John M. Hering, secretary.

## Law in the Building Trades.

#### CONTRACT FOR FIXED PRICE AN ENTIRE CONTRACT.

A contract to erect a building at a fixed price is an entire contract, and must be performed in accordance with its expressed terms as contained in the writing creating it, unless properly modified in a legal manner.—McConnell *vs.* Hughes (W. Va.), 40 S. E. Rep., 436.

#### DAMAGES FOR WHICH CONTRACTOR WILL NOT BE LIABLE.

A house owner employed a contractor to put a heating apparatus into the house, and rented another house, which he was occupying to third parties, intending to move when the heating apparatus was installed. By reason of the delay of the contractor he was unable to deliver possession to his tenant at the promised time, and lost certain rent. It was held that he could not, in the absence of special notice to the contractor of the agreement to rent the house he was occupying, recover the amount of such lost rent as damages for the delay, the damage being too remote.—Reilly *vs.* Connors, 72 N. Y. Sup. Rep., 470.

#### ARCHITECT HAS NO POWER TO WAIVE WRITTEN NOTICE.

A building contract provided a specified sum as liquidated damages on failure to complete the work by a specified date, that in case of delay due to the act of the owner, the architect or other contractor, the time fixed for the completion of the building should be extended for an equal time; but that no such allowance should be made him unless a claim in writing was presented to the architect within 24 hours. It was held that the architect could not waive the written notice.—Wagner Company *vs.* Cawker (Wis.), 88 N. W. Rep., 599.

## A Hip Turret Skylight.

BY H. COLLIER SMITH.

In the following description of the typical construction of a hip turret skylight no dimensions are given, as the members must necessarily vary according to the areas covered and the lengths of span in different skylights. Referring to the sketches, Fig. 1 is a vertical cross section, Fig. 2 a vertical section of turret showing stationary glass in ends, Fig. 3 a horizontal section on A A of Fig. 1 and Fig. 4 a plan view of the structural skylight roof framing; *a* in Fig. 1 is the terra cotta filled angle iron roof curb, upon which the turret of the skylight rests, the typical construction of which is too well known to require description. This curb is generally, although not always, furnished by the building contractor, and is sometimes made of reinforced concrete or brick, depending upon the nature of the area lighted.

The angle iron framing of the turret consists of horizontal angles *b* and *b'* around all four sides of the opening, joined by the uprights *c*. The corner uprights are made of angle shape, so as to also act as knees for securing the miter connections of the horizontal angles *b* and *b'*, while the other uprights are made T-shape in order to allow of a small and symmetrical section in the sheet metal posts in which they are incased. In Figs. 1 and 3 *d* indicates pivoted sashes, in Fig. 3 *e* the stationary glass, in Figs. 1 and 3 *f* the movable louvers, *g* the lower operating arms and *h* the bar connecting those arms for operating all louvers simultaneously; *i* in Fig. 1 is a spring which keeps the louvers closed and J a cord for pulling them open.

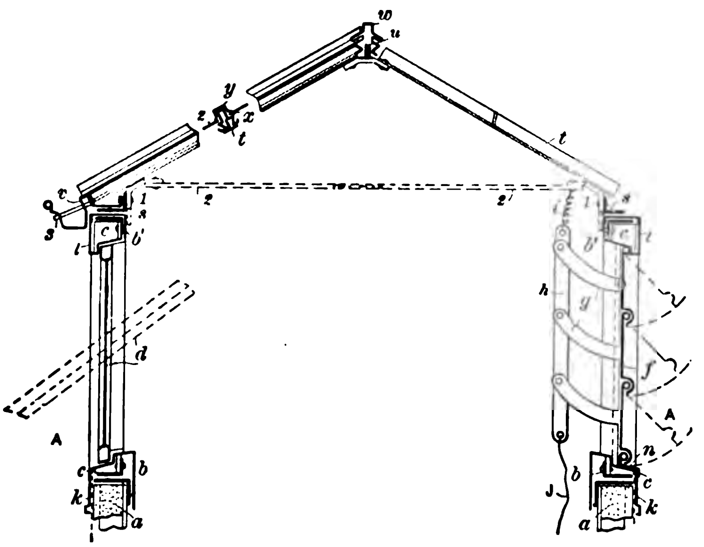

Fig. 1.—Vertical Cross Section.

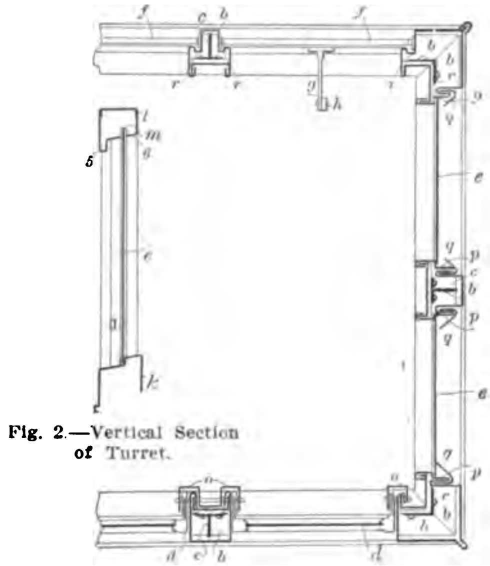

Fig. 2.—Vertical Section of Turret.

Fig. 3.—Horizontal Section on A A.

The lower sheet metal curb *k* and the upper curb *l* of the turret run continuously around all four sides, without change of profile, unless it is desired to use stationary glass in the ends, in which case the glass groove *m* in Fig. 2 is formed in the end pieces of curb *l*.

The small piece *n* is planted on curb *k* to receive the lower edge of the lower louver. Curb *k* is wider than curb *l*, the surplus projecting inward and being formed with a wash, so as to catch and conduct to the outside any leakage or condensation occurring inside of the skylight or turret not otherwise taken care of.

Referring to Fig. 3, it will be seen that the upright sheet metal posts in connection with the pivoted sashes as well as the side rails of the sashes are provided with inwardly projecting flanges, for connection by and through which the pivot pin passes. These flanges also permit the use of a very efficient form of weather stop, *o*, which is made in two pieces, the lower piece extending from the pivot down and attached to the post, and the upper piece extending from the pivot up and attached to the sash or sashes.

The upright sheet metal posts in connection with the stationary glass are formed with the slip joints or pockets *p* for receiving the detachable glass caps *q*. These caps are held in place at their top ends by the overhanging member of curb *l* and at their bottom ends by clips secured in pockets *p* and bent over the caps.

The pockets or channels *r* in the posts, in connection with the movable louvers, take care of any water that may find its way around past the ends of the louvers, conducting same down to the lower curb, from which it runs off. The member *n*, as shown in Fig. 1, should not extend over across the bottom of channels *r*, as this would dam the outlet from the channels and defeat the object for which they are provided.

The structural roof framing of the skylight consists of the curb angle *s* shown in Fig. 4, the T-shaped bars *t* and T-shaped hips and ridge. If the size is too great to allow of assembling in the shop the hips and ridge can be made of two angles, thus permitting shipment in four sections, which are easily riveted or bolted together on the building. The T-bars are secured to the angle curb,

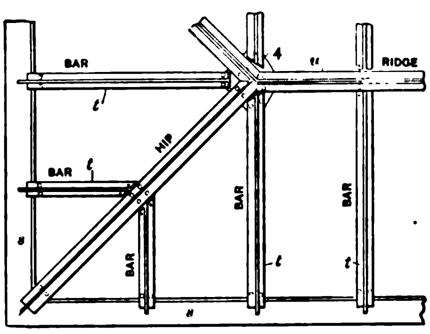


Fig. 4.—Plan View of Skylight.

*A Hip Turret Skylight.*

as well as the hips and ridge, by knees, and the junction of the hips, ridge and bars is effected by means of a gusset plate, to which all are riveted. It will be noted that no forging or fitting is called for on any of the structural work of either turret or roof, as it is cheaper to make connections by means of knees *i* and gusset plates, as shown at 4. This method of constructing the angle frame permits the use of the continuous sheet metal curb and ridge *u* without cutting. Ordinary sheet metal bar construction is slipped over the upturned web of the T-angle bars, hips and ridge, the condensation gutter members of the sheet metal bars resting on the flanges of the T-angles. All sheet metal connections should be riveted, laps being provided for this purpose. The condensation tubes 3 can also be made to answer as gutter dogs or braces.

If the skylight be a long one the knees 1 in Fig. 1 can be extended down, as indicated by dotted lines, to form a guide for holding the turret and roof curbs in proper relative position, and the upper end of the knee can be extended horizontally to form a connection for the cross tie 2. Curb *l* should be made in two pieces, with slip lock seams at the points 5 and 6, for which see Fig. 2.

Assuming the roof curb to be complete, the order or method of getting out and putting up the work is as follows, assuming the light to be too large to complete in the shop: After all the work is in knocked down form put the turret together in sections, leaving the corner seams open, of course, and leaving off the top of curb *l*. Then go to the building and set the angle curb *b* and erect the uprights *c*. Now slip the sheet metal turret sections over the structural work and make the corner and other seams. Next bolt or rivet the curb angle *b'* in place and put the top on sheet metal curb *l*. Now all is ready for the erection of the structural roof frame, after which sheet metal curb *v* is set. Next in order is the setting of the sheet metal hips and ridge, and lastly the sheet metal bars, when the glazing can be done.

It will, of course, be understood that the section shapes of the sheet metal members throughout can be modified to suit any standard constructions in regard to connections between sashes and posts, louvers and stationary glass, &c., without interfering with the general construction shown. A skylight of structural iron construction thus incased in and protected by hollow sheet metal construction is far more fire resisting than when the structural work is not so protected. Better weather proof qualities are also obtained.

## Apprentices in the Sheet Metal Trade.

A great deal has been written regarding the apprenticeship question, and all of it in a pessimistic vein, which tends to give the impression that there has been a sad deterioration in the quality of material being made at present into sheet metal workers as compared with those who are now journeymen. One writer deplores the tendency of the boys to talk prize fights, theaters, skating, &c., in preference to squaring the circle, solving intricate pattern problems and discussing the merits of charcoal iron *vs.* soft steel sheets. Unconsciously these writers all throw bouquets at themselves as being bright and shining marks whose example as models of virtue as mechanics, both theoretical and practical, should be the guiding star to lead the new crop of apprentices in the straight and narrow path that leads to $15 or $18 a week, eight months in the year.

Man is an egotistical animal, and we are all prone to plume ourselves on our superior knowledge and ability, and one of our great weaknesses is the delight we take in holding ourselves up as models to be followed and pointing out the difficulties that we had to surmount before reaching our present pinnacle of perfection. We forget the days of our youth, when we carried a well worn copy of the genus dime novel in our pocket and slipped it out for surreptitious peeps when the boss went across the street with a friend.

To hear us tell it, our only literature was the Bible and the Catechism for Sunday consumption and a pattern book for week days, nights and holidays. We never stole the glasses out of old man Jones' spectacles and substituted bright tin, and then stood afar off with a look of innocence that would melt a heart of stone while the old gent would rub and try on and rub and try on again, never suspecting the trick that had been played on him. We never nailed the new man's lunch box to the floor, mixed powder in the rosin pan, ran the boss's cat through stove pipe to clean it out, or dropped solder on the dog to see him jump. Oh, no! All these things were devised by the modern cub.

Seriously, there is something wrong with the apprenticeship system, and it would be worth a great deal to the trade to be able to find the trouble and correct it. The trade is a far better one than it was in former times, for it has reached the plane where the men employed at it are no longer "tinkers" and merely skilled in handiwork, but are sheet metal workers, artisans with brains capable of thinking and planning. The ordinary outside foreman in charge of a gang of cornice and skylight workers does more thinking and planning in a day than a whole shop full of assortment workers ever did in a week. His position demands it, and unless he does it there is soon a demand for another man to fill the position.

If the pay were commensurate with the ability demanded there would be a greater inducement for men to perfect themselves for positions of this kind, but as long as the plasterer and bricklayer get twice as much as the sheet metal worker, and the carpenter, iron worker, plumber and steam fitter get more for less dangerous work, requiring a great deal less skill, we cannot expect the trade to be very attractive.

As long as conditions are such that men enough cannot be secured to do the work from September to December, says a recent issue of the *Metal Worker, Plumber and Steam Fitter*, and there is not enough work the other eight months in the year for more than 60 or 70 per cent. of the men, we cannot expect a headlong rush to learn the trade. It is folly to talk about the labor unions limiting the number of apprentices, for in very few places is the number limited at all.

In the opinion of the writer the main cause of any backwardness on the part of the apprentices of to-day is the lack of encouragement by their employers. How many of them hire boys to learn the trade, encourage them to study and ask questions—insist on their doing so—and explain to them the possibilities open before them? The material coming into the shops is better than was formerly brought in, and we know it, even if it does jar our vanity to have to acknowledge it, for this material has a better education to start with, and is just as strong and healthy, and has the advantage of being, possibly, a little older on the average than the newly entered apprentice was in our time.

Having the material to work with and a good trade to teach a boy, it is certainly our fault if we do not make a good mechanic or else fire the defective material out and get some that is decent. Sad to say, however, we make a very poor effort, if we make any at all, to teach a boy, interest him or instil in his heart a desire to learn the business thoroughly. We discourage him at the start by talking of the trade pessimistically, and if he has any ambition we dampen his ardor by such talk. Then we let him alone to work out his own salvation.

What elevating conversations did we hear as the men sat around the stove in the lunch hour? Were there discussions regarding whether cleating or nailing was better for a flat lock roof, methods of cutting patterns, or the reason that fruit cans were cut a certain size? Or was the talk confined to how many wash boilers Bill Simpkins could make in a day and how many squares of tin John Jones could lay and finish up? Sad to say, at least a large proportion of the talk was "air," empty boasts of what some one could do.

Some one suggests that until we get better methods of turning out mechanics we must depend on the old countries to supply them. Undoubtedly the old countries supply excellent artisans, but if the newer and better paying branches of the trade, such as cornice, skylight, steel ceiling and metal furniture work, had to depend on the foreign workman there would be less work of this kind done. In an experience of over 16 years at cornice and skylight work and roofing the writer has seen very few, indeed, of the foreign mechanics who were working at these branches of the trade as foremen of gangs on the outside. Nearly all these positions are held by American born and American educated mechanics. The foreign workman as a mere artisan is often superior to our own product, but he lacks the initiative, the executive ability and the "get-up-and-get" of the better class of the home grown article. And these qualities are in our workmen because the life, the natural exuberance and thoughtlessness of youth and the mischief have not been crushed out of our boys.

Probably they do not devote as much thought to the trade as they did in our time, when we, the "model cubs," were learning the trade, for they are not being spurred to it as much, but they will wake up, at least a large proportion of them will, and turn out very creditable mechanics. Probably a greater proportion of them study the trade than ever studied it in the past. In the writer's experience he was the only "cub" out of about 15 or 20 he worked with who could cut a pattern, explain how tin plate was made or how slate was quarried. At the present time he knows five "cubs," at least four of whom, from present indications, will make first-class mechanics. They are average boys, but have been talked to some regarding the possibilities offered by the trade, and one of them at the present time is borrowing *The Metal Worker, Plumber and Steam Fitter*. Another, who has just finished his time, is taking a correspondence course in pattern cutting, and one mechanic in the shop quit his job to take a course in the trade school. These are not exceptions, but they go to show the effect a little interest and encouragement have on the apprentices.

Besides being egotistical we are selfish. We look at questions as they affect us, regardless of how they affect others, and we seem to think that we do not owe any duty to the community at large. For this reason we are satisfied with our lot in life so long as we get a dollar's worth of work for a dollar or get a dollar for a dollar's worth of work. We are too selfish and too much wrapped up in ourselves to give any thought to others, to take any pride in the trade, to do anything to raise the standard of it or to create any pride in it. When we take an interest in it enough to make it something to be proud of we will find that there will be no apprenticeship question any more, for it will be solved. The material is at hand to be trimmed into shape, but the tools are dull. What will we do?

## Preservative Treatment of Timber.

It is a well-known fact that the treatment of wood with a view to imparting to it such qualities as will add to its durability falls into several classes according to the manner in which the preservative is applied. Where few pieces are to be treated the preservative is often applied to the outside of the wood either with a brush or by dipping into the preservative, for when the wood is absolutely dry it will in many instances absorb in this way sufficient quantities of preservatives having any penetrating power and requires no further treatment. Such excellent preservatives as tar oils, spirittine, carbolineum, &c., can be used to advantage to protect fence posts, sills and other structural timbers, but great care must be taken that the wood be absolutely seasoned. All tar oil products should be applied hot.

One of the effective methods of treating timber is that in which corrosive sublimate is used, and which is illustrated and described in a paper by Hermann von Schrenk, in charge of forest products of the Bureau of Forestry, and printed in the year book of the Department of Agriculture under the title, "Recent Progress in Timber Preservation." The method of treating timber according to this plan consists in immersing the wood in a solution of mercuric chloride for a period sufficiently long to permit of more or less thorough penetration of the preservative. Excellent results have been obtained by soaking wood in a solution of corrosive sublimate (mercuric chloride). This process has been extensively used in Europe for many years, particularly for smaller pieces of wood, such as posts, stakes, boards, &c.

The method of operation is extremely simple and the original cost of the necessary apparatus is very small. A tank or vat is constructed of thick planks, carefully joined together so as to make the tank water tight. No iron must be used in building this vat, since it is quickly destroyed by the mercuric chloride solution. The wood to be treated, which ought to be seasoned, is piled in this vat, and when the latter is almost full, by means of a series of clamps the wood is held firmly in position. The corrosive sublimate solution is then run in through wooden pipes from a neighboring storage tank, made also of wood.

The solution is made by using 1 part of sublimate to 150 parts of water, the salt being first dissolved in a small quantity of hot water and then diluted to the proper point. The strength of the solution decreases as it is used, and it must therefore be renewed by adding more sublimate from time to time. The liquid should stand in the vat so that it covers the wood at least 1 inch. As light affects the solution, it must be kept out by some sort of roof. The wood is left in the vats for from five to ten days, according to the size of the timber. Time should be given for thorough absorption by the wood before it is removed. After the solution has penetrated for a sufficient distance into the timber the wood is taken out and dried. As the sublimate is comparatively insoluble in water, it remains in the timber for a very much longer time than salts like copper sulphate or zinc chloride.

Wood treated in this way can be employed with comparative safety for fence posts, stakes for grape vines, &c. The cost of treatment is about 4½ cents per cubic foot of wood. In view of the small expense involved in putting up an apparatus to treat with this process, and the comparatively good results obtained, it is somewhat surprising that it has not been more generally employed by persons using small quantities of timber, who could not put up an expensive cylinder apparatus, such as is required for treatment with tar oil or zinc chloride.

Corrosive sublimate, or mercuric chloride, is extremely poisonous, and care should be taken to prevent unnecessary handling of the solution, especially by persons not familiar with its character. In case of poisoning the patient should at once drink milk in large quantities, or water in which well-beaten fresh eggs have been stirred —two or three eggs to a quart of water.

In many instances small pieces of timber, such as fence posts, grape vine stakes, &c., can be treated with tar oil very much after the principle of the corrosive sublimate treatment. A small steel tank is used in many parts of Europe for this purpose. This tank is set in masonry in such a way that a fire can be built under it. Tar oil is poured into the tank, the posts or poles are set vertically in it, and a fire is started under it. As soon as the oil becomes thoroughly warm it penetrates into the timber for smaller or greater distances. Experiments on a considerable scale are now under way in this country to determine the exact length of time necessary to bring about a certain penetration, particularly with reference to fence posts. It is expected that preliminary results will be available in the course of three or four months. Attention should be called to the fact that treatment of this kind is possible only with absolutely dry wood.

# New Publications.

**Tools for Engineers and Wood Workers.**—By Joseph Horner; 340 pages. Size, 6 x 8½ inches. Over 450 illustrations. Bound in board covers with gilt side and back titles. Published by D. Van Nostrand Company. Price, $3.50, postpaid.

As indicated by its title, the purpose of this work is to give an account of such tools as are commonly used by wood workers and engineers, and it is written chiefly from the standpoint of the men who are called upon to use them and who desire to understand the principles which underlie the forms in which those tools are found. The book is divided into six sections, embracing 28 chapters, a large part of the matter consisting of selections from various articles contributed by the author to the *English Mechanic* and the *Mechanical World*, which have been carefully revised and supplemented where necessary, although several chapters are chiefly or entirely new, while a substantial proportion of the illustrations have been specially drawn and engraved for the work. In Section 1, covering Chapters 2 to 6, inclusive, "the chisel group" of tools is considered, after which some scraping tools, and then tools related to both chisels and scrapers. The fourt section is given up to a consideration of punches, hammers, molding and modeling tools, also miscellaneous tools and tool handles. Section 5 deals with hardening, tempering, grinding and sharpening, and Section 6 has to do with tools for measurement and test.

"TERMS USED IN FORESTRY AND LOGGING" is the title of Bulletin No. 61, which is about to be issued by the

Forestry Division of the United States Department of Agriculture, Washington, D. C. The bulletin includes two separate lists of terms, each alphabetically arranged. The first comprises the technical vocabulary of American forestry, all terms being defined, and in the case of the most important the German and French equivalents are given. The second list contains terms in common use among lumbermen, the varying usage of different regions being recognized, but slang and terms which are purely local being eliminated.

## Painting Concrete Building Blocks.

The growing popularity of hollow block construction for buildings of various kinds has brought to the contractor many problems for solution, and no little discussion is at present to be found in the trade press relative to the manner in which obstacles encountered shall be overcome. A builder in Oklohama has intimated that it would be desirable to know how moisture may be kept from penetrating walls constructed of cement blocks and what preparation will kill the caustic properties in the cement so that paint will adhere permanently to the surface. He sends his queries to the *Painters' Magazine*, which, in a recent issue, furnishes the following reply:

We have repeatedly called attention of interested parties through these columns to the fact that cemented surfaces or concrete cannot be coated with paint or enamel or any other preparation until the caustic properties in the cement have been neutralized by age, which requires from one to two years' time. As no one, however, will wait for this to occur naturally, the best means to accomplish this effect artificially and on comparatively fresh cement is to sponge the surface with a solution of 12 fluid ounces oil of vitriol in 1 gallon of soft water. This will neutralize any caustic lime that is present in the cemented surface and turn it into the inert sulphate of lime (gypsum). It also roughens the surface, giving the oil or paint a better grip, so that succeeding coats will obtain a firm hold. When the cement is a month or so old the dilute acid wash can be dispensed with and a solution of 4 ounces of bicarbonate of ammonia in 2 gallons of water used in its place, in which case the surface need not be rinsed with clear water, but may be painted upon as soon as it is dry. In order to exclude moisture the best plan is to prime the surface treated as above with good old raw linseed oil, giving it ample time to become hard. Upon this coat of oil, which should be applied liberally to stop suction, a coat of flat paint, composed of the necessary pigments, linseed oil, turpentine and japan drier, should be given, and if this shows up unevenly another coat of the same paint and finally a finishing coat of weather proof gloss paint or enamel, made of good pigments and exterior varnish. This treatment is certain to keep out moisture and is of course intended for concrete blocks that are not colored, but made in the natural color of cement. For colored concrete blocks, where it is desired to preserve the original color and which, as a matter of course, are not to be painted, one part of water glass (silicate of soda, concentrated) is to be mixed with three parts of rain water. When this is applied to the cemented surface it decomposes any lime that may be present and converts it into silicate, and while the color becomes somewhat darker the surface acquires a hardness which resists the action of the weather and keeps out moisture.

## Strikes and the Labor Unions.

In its quarterly "Bulletin," just issued, the New York State Department of Labor discusses the disastrous effect of recent strikes upon the labor organizations that undertook them, referring especially to the failure of the glaziers' strike as being followed by the dissolution of a union of 500 men, and that of the Rapid Transit system in New York City by the disruption of unions embracing more than 4000 men.

In some industries trade has only recently recovered from the recent depression which greatly weakened the workmen's organizations. Thus the Schenectady unions lost 16 per cent. of their members between October 1, 1903, and April 1, 1905, while Syracuse was the only large city in which unionism made any gain in number of adherents.

In the six months specified 165 organizations in this State dissolved and 20 more amalgamated with other unions of the same trade. On the other hand, only 99 new unions were organized, causing a net decrease of 86 and leaving 2418 organizations in existence at the end of March. The aggregate number of members of unions was then 374,262, signifying a net decrease of 17,414 since September.

While the decrease in organizations was principally in the villages and smaller cities, four-fifths of the loss in membership was in the seven principal centers of industry. New York City lost 8741, or 3.4 per cent., of its membership, but still has 245,978 unionists; Buffalo has 184 unions and 30,158 members; Rochester, 91 unions and 12,130 members, a decrease of 125; Syracuse, 78 unions and 8162 members, a gain of 171; Albany, 81 unions and 7691 members, a decrease of 528, or 6.4 per cent.; Troy, 55 unions and 5149 members, a decrease of 106, or 2 per cent.; Schenectady, 58 unions and 5290 members, a loss of 1012.

STEPS OF GLASS are a feature of construction that was illustrated some time ago in *Nouvelles Annales de la Construction*. Both the treads and risers are of reinforced plate glass. The glass slabs, which, it is stated, can be made up to 10 feet in length, have a wire trellis work skeleton imbedded in the center of each of them, and as they freely admit the passage of light they may be used for assisting in the illumination of dark corridors and cellars.

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RESIDENCE OF CONCRETE BLOCK AND FRAME CONSTRUCTION ERECTED FOR MR. GEORGE L. HIRTZEL, ELIZABETH, N. J.

J. A. OAKLEY & SON, ARCHITECTS.

SUPPLEMENT CARPENTRY AND BUILDING. SEPTEMBER. 1905.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
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DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
232-238 WILLIAM STREET, NEW YORK.

OCTOBER, 1905.

H. H. Roberts, who has been identified with the David Williams Company for 18 years, has resigned as manager of the Philadelphia office in order to engage in business on his own account.

We have appointed as manager of the Philadelphia office S. S. Reckefus, who has been connected with prominent technical journals for many years, both in the East and in the West.

### Restoration of Baltimore.

Far better than the prophets found any promise of, as they set forth the disasters that were to flow from the great fire in Baltimore in February, 1904, has been the outcome of the rebuilding movement. A loss of $75,000,000, to say nothing of the crippling of business for a long time after the fire, was well calculated to create depression. There could be no expectation of an influx of new life such as swept Chicago on to a new high point in population and in trade following the $200,000,000 fire loss of 1871. The settled life of the Monument City presents some contrasts to the restless, buoyant spirit that led the Chicago community of 1871 on to its splendid triumphs. But the restoration at Baltimore not only confounds the faint hearted prophets, but gives real occasion for the pride with which the newspapers of that city now point to the achievements of the past year and a half. There were delays, but these were really due in part to a public spirited movement which sought to turn the disaster to account by acquiring sufficient property to widen a number of streets. By the erection of buildings on 770 lots out of 155 acres of fire swept territory, on which stood 1382 buildings before the fire, we are told by the Baltimore press that the city now has "a business center superior to that of any other city in the world." While $15,000,000 represents the outlay for structures built by private expenditure, it is stated that the rebuilding movement has been accompanied by an outlay of $100,000,000 on docks, parks and other important public work, largely due to the quickening of local spirit in the revival following the fire. Chicago was able to say two years after her fire that laid waste 2100 acres that all traces of the conflagration had disappeared. And in the decade following 1870 her population grew from 298,977 to 503,185. The Baltimore record is not so sensational but it represents a magnificent achievement that means great things for the commercial life of the city in the years just ahead.

### Plumbing on Farms.

The time is fast arriving when the farm is going to have the conveniences of the city. The age is one of widely circulated low price literature replete with timely suggestions and one of remarkable credulity in the possibility of inventions and of receptivity in the accepting of suggestions. For some years the farmer has recognized the revenue producing capacity of labor saving inventions in agricultural machinery, until now the farm without some machine, even if nothing but some hand operated contrivance, is worthy of being fenced in as a national curiosity. The telephone and the electric light have invaded rural districts until the farmer's life is becoming as strenuous as that of the inhabitant of the desk-telephoned push-buttoned modern office. In the light of the fact that the farmer is anxious to realize the conditions of life in congested communities, it is unquestionably the time to cultivate his tastes in things which really have been fundamentals in the upbuilding of modern civilized living—in other words in matters of sanitation, in heating, ventilation and plumbing. It is inexplicable that with all the eagerness that the farmer has shown to surround himself with twentieth century conveniences his property, especially in the East, is practically devoid of some of the simplest features of modern sanitation. This absence of essentials to comfort and labor saving may in part be due to the fact that popular literature does not lend itself readily to the discussion of the details of home design and arrangement, but it is also due in part to a laxness in the case of those engaged in plumbing and heating in pushing their business to its limit. A most promising field of business endeavor lies in the sale of material for up to date water supply, drainage and heating plants on farms, even if it does not include the work of actual installation. When instances arrive of interesting cases where just this sort of business has been consummated it requires no debate to decide whether or not our readers are likely to care for an account of them, and for the suggestions which it is likely to make the article on some plumbing work on a farm printed elsewhere in this issue is commended.

### Another New Office Building.

A notable addition to the colony of skyscrapers now to be found on the lower portion of the Island of Manhattan will be the new office building in course of construction at Trinity place, Rector and Greenwich streets for the United States Express Company and to which very brief reference has already been made in these columns. The caissons for the foundation are now being sunk to bedrock and it is expected that work on the superstructure will soon be commenced. The building will be 23 stories in hight and will have a frontage of 118.7 feet in Rector street, 133.9 feet in Greenwich street and 142 feet in Trinity place, while its width on the rear, or north, line will be 139.10 feet. The first five stories of the façade will be of granite, while the remaining stories will be of brick trimmed with terra cotta. The style of architecture will harmonize with the Empire and Trinity buildings, which are in close proximity to the new structure. According to the architects, Clinton & Russell of New York City, the cost is placed at $1,600,000, and it is expected to have the building completed and ready for occupancy by August 1, 1906. The new building will be used as a connection between the Rector street stations of the Sixth and Ninth Avenue Elevated railroads. The present elevated structure in Rector street between these stations will be removed, while the second floor of the United States Express Building will contain an arcade leading directly from one station to the other. One of the serious problems in connection with a towering office building is to so control its surroundings as to insure in perpetuity ample outside light and air to the occupants of the various floors. This is usually accomplished by securing either through long lease or purchase the buildings on adjoining sites, which as a general thing are not more than four to six stories high, which hight is a comparatively small factor when that of the skyscraper is considered. With the adjacent buildings under the control of the owners of the skyscraper there is no danger of their being torn down to make way for the erection on the ground they occupy of any building sufficiently tall to shut off the light and air from the upper stories of the skyscraper. In the particular case we are describing the United States Express Company in order to protect the light for its new building has purchased the old structures adjoining it on Greenwich street.

## The Past and Present of Granite.

Like everything pertaining to the building business, granite manufacturing and the uses of granite has changed wonderfully for the better, and in the last 25 years. Any of the old timers of 30 or 40 years ago would be greatly surprised if they could visit us now and see the difference, says a writer in a recent issue of the *Record and Guide*. In the early history of granite in New York City there were only two kinds that could be marketed to any advantage—the old Quincy granite and that taken from the Millstone Point quarries in Connecticut. The latter was given the preference on account of being nearer and also because it was a light colored stone. The work at that time consisted mostly of low water table courses, sills, mullion posts and the lintel course, with perhaps a small moulded course running around the top. Instances of this construction still remain on the lower East Side. Other than this, about the only use granite was applied to was for bank vaults, of which there were a great many constructed from granite blocks about 2 feet square of different lengths laid on each other, covered with a granite roof, and bearing blocks for wooden posts and girders.

Gradually the use of granite increased until we saw granite sidewalks and whole fronts. One of the buildings still left is the old Astor House, an early effort in this way. As iron began to come in use heavy bases were used under cast iron columns, and under the wrought beams were placed at each end heavy girder blocks. Gradually, as the use of granite increased, the varieties increased, and granite that is now being selected for granite work in the fronts of buildings varies in color from a white almost like marble to the very blackest of Quincy, with pink shades predominating. There are now used in New York some 50 or 60 varieties of granite.

The pink granites have seemed to become a fad, until the larger proportion of the granites used in New York are of this shade. That which has had the largest run in the market is the Milford Pink from the quarries of Milford, Mass., the Jonesboro running a close second. One of the latest pink granites to be given a share of the business is the Black Island pink, which combines with its color a fine grain and is better for carved or molded work than the coarser grain granites. In place of the few pieces of granite that used to be found in the building we have now beautiful fronts complete, as in the Post Office, the Hall of Records, the Custom House, the Schwab mansion, the Clark mansion.

The Clark mansion is probably the most elaborate piece of granite work that has been placed in New York. The carving has cost an immense amount of money and was all done by the day at the building. The columns in the Cathedral of St. John the Divine attract the attention of every one. There is hardly a granite manufacturer or producer in the State of New York but what has undoubtedly taken a trip to the heights to see these, the manufacturing and setting up of which would have been deemed impossible only a few years ago. Taken as a whole the change from the old condition of things to the present condition surprises every man in the business who looks back to his first experience in furnishing granite for New York.

Steel construction cut out all of the interior work that the quarrymen once depended on for disposal of their discolored stone, but the fine fronts that have been used have increased so rapidly that the quarries have been able to throw away that which they once felt obliged to use, and by producing only a good grade of stone increased their earning capacity enough to make up for the loss of market which the steel construction cut out. Any casual observer passing through the streets of New York would not be attracted particularly by the evidences of the difference that exists between now and 50 years ago in this business, but should any one feel interested enough to look into it he would find that the advance has been greater in the granite business than in any other in the city of New York.

In the manufacturing of granite the implements used were very crude, while at the present time all up to date manufacturers have pneumatic air plants and tools run by compressed air for the manufacturing of the finest work. A granite yard is an interesting spot and one which is visited by very few architects, whereas architects should, to understand thoroughly the good results that can be obtained in granite, visit and investigate the mode of manufacturing, and the simplicity and economy of using certain grades of granite. The beauty and durability all will concede. The price at which it can be produced allows it to compete with any other stone, provided that treatment is accorded it that it should have.

Molding and carvings in granite should never be attempted on the same lines in which marble and limestone can be manufactured. They should be bolder and more massive. A great many designs that are put on the market have too fine molds and do not produce the heavy shadow which is the beauty of all moldings. Soft stone will not stand the projections that can be given to granite, and in this particular especially granite should recommend itself for use. The present mode of cutting granite with tools employed give this advantage over the old mode of doing, and some of our prominent architects have caught on to that fact and in the treatment of their buildings make their designs so that the beauties that can be drawn from granite are fully exhibited. The Pennsylvania Depot when completed will be one of the beautiful things of New York, the molds, carvings, &c., in the design of this building being up to date and easily produced by the present modes of working. If the reader of this sketch feels at all interested in the subject, and would like to investigate the difference in the old mode and the present, of manufacturing granite, any granite manufacturer in New York would be pleased to have a call from him and to show him the way in which granite is now handled.

THE plans are being drawn by Robert T. Lyons, architect, 31 Union Square West, New York City, for a 12½-story apartment house, which will cost in the neighborhood of $800,000, and will occupy a plot 100½ x 150 feet on the northwest corner of Central Park West and Seventieth street. It will be of a high class type of fire proof construction, with exterior walls of granite, Indiana limestone and terra cotta. On each floor will be three suites of apartments of 11 rooms and 3 baths each. The building will contain three passenger and two service elevators and will be supplied with all modern improvements.

THE new store which is in process of construction at Fifth avenue and Thirty-fourth street, for B. Altman & Co., will when completed be eight stories in hight and will cost about $1,500,000. The general contractors are Marc Eidlitz & Son, who will also do the masonry work, while Post & McCord will supply the structural steel, which will be put up by the American Bridge Company. The building will have a base of granite with a superstructure of French limestone.

# A SHINGLED HOUSE AT SEATTLE, WASH.

AT intervals in the past we have had requests from some of our readers to publish designs of houses showing the drawings so far as possible with all the data upon them exactly as furnished by the architect. The idea of this was to indicate all the little details and memoranda available for the practical builder as the drawings come from the hands of the architect, and which serve in conjunction with the specifications as his guide in executing the work. With a view to meeting the wants of our readers in this respect we have selected the design of a shingled residence in Seattle, Wash., and present herewith engravings which are direct reproductions from the architect's drawings. The half-tone supplemental plates are made from photographs of the completed structure, one of them showing the general treatment of the exterior, while the other gives an idea of the interior finish.

The house covers an area 30 x 40 feet, with front and rear porches, and has a foundation of concrete made up of 5 parts gravel, 3 parts washed coarse sand and 1 part Alsen Portland cement. The floor of the basement has 2½ inches of concrete as above, and is finished with 1 inch of sand and cement in equal parts. The same sand and cement finish 1½ inches thick is applied to the slope of the sides of the basement, the earth being first prepared by making it smooth and compact. An idea of this treatment may be gathered from an inspection of the sectional view taken on the line A A of the foundation plan.

Front Elevation.—Scale, ⅛ Inch to the Foot.

*A Shingled House at Seattle, Wash.—A. W. Spalding, Architect, Seattle, Wash.*

The advantages of this form of treatment are set forth by the author of the design in the following words: "While slightly reducing the floor size of the basement it greatly reduces the cost of the foundation wall, as it leaves dry earth beneath the wall, insuring a perfectly dry basement. I have used this form of construction in Minneapolis, a severe climate, and on the Pacific Coast, a mild, wet climate. In certain soft soils it is well to run down piers about 8 feet apart. The cost is reduced on the whole fully three-fourths. No better foundation was ever put under a house than under the one illustrated in the plans and photograph herewith."

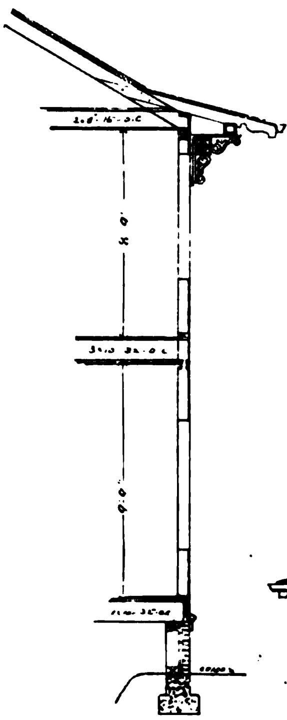
Another important feature in connection with the house here shown is the "light mill construction." The joists are 3 x 10 inches, spaced 32 inches on centers; the lining floor is 1¼ x 8 inch shiplap fir laid at right angles to the joist, no bridging being used. The attic flooring is laid single of ⅞ x 4 inch No. 2 fir on 2 x 8 joists placed 16 inches on centers. The first-story ceiling consists of 1½ x 2 inch strips, also placed 16 inches on centers for lathing. The finish flooring of the first and second stories is ⅜ x 2 inch D. & M. quarter sawed white oak laid at right angles to the lining shiplap floor. This wide spacing of joists, with no bridging, reduces the cost of labor and also very materially reduces the spread of fire. The usual construction of light 2-inch joists with bridging constitutes kindling wood between floors. No more material is used in this form of construction than in the ordinary style.

Another point to which the author invites attention is the width of the house as compared to the depth. Usually for inside lots not over 50 feet wide houses are built narrow and deep, but the author of the dwelling here shown claims the latter to be incorrect. The most desirable outlook from a house next to the front is the rear; the sides being usually shadowed by adjoining houses on narrow lots. This house is supplied with an unusual glass surface because located in a cloudy climate; the wide overhanging eaves protect the house from rain.

The outside of the frame of the house is sheathed with ⅞-inch fir shiplap, over which is placed tough building paper, No. 1 P. & B., the same being used over the shiplap on the roof. On this, in turn, are laid cedar shingles, as indicated in the half-tone picture of the exterior. The outside trim of the house is painted with three coats of pure white, while the shingles are tinted with two coats of Berry Bros.' dark brown shingle stain. The brick work is selected red sand mold bricks laid in red mortar for basement, veneer and chimney tops.

The building is plastered in a first-class manner with three coats so-called wet work, white putty coat finish. All ceilings are tinted a light cream, the first story ceilings being decorated in an attractive manner. The side walls throughout are papered and those of the reception room and dining room are tinted and paneled in water colors. The hardware is of neat design, sand blast finish.

The interior finish of the principal rooms of the house is noted on the plans. An inspection of them shows the living room, reception room and hall to be finished in ivory white, three coats, and varnish rubbed to a dull gloss. In the hall, dining room, reception room and living room is a wainscoting 2 feet high. The dining room is finished in natural fir, being treated with two coats of varnish and rubbed dull. The rooms on the second floor are finished in natural fir.



Section.

The bathroom has a wainscoting 4 feet high and the walls are treated to four coats of white paint. The equipment is first class in all respects, consisting of a Delecto siphon jet closet of the Standard Mfg. Company's make, wash bowl of the Copley pattern and a bathtub with Imperial waste. The house is piped for gas and wired for electricity, the dotted lines on the first floor plan running from the walls to the chandeliers indicating the position of the various switches controlling the different lines. The house is heated by a Richardson & Boynton furnace and ventilated by the vent flue in the chimney, the vents running to the base of the chimney from each room.

The principal items of cost are mason work, including foundation, concrete floor, chimneys, brick veneer, &c., $400; carpenter work, including lumber, material, work and labor, $1800; plastering, $250; painting, $350; plumbing and sheet metal work, $350; heating, $150; hardware, $150.

The house here shown was erected for himself not long since in Seattle, Wash., by A. W. Spalding, architect, 620 Colman Building, Seattle, Wash.

*A Shingled House in Seattle, Wash.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.*

The concrete work on the west basin of the Jerome Park Reservoir, New York City, is nearly finished. The area of this basin is 93 acres, and it is being lined with concrete 6 inches thick, made by a battery of 18 Ransome concrete mixers. The mixers are mounted on trucks and are readily moved as the work progresses. The stone is delivered to the mixers in flat cars and is shoveled from the cars into Ransome charging hoppers. This is probably the largest number of concrete mixers ever engaged in work at one time on a reservoir. When the contractor, William Bradley of New York City, has finished the west basin he will begin upon the east basin, which covers 160 acres.

## A Concrete Dwelling.

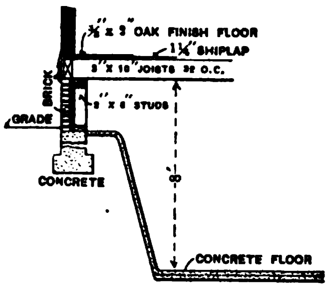
In an interesting paper read some time ago before the National Builders' Supply Association by Charles A. Matcham, manager of the Lehigh Portland Cement Company, the author describes a concrete house that he had built for himself.

Including porches, it has 58 feet of frontage and 55 feet depth. In starting foundations, they are made 15 inches in width for about 1 foot, or cellar floor level; from the cellar to roof 13 inches, the concrete mixture being one part cement, four parts sand and seven parts stone. The window and door frames were set as the concrete progressed. The hall floors, 16 x 35 and 8 x 15 feet, are of concrete and expanded metal; the floor is 5 inches thick, laid on 12-inch by 17-foot beams set 8 feet apart. These concrete floors were finished off with cement and tile bordering. The porches are also of concrete and expanded metal resting on an offset in the concrete walls, with cement and tile finish. The porch roofs are of a clear span of 12 feet, made of concrete and expanded metal.

This expanded metal was of 2-inch mesh, ⅛ inch thick. It was laid on the boards set to hold the concrete. To this expanded metal were fastened some small channels 1 inch deep and 2 feet apart. The concrete was then laid and tamped into the meshes and around channels and made 4 inches thick. The walls and arches are reinforced with iron rods, the walls having ¼-inch rods set vertically and horizontally about 18 inches apart, and over the windows and porch openings ½-inch rods are laid in the concrete.

All the rough concrete, after framing was removed, received a rough coat of cement and sand plaster, proportions one to four. This gave an even surface and could have been considered the outside finish, but in order to have a light buff finish a second coat of lime and yellow sand was put on very thin, proportions being one part lime to four parts sand.

In doing the work over again Mr. Matcham would only apply one coat composed of one part cement, one part lime and five or six parts of white or yellow sand. The moldings on the columns were finished by applying the coating of lime and sand with a brush. The adhesion of the coating to the concrete has made a perfect bond. A house with the natural concrete finish, evenly roughed off, would have a neat finish and of course be cheaper, but not as warm in appearance as the buff sand finish of this house.




Section through Foundation on Line A A of Basement Plan. —Scale, ⅛ Inch to the Foot.

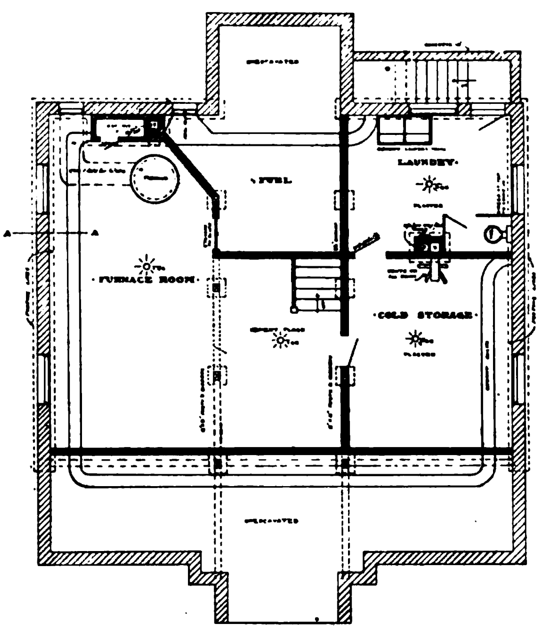
The fire place in the billiard room is made of ordinary red clay brick and gray cement brick, the mantel being molded in one piece, cast out of sand and cement. The fire place in the dining room is of sand and cement brick with molded mantel.

Much has been said as to the feasibility of plastering on solid walls without using lathing, there being doubt about moisture coming through the walls and plaster. Moisture will not penetrate a solid wall if a reasonably wet concrete is used; a dry concrete Mr. Matcham cannot vouch for, and water may penetrate it, although this is doubtful.

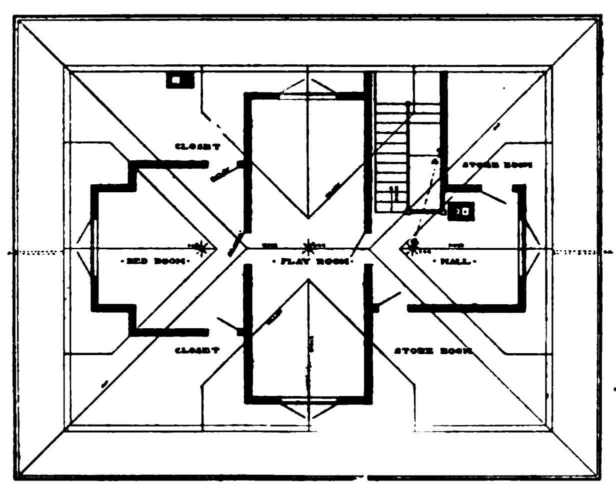
Claims are made that the different temperatures between the inside and outside of walls, particularly in winter time, cause sweating. Mr. Matcham denies this on the ground of experience with various kinds of buildings, all having varying temperatures; all have shown perfect dryness inside, irrespective of temperatures and weather.

As to the cost of construction there were 400 cubic yards of concrete in the walls and floors of the house, and taking into consideration the carpenter work, setting up framing, setting doors and window frames and joists as the work progressed the common labor, cement, sand and stone totaled up to $2600, which would make the concrete cost $6.50 per yard. Ordinary brick houses with pressed brick face cost, he said, from $10 to $12 per cubic yard.

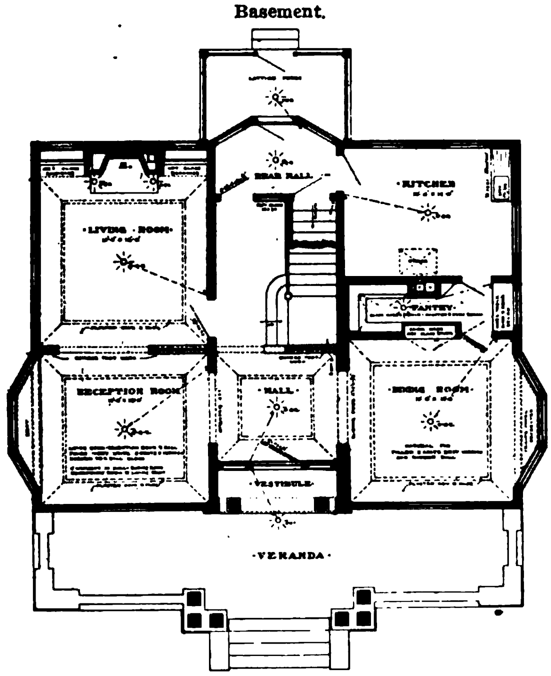
In considering the cubic yards of concrete in this house the hall and porch floors and roofs are figured in. If these had been figured separately the main walls of the house would cost less per cubic yard, and of course the floors and roofs more. The following material was used to a cubic yard of concrete: 320 pounds of cement, 950 pounds of sand, 2560 pounds of crushed stone, 290



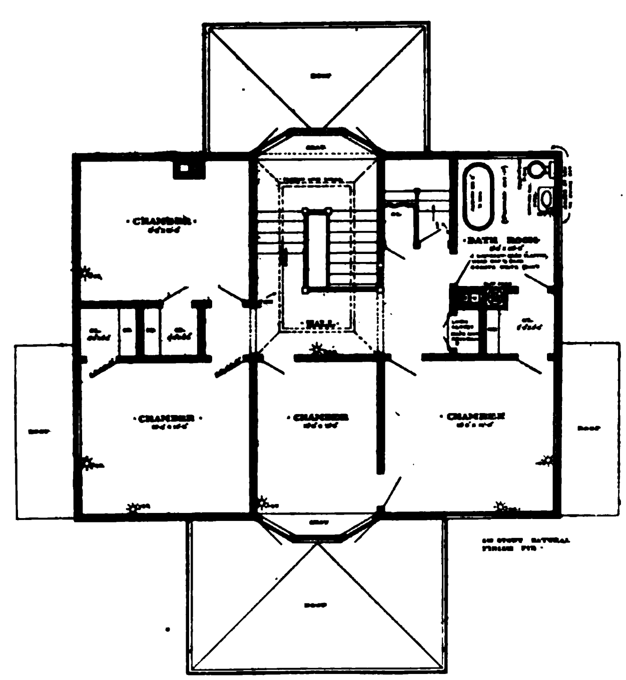

Basement.




Attic and Roof Plan.




First Floor.




Second Floor.

*A Shingled House in Seattle, Wash.—Floor Plans.—Scale, 1-16 Inch to the Foot.*

pounds of water. Total, 4120 pounds. The proportions were about one part cement, three parts sand and eight parts stone.

## Specialization and the Architect.

The industrial machinery of the twentieth century demands of each individual the performance of the task

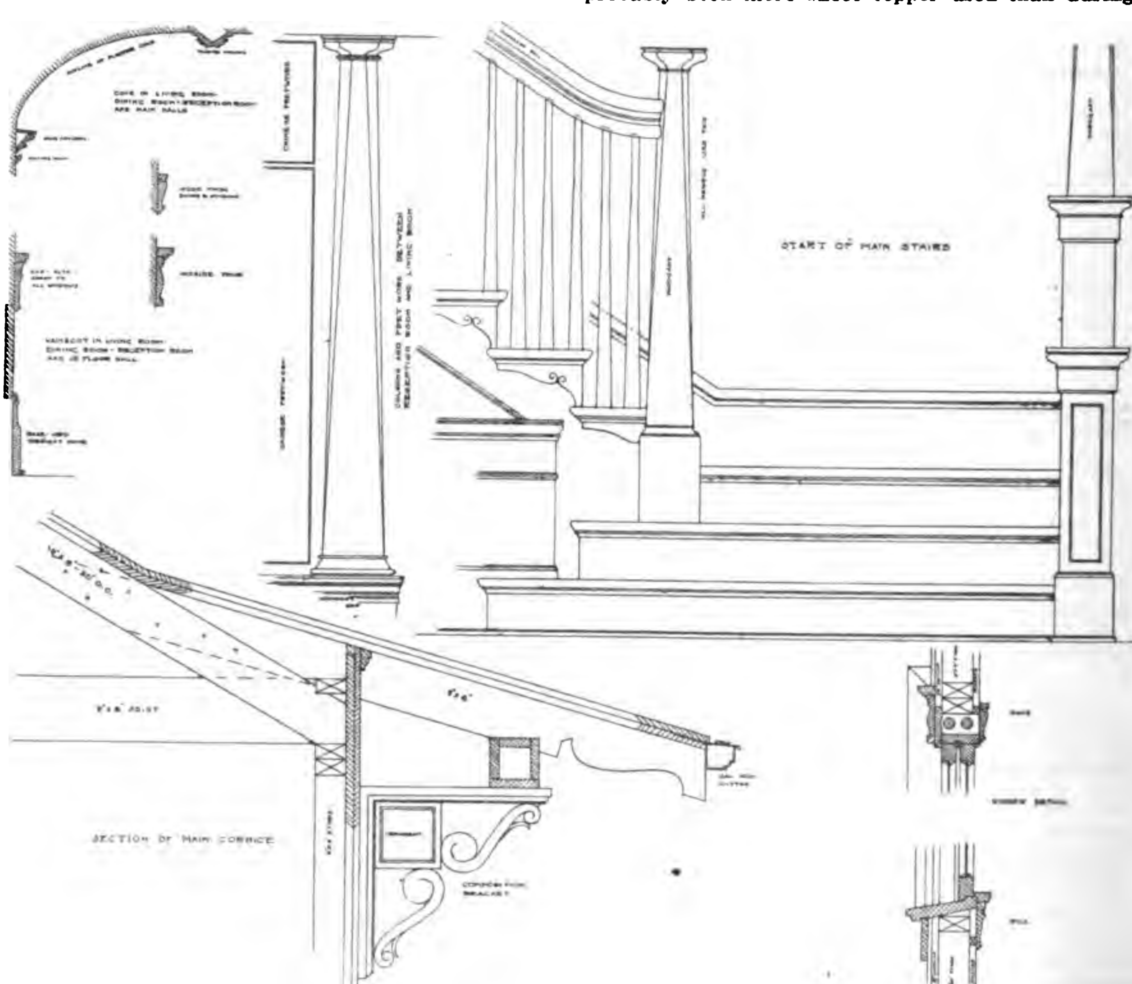
View in Reception Room Looking Toward the Main Stairs.

for which he is best equipped. The tendency of the age is toward specialization and co-operative effort, says Charles H. Israels, a well-known architect of New York City, in a recent issue of the *Architectural Record*. Each department has its definite area of activity, and co-operation itself is obtained through specialists in executive management. Most of the forces of industry are instinctively adjusting themselves to the new conditions. They have selected their own positions in the movement. A few have refused to recognize the tendency; the procession has swept by, and being unable to carry them along has ruthlessly bent them in the direction of progress—where they either remain stationary or are forced into positions for which their workers are ill equipped and their original destiny perverted.

The complex building trades have responded in the main to this tendency—all but the architect. He is reactionary. Architecture in past ages was an art. Its practitioners were recognized as artists. The architect still proclaims himself an artist, but in a large measure he has become a business man; and the practice of architecture has become a business. A list of the most successful practitioners in the United States would contain the names of an undue proportion of men who owe their success to their abilities as organizers, promoters and business men rather than as designers, as architects.

The architect may deplore the fact, but he is himself responsible. He has not readjusted his work in order to cope successfully with the conditions of the times. He has not specialized in the one field in which his training makes him supreme. He has opposed this specialization. He has been stubborn. Other forces have bent him—and in his own specialty he stands still. His progress has been in directions where others can give better results.

The use of sheet copper has greatly increased during the past year, and in the last six months there has probably been more sheet copper used than during any corresponding period. This was largely brought about through its use for ornamental work where galvanized iron had been used heretofore.




Miscellaneous Interior and Exterior Details.—Scale, ½ Inch to the Foot.

*A Shingled House in Seattle, Wash.*

# METHODS OF CONCRETE BUILDING CONSTRUCTION.

BY F. E. KIDDER, Consuting Architect.

ALTHOUGH the manipulation of concrete has generally been considered as pertaining more particularly to the trade of the mason, probably because it is much in the nature of mortar, yet, as a matter of fact, the great bulk of the concrete now being used in the United States is handled by common labor under the direction of men who are not and never were masons (in the ordinary use of the word), but to a great extent the most skilled labor required in connection with the work is performed by carpenters. Where concrete is formed above ground it must necessarily be in molds, which from economical considerations must be built of wood and consequently erected by carpenters. Even for putting in concrete foundations there is no reason why the work should not be done by the carpenter, who is usually the principal contractor, just as well and at less expense than by the mason contractor. This is particularly true where the foundations are for wooden houses, as will be pointed out later.

Where the concrete is first molded into blocks the latter can probably be laid to better advantage by masons, and it would seem to the writer that this belongs more particularly to the stone mason, as the material is, in fact, an artificial stone. But the molding of the blocks, and particularly arranging for the various sizes and shapes required, adapting them to openings, floor joists, &c., can be done better by an intelligent carpenter than by any other building mechanic. In many localities a progressive carpenter might add a block factory to his business to considerable advantage, and even if he has nothing to do with the making and setting of concrete the carpenter must join his work to it and hence is more or less affected by it.

There are many reasons, therefore, why carpenters should be fully informed in regard to the various methods employed in building with concrete and cement blocks—the cost, advantages and disadvantages of the same and the possibilities of taking advantage of them. This is especially true in view of the great quantities of cement now being used and the misleading statements found in much advertising matter.

Being comparatively a new method of building, it has not been standardized as brick or stone, so that there is considerable variation in the methods employed by different contractors and in the making and use of cement blocks; but many facts have been definitely determined and methods are gradually growing more uniform with less disagreement among users of the material. At the request of the editor of this paper the writer has undertaken to give such information along this line as he deems of especial interest to carpenters and carpenter contractors, and particularly to show how they may use the material, both in monolithic construction and in the form of blocks. To do this the writer may seem to favor certain forms of construction, or certain block machines, but he wishes to say positively that he is not financially interested in any system and that all opinions given are based solely on his experience, observation and general knowledge of building materials and methods.*

### Definitions and Established Facts Relating to Concrete.

To use cement or concrete successfully, or to estimate at its true worth much of the matter now being published regarding cement block making, an understanding of the technical terms used and a knowledge of the fundamental facts relating to the strength and other properties of concrete are absolutely essential; therefore it has been deemed best to briefly outline these before taking up the methods of using the materials.

Although some facts stated are not generally understood, they have all been well established by numerous and most carefully conducted experiments and will probably not be disputed by any concrete expert.

**Concrete** may be defined as an artificial rock, made by mixing cement and an aggregate composed of sand or broken stone, brick or pottery, slag or cinder. In these articles the term will be used to designate a mixture of Portland cement with an aggregate containing either gravel or crushed stone.

**Rubble Concrete** is concrete in which large stones are imbedded.

**Mortar** is a mixture of cement or lime with sand or the screenings from crushed stone, made into a plastic form by the addition of water. The distinction herein made between cement mortar and concrete is that the latter contains coarse particles, either gravel or broken stone, while the former does not.

**Lime Paste, or Putty,** is obtained by slaking calcined lime with water and permitting the water to evaporate until a thick paste is formed—generally requiring from three days to a week.

**Hydrated Lime**—powdered slaked lime. Manufactured by finely grinding lump lime, slaking with water, and then cooling and screening through a fine screen.

**Voids** are the spaces throughout a mass of dry concrete, mortar sand, gravel, broken stone, &c., that are filled with air.

**Porosity** is the property of materials for absorbing water.

**Permeability** is that property of concrete and other materials which permits water to pass through it.

**Density** in concrete or mortar represents the proportion of absolute solid substance contained in a given volume of concrete or mortar—*i. e.*, the less the proportion of voids the greater will be the density of the concrete.

### Weights and Volumes of Cement, Sand, Gravel and Crushed Stone.

Portland cement is supposed to weigh 380 pounds to the barrel, or 95 pounds to the bag. The net weight is about 376 pounds to the barrel.

The average weight of loose Portland cement is about 92 pounds per cubic foot.

The average Portland cement barrel contains about 3½ cubic feet.

Gravel and rock concretes vary in weight from 140 to 152 pounds per cubic foot. Cement mortars from 116 to 136 pounds per cubic foot.

Sand (dry) varies in weight from 85 to 110 pounds per cubic foot.

Gravel varies in weight from 96 to 120 pounds per cubic foot.

Crushed trap rock, screened, will average about 90 pounds to the cubic foot at the crusher, or 100 pounds after it has been settled by hauling some distance.

Crusher run stone (containing the entire product) is about 10 per cent. heavier.

A solid mass of the materials of which ordinary sands and gravels are composed would average 165 pounds to the cubic foot, all sands and gravels being remarkably uniform in this respect.

The average weight per cubic foot of the stones commonly used in concrete is as follows:

Granite, 168; limestone, 162; trap, 180; sandstone, 150.

### Facts Relating to the Strength of Concrete.

With the same aggregates the greater the proportion of cement the stronger and more impermeable will be the concrete.

With the same proportion of cement the mixture which contains the greatest percentage of solid materials will almost invariably be the stronger, or, in general, the strength of concretes containing the same percentage of cement vary as their weight per cubic foot, the heavier concrete being the stronger.

As a rule, the addition of coarse gravel or broken stone to cement mortar in proper proportions increases the crushing strength.

* It is, perhaps, proper to add that during the season of 1903 the writer acted as general manager of a cement block factory and had charge of the erection of a large apartment building, in which all walls and principal partitions were built of cement blocks. For five years he has been consulting engineer to the largest contracting corporation for reinforced concrete in this section and has investigated the entire subject of concrete building very thoroughly.

Thus a 1 : 2 : 4 * concrete has about the same strength as 1 to 2 mortar, and about 12 times the strength of 1 to 6 mortar. A 1 : 4 : 8 concrete is about 50 per cent. stronger than 1 to 4 mortar.

The foregoing statements are well illustrated by the following table, selected by Taylor & Thompson from tests of concrete and mortar cubes made at the United States Arsenal at Watertown, Mass., and published in the Government Report for 1899. This table is worthy of careful study by all users of concrete, whether for monolithic or block construction:

*Weight and Compressive Strength of Concrete and Mortars of Different Proportions.*

| Proportions. | | | Weight per cubic foot. | Compressive strength per square inch. Pounds. Age, four months. |
|---|---|---|---|---|
| Cement. | Sand. | Broken stone. | Pounds. | |
| 1 | 1 | 0 | 136.5 | 4,370 |
| 1 | 2 | 0 | 134.2 | 2,506 |
| 1 | 3 | 0 | 133.8 | 1,812 |
| 1 | 4 | 0 | 120.9 | 830 |
| 1 | 5 | 0 | 119.3 | 532 |
| 1 | 6 | 0 | 116.9 | 169 |
| 1 | 2 | 4 | 150.7 | 2,178 |
| 1 | 2 | 5 | 150.9 | 2,452 |
| 1 | 2 | 6 | 151.2 | 2,124 |
| 1 | 3 | 6 | 146.9 | 1,815 |
| 1 | 4 | 8 | 143.2 | 1,135 |

### Relative Value of Aggregates.

Only sand, crusher dust, gravel and broken stone will be considered under this head.

**Sand.**—Contrary to common opinion, it has been proven by tests that sharpness in sands is not essential for good concrete, and that round grains give greater density and equal if not greater strength.

**Coarse Sand** produces stronger mortar than fine sand, but to render concrete impermeable a certain amount of fine sand is necessary.

When several sands are available that which will give the strongest mortar may be readily determined by drying a quantity of each and then weighing out 10 pounds of each and mixing with a given weight of cement, say 4 or 5 pounds, using the same quantity of water with each batch. Then turn the different batches into boxes or tubes of the same size. That batch which when set makes the least volume will make the strongest and least permeable mortar. The same process may also be used with gravel and broken stone.

Another easy method of judging of the value of different mixtures of aggregates is to dry a little more than a cubic foot of each and then fill with each a box made exactly 12 inches square and 12 inches deep inside, and accurately weighing (first weighing the box to get the net weight). That mixture which weighs the most will as a rule produce the strongest concrete with a given proportion of cement.

As a rule it will be found that sand containing grains varying in size from fine to coarse will give the greatest density, or a mixture of coarse and fine sand, or coarse sand and crusher screenings.

By a little mixing of the coarse and fine material one can soon determine what proportion of the two will give the densest mixture, and then the two materials can be mixed by measure in their natural state.

**The Percentage of Voids** in the different aggregates may be determined by dividing the weight per cubic foot by the weight of a cubic foot of the solid material (as given under the heading of weights), subtracting the quotient from 1 and multiplying by 100.

For example: If a cubic foot of dry gravel is found to weigh 106 pounds (when settled by tamping or rapping the sides of the box) then the percentage of voids equals $(1 - \frac{106}{165})\ 100 = (1 - 0.64)\ 100 = 36$ per cent. If the gravel only weighs 99 pounds per cubic foot the percentage of voids will be 40.

### Sand vs. Stone Dust.

The results of a large number of tests by different persons and different sands seem to show conclusively that crusher dust makes a stronger mortar than the best sand, the increase in strength sometimes reaching 100 per cent.

(By crusher dust is meant that portion of the product of the crusher which has been passed through a ¼-inch mesh.) Crusher dust containing particles of mica should be avoided.

### Gravel vs. Broken Stone.

As a rule tests of the comparative strength of concretes made from gravel and from hard, broken stone, such as trap rock or hard limestones, mixed in the same proportions (by measured volumes), have shown the broken stone concrete to be the stronger. The difference in strength, however, diminishes with the age of the concrete. For ordinary purposes gravel concrete in which the particles are well graded is as satisfactory as that from broken stone, and is usually much cheaper.

### Impurities in Aggregates.

The presence of a small amount of clay in sand and gravel does not as a rule weaken or injure mortars or concretes, but it is generally considered that the presence of loam or dirt is objectionable. Before accepting sand or gravel containing a large percentage of foreign matter tests should be made of that particular sand or gravel, washed and unwashed.

The presence of dirt in sand or gravel may readily be determined by putting a handful of the sand in a small strainer and turning clean water on it, catching the water in a glass dish. After a while the dirt will settle in the bottom of the glass dish.

### Wet vs. Dry Mixtures.

Concrete mixtures are commonly designated as dry, medium and wet.

A dry mixture is one in which the consistency is about the same as that of moist sand, the mixture barely retaining its shape when squeezed in the hand.

A medium or moderately wet mixture may be defined as one that will not quake in handling, but will quake in heavy tamping.

A wet mixture is one that quakes freely and can be poured.

Experiments show that dry mixtures attain their strength more quickly than wet mixtures, but that medium mixtures produce a denser and stronger concrete, and, except for reinforced concrete, are to be preferred to wet or dry mixtures. Also that it is better to use too much than too little water.

Few concrete experts approve of dry concrete.

### Setting of Cement.

The setting or hardening of hydraulic cements after they have been mixed with water is due to a chemical reaction which is very different from the hardening of lime mortars. "The process of setting is a gradual one and may be arbitrarily divided into three parts, viz.:

### Initial Set; Final Set; Hardening.

"The dividing line between the periods is arbitrary, but the division is based upon the fact that after water is added the paste remains plastic for a certain period and then commences to 'stiffen,' or 'crystallize.' This is called the time of initial set. The setting process continues rapidly, and when a point is reached that the paste will withstand a certain pressure, arbitrarily fixed in practice, it is said to have reached its final set. The process of hardening now continues slowly, and proceeds with increasing slowness for an indefinite period."

In practice cement mortar or concrete is said to have set when its shape cannot be altered without causing a fracture—*i. e.*, when it has entirely lost its plasticity.

The time is greatly affected by the temperature of the water used, and also of the surrounding air, and to a less extent by the amount of water used in mixing.

Under normal conditions Portland cement should commence to set in 30 minutes, and should develop a hard set within two hours from the time of mixing. In cold, damp weather the time of final set may be delayed for ten hours.

Even at the time of final set mortar or concrete has no appreciable strength and is not capable of sustaining a load.

*(To be continued.)*

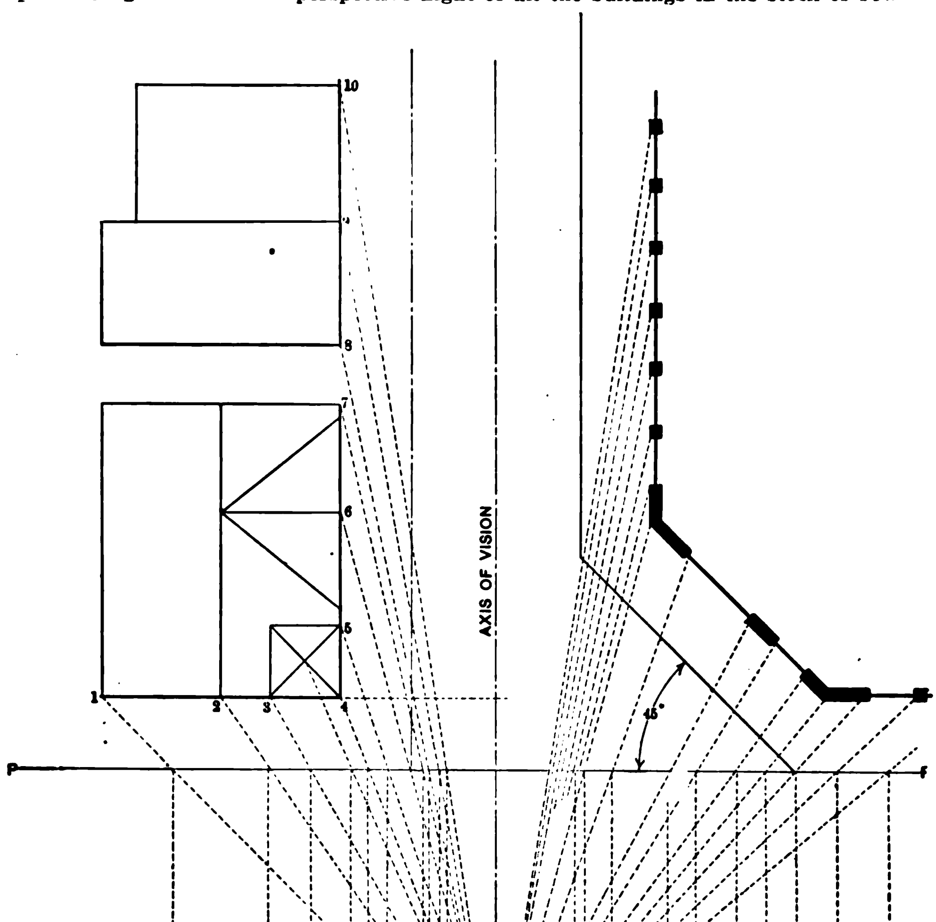
* These figures refer to the proportions of cement, sand and coarse aggregate, in the order named.

* Taylor & Thompson, page 88.

# PERSPECTIVE DRAWING FOR THE BUILDER.—II.

By M. M. Sloan.

A RECEDING street, upon one corner of which is located a lodge entrance and fence, while upon the other is a building in the foreground and others in the distance, is shown in Fig. 7. Above the perspective drawing the plan of the plot shows the several buildings in their true relative positions. The point of sight is located on a vertical line drawn through the center of the receding street. The picture plane for this view is located parallel to and somewhat in front of the face of the several buildings, as shown by the line P P in the plan, and the point of sight or station point S is 75 feet forward of the façade of the church, as measured on the axis of vision. A simple means of drawing this perspective is to extend lines from the angles of the several buildings designated by 1, 2, 3, 4, 5, &c., to the point of sight intersecting the picture plane P P. These radial lines, drawn from points which represent the primary vertical lines of the perspective, will give on the screen or picture plane the vertical lines of the image of the entire view included in the visual angle. When these points, 1, 2, 3, 4, &c., are thus obtained on the picture plane P P they may be projected thence by vertical lines to the portion of the paper allotted to the view, and upon these vertical lines the perspective may be constructed.



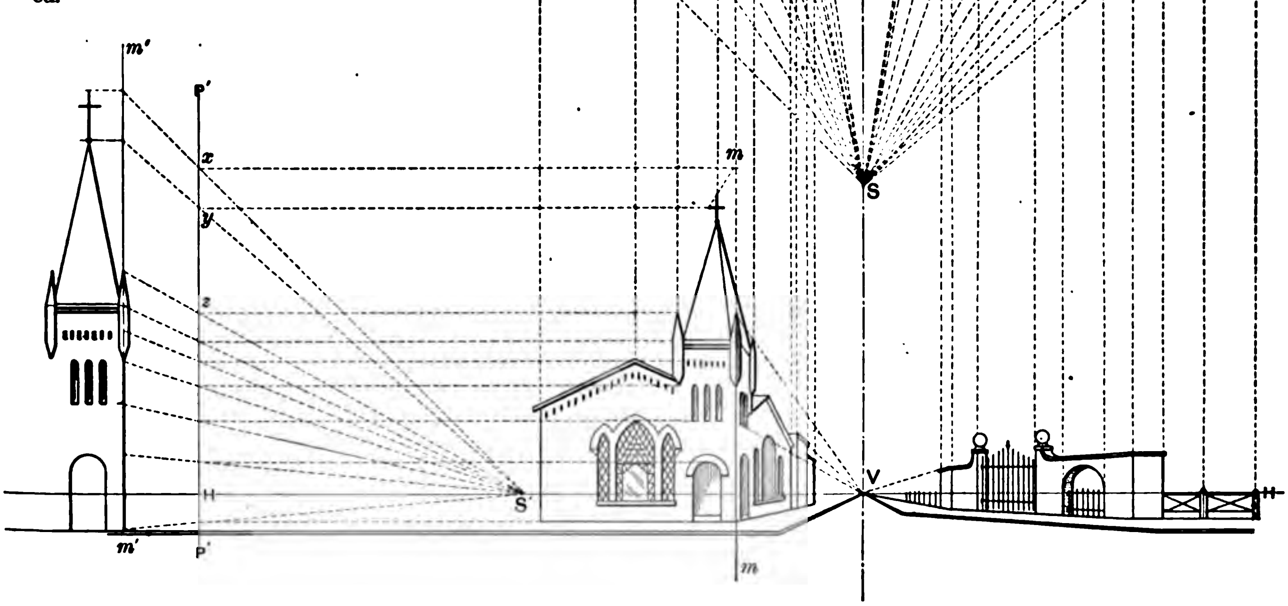




Fig. 7.—Perspective of Streets Parallel to and Receding from the Picture Plane.

*Perspective Drawing for the Builder.*

to the point of sight S', the location of points *x*, *y*, *z*, &c., on the picture plane P' P' are obtained, and by projecting these points to the line *m m* in the perspective and drawing lines thence to the vanishing point V, the apparent hight of the several features of the tower is obtained. The perspective hight of all the buildings in the block or row

In order to obtain the reduction of the several hights of the church shown in the foreground due to the fact that it is beyond the picture plane it is necessary to draw the side elevation to the left, using the same scale as for the plan, at its correct distance from the picture plane P' P', and the view point S' of the side view. By drawing lines from the principal points in this elevation may be found on *m m* by first setting off their hights on *m' m'* and then obtaining their positions on the picture plane P' P', the apparent hight of the several buildings being afterward obtained by describing lines from the points thus found on *m m* to the vanishing point V.

It will be observed in the plan that the building line of the lodge gate is neither parallel with nor at right angles to the picture plane, but extends at an angle of 45 degrees thereto. The question therefore arises, To what point do the lines of the wall and lodge gate vanish? All the horizontal lines of an object vanish in the picture to points on the horizon line H H, for that line is on a level with the eye. It is also evident that as lines which are perpendicular to the picture plane converge to the point of sight, and that as lines parallel with the picture plane do not converge to any point, lines extending oblique to the picture plane must converge to some point between these two limits.

The method of locating the vanishing point for the

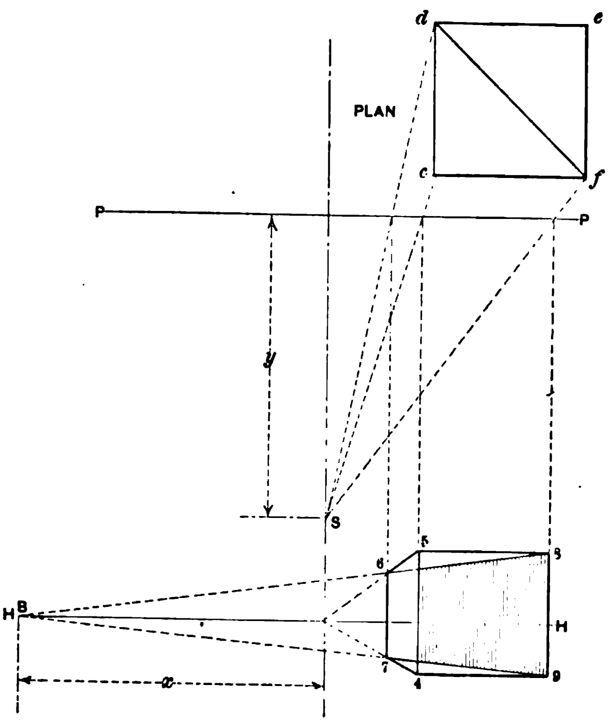



Fig. 8.—Obtaining the Vanishing Point of Oblique Surfaces.

at which the lines meet with the picture plane. In Fig. 8 it was demonstrated that when parallel lines lie at an angle of 45 degrees with the picture plane, their point of convergence on the horizon is at a distance from the axis of vision equal to the distance from the station point to the picture plane, and this may be considered as an established principle.

A diagrammatic representation of the diminution in the size of objects as they recede from the picture plane is illustrated in Fig. 9. The hight of the nearest figure to the picture plane P P, as viewed from S, is represented by the distance *a a'*. The second figure is twice the distance from the plane of the first, and lines drawn from the point of sight through P P to its extremities would make its hight on the picture plane equal to *a b*. If this distance be measured it will be found to be one-half of the distance *a a'*, and from this we have the very important principle that the dimension of an object as seen on the picture plane is inversely as the distance of that object from the eye. By inversely is meant that if the distance is doubled the dimension of the object is reduced to one-half, while if the distance is four times that of the nearer figure then its hight on the picture plane would be one-quarter, or as *a c* is to *a a'*.

The method of developing the complete perspective of a building can be most easily grasped by an explanation of what is usually known as the "plan above" method, which is illustrated in Fig. 10. According to this method it is first necessary to lay out accurately to scale a plan of the building, showing the position of the several window and door openings and the outlines of the roof. Upon such a plan chimneys, porch columns and other projections or depressions must be shown. Let it be considered that such a plan has been laid out at A in the figure. The back portion of the building—that is, all of that portion of the building which would lie back of or beyond a line drawn through the points 6 and 5—will not be needed in the plan, since it will be invisible from the chosen point of view. Neither are any of the details required which lie between points 1 and 6, for all of that portion of the building is hidden by the projection marked *w*.

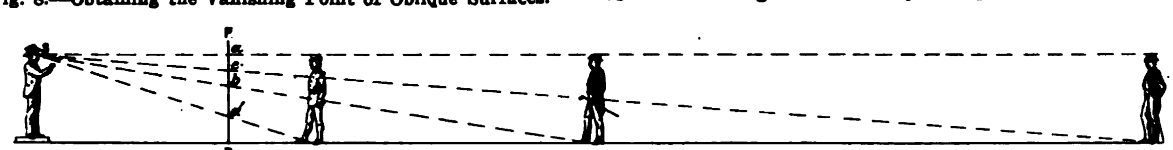


Fig. 9.—Diagram Illustrating the Apparent Decrease in Size of Receding Objects.

*Perspective Drawing for the Builder.*

edges of an oblique wall is shown in Fig. 8. If we include this wall in a square, *c, d, e, f*, the plan of the face of the wall will be represented by the diagonal *d f*, and if we can construct the perspective of the cube of which *c, d, e, f* is the plan, as shown in the lower part of the figure by 5 6 7 4 9 8, we can then draw through the cube thus represented the diagonal lines 6-8 and 7-9, showing the face line of the wall, and can then determine by their convergence the location of the vanishing point. The construction of the perspective of the cube is accomplished by the method employed in Fig. 7, and is so clearly shown as to require no further explanation. The convergence of the lines is shown at B, and by measurement it will be seen that the distance *x* is the same as the distance *y* of the plan, which condition applies to all oblique lines making an angle of 45 degrees with the picture plane.

From these several illustrations the following principles are then evolved, viz.: That all lines parallel with the picture plane, whether vertical, horizontal or inclined, have their true direction in perspective; also that all lines which are not parallel with the picture plane but which are parallel to one another seem to converge to a point called the vanishing point. We also note that all parallel lines at right angles to the picture plane have their vanishing point on a level with the eye and directly in front of the viewpoint, and that parallel horizontal lines extending at an angle with the picture plane also have their vanishing point on a level with the eye, but to the right or left of point of sight, depending upon the angle

For this reason corresponding portions of the elevation B are not shown.

In beginning any perspective it is first necessary to decide upon the position of the picture plane. It can be located at pleasure, but it is customary in architectural drawings to draw the same through the foremost corner of the building. This position is decided upon in order to facilitate the measurement of hight, as will hereafter be described. The next thing to consider is the distance of the observer from the subject, or, in other words, the location of the point of sight. The position of the point of sight is usually taken on a line perpendicular to the picture plane, drawn from the point of contact of the object with that plane. In the diagram under consideration the point of sight P S is at a distance away equal to about twice the front width of the building.

The position of the eye above the ground has much to do with the appearance of the perspective.

For architectural subjects it is usual to choose a point of sight 5 feet 6 inches above the ground level upon which the building stands. Frequently, however, where it is the purpose to show the extent or grouping of a number of buildings, such as those comprising a large institution, it is necessary to take a point of sight many feet above the ground, and in this way secure what is sometimes known as a bird's-eye perspective.

The next step in the operation is to locate the horizon line and the position of the vanishing points. Before this is done it is usual to draw a horizontal line at the base line of the perspective, which may be termed the ground line, marked *b b* in Fig. 10. If the hight of the eye of the observer is placed at 5 feet 6 inches this distance must be set off on the vertical line, measuring from the ground line at C, and a horizontal line drawn through the point so obtained will give the horizon line, designated by H H. To obtain the vanishing points is a comparatively simple matter. They are located by drawing lines from P S parallel with the sides of the building in the plan until they intersect at V and V the line P P, representing the picture plane, and the vanishing points for the perspective are obtained by dropping lines vertically from these points until they intersect the horizon H H at the points V P at the right and left.

The perspective may now be rapidly developed by projecting

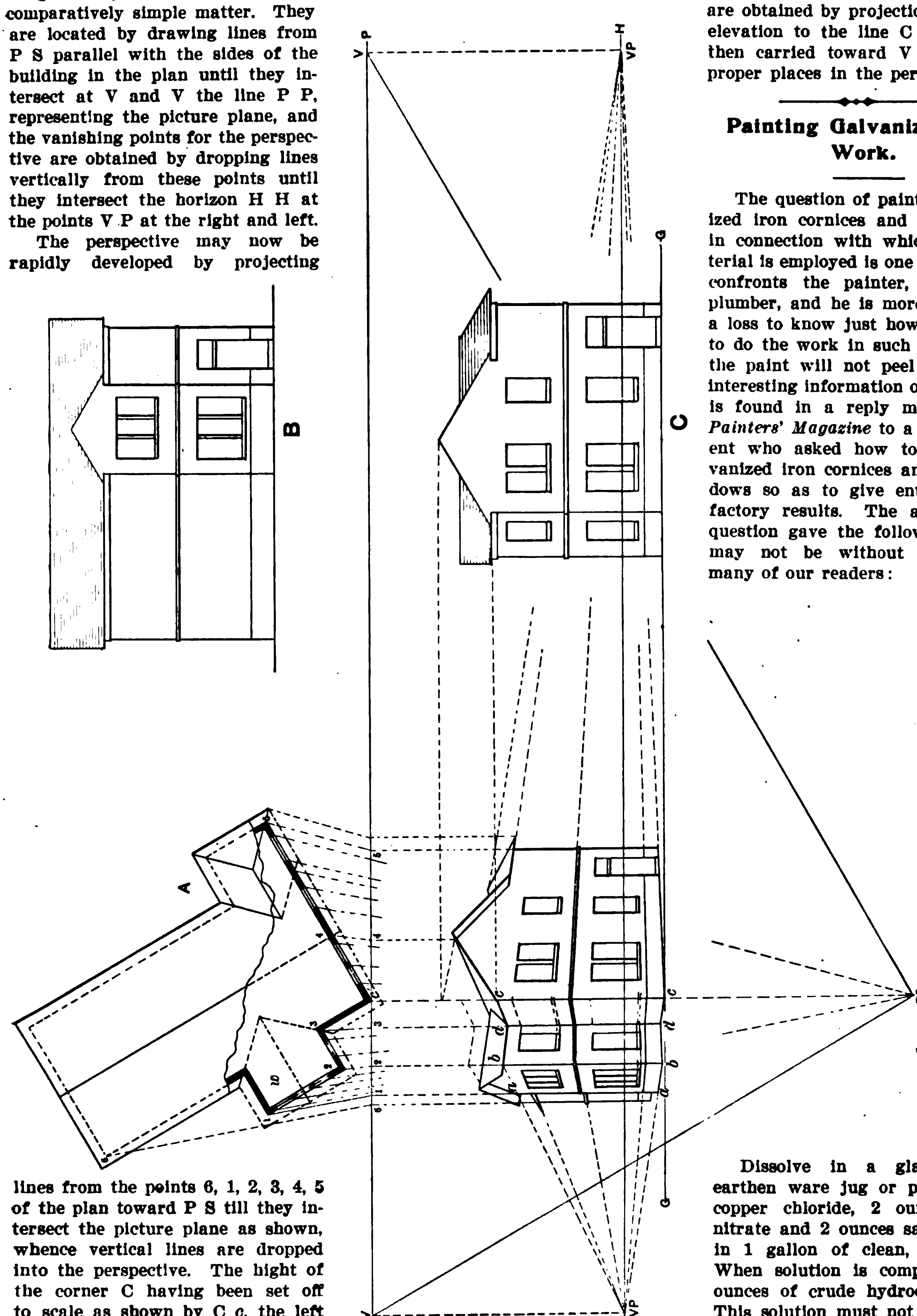


Fig. 10.—Perspective Drawing According to the "Above Plan" Method.

*Perspective Drawing for the Builder.*

lines from the points 6, 1, 2, 3, 4, 5 of the plan toward P S till they intersect the picture plane as shown, whence vertical lines are dropped into the perspective. The hight of the corner C having been set off to scale as shown by C *c*, the left hand side of the building may be drawn in by drawing lines from the extremities of the line C *c*, representing the corner of the building in the picture plane, toward the left vanishing point, and where these lines intersect the line from 3 on P P the vertical line marked *d d* is drawn. The surface of the building marked 2 3 in the plan is found by drawing lines from the points *d* and *d* from the right hand vanishing point, cutting the line from 2 on P P, as shown by *b b*. Similarly, the surface of the building designated 1 2 in plan, exclusive of the gable, is found by drawing lines from the extremities of the line *b b* toward the left hand vanishing point, cutting the vertical line from 1 on P P. This gives the points *a a*. The far corner of the building, designated 6 in the plan, is found by intersecting the lines drawn from C and *c* with a vertical line dropped from point 6 on the picture plane. The several hights for the window openings, belt courses, &c., are obtained by projection from the elevation to the line C *c*, and are then carried toward V P to their proper places in the perspective.

## Painting Galvanized Iron Work.

The question of painting galvanized iron cornices and other work in connection with which this material is employed is one which often confronts the painter, builder or plumber, and he is more or less at a loss to know just how to proceed to do the work in such a way that the paint will not peel off. Some interesting information on this point is found in a reply made by the *Painters' Magazine* to a correspondent who asked how to paint galvanized iron cornices and bay windows so as to give entirely satisfactory results. The authority in question gave the following, which may not be without interest to many of our readers:

Dissolve in a glass jar or earthen ware jug or pot 2 ounces copper chloride, 2 ounces copper nitrate and 2 ounces sal ammoniac in 1 gallon of clean, soft water. When solution is complete, add 2 ounces of crude hydrochloric acid. This solution must not be made in tinware or the copper will precipitate and render the wash unfit for use. With a soft, flat brush apply this wash to every part of the exposed galvanized iron surface and the latter will turn dark gray or black, but drying, a light gray film will show, upon which almost any oil paint will adhere tenaciously. The next coat should be dry red lead, mixed with equal parts raw linseed oil and turpentine without dryer. The finishing coat may be selected as fancy or requirements may dictate. Treated in this way a good job should result.

# PLASTERING IN WINTER.

THE very severe weather which was experienced in this country the past winter, resulting in the practical cessation of building operations in nearly every section, serves to direct attention afresh to the difficulties which always attend the attempts to satisfactorily plaster a building when the temperature is at a low degree. In discussing the matter a writer in a recent issue of the *Engineering Record* points out how many of the defects noted in connection with plaster work done in winter may be remedied, as their causes seem to be very little understood. He says:

Heretofore wall plaster has been a mixture of varying proportions of slaked lime, sand and hair made at the building, usually out in the open with no protection from the elements. If cold weather came on the mixture would freeze and could not be used until thawed out, with consequent injury to the binding qualities of the material; or, as often happens, the frozen mixture is applied to the walls to soon come off as the frost thaws out. Then, too, the quality of lime used varies greatly, and poor lime is cheap. Sand also differs greatly in quality, and sand that contains a large percentage of loam requires less time to bind it together; but loamy sand makes a very inferior plastering mortar. When lime of the best quality is obtained and good sharp sand is at hand, the proportions that enter into the mixture are uncertain and are guessed at by the laborer who does the mixing. This laborer is the unskilled workman of the job, and if he does not properly manufacture the mortar all the skill in the world in applying it to the wall by skilled workmen will avail little.

This unsatisfactory state of affairs in making plastering mortar has now been overcome, as many manufacturing plants have been established throughout the country which slake lime by machinery, dry the sand, card the hair, automatically weigh the proper proportions of each and mix the whole together thoroughly by machinery and deliver this mixture in a dry state to the building in suitable containers, usually jute bags. As the material so prepared requires only water to be added at the building to make it ready for use it does away with a great many of the disadvantages of the old way, and has the great advantage of insuring a uniform plastering mortar of very superior quality that is easily handled.

Plastering mortar prepared in this way can be taken into the building and mixed with water in water tight boxes on the floor where it is to be used, and this avoids all chance of freezing if the building is properly heated, as it should be.

### Some of the Troubles Encountered.

In the treatment of some of the troubles encountered in plastering in winter, we will not consider those met with when plastering mortar is made at the building in the open in the old way, but will consider that if the mortar is made at the building it is properly protected so far as its manufacture is concerned. With this exception the following comments apply equally to all kinds of plastering mortar.

Plaster is necessarily applied in a wet state, and the surplus water has to evaporate or be dried out of it. It is this surplus water and other dampness in a new building that are the chief causes of trouble in winter plastering.

In winter, when the temperature is low, evaporation takes place slowly or not at all. In most cases the building is cold, is not inclosed, or possibly the windows have only muslin screens, but at any rate the conditions are usually bad for drying out the moisture from the plaster and from the other parts of the building. If very cold weather comes on the damp plaster freezes and then there is trouble.

The amount of dampness in a building is very much greater than is usually supposed. In frame structures there is moisture in pretty much everything that enters into it—the brick in the chimneys, the cement concrete in the cellar and bathrooms, even the lumber contains much moisture. In the larger brick or stone buildings with thick walls, concrete or tile floors the amount of moisture is very large. The greater part of this moisture will have to be dried out of the building sooner or later, but until this is done it is liable to be a source of trouble, and this is particularly the case in winter.

The methods used to get rid of this moisture are for the most part crude, and in many cases are the causes of greater trouble than the moisture itself. In hardening, the plaster of Paris and lime in wall plaster combine chemically with some of the water, either in the form of water of crystallization or in formation of hydrates. Therefore, all of the water added to wet the plaster does not have to dry out. The so called hard or patent plasters contain more or less plaster of Paris; they do not require so much water to be dried out as other plasters that do not contain plaster of Paris; in other words, they dry quicker. This chemical change or hydration takes place gradually, and it is not desirable to dry the plaster so quickly as to prevent its taking place properly. An overheated building is quite, if not more, injurious than an underheated one. The majority of builders regard the ideal drying conditions in winter to be an overheated, tightly closed building with no circulation. This is far from being right. Circulation of air is, if anything, more important than heat, if the outside atmosphere is above freezing. On such days as the atmosphere outside is very damp and moist it is better not to open the windows.

### Ideal Conditions.

The ideal condition is to have a gentle heat to keep the atmosphere warm, and allow sufficient circulation of air to absorb and carry off the moisture. It is especially important that the heat should be kept up during the night. The proper way to accomplish this is to have the heating apparatus installed in a building and in working order before any plaster is applied. Temporary connections can be made, and heaters placed in the middle of the room. By doing this, and observing the simple precaution of opening the windows from the top during the day time to allow a free circulation of air to let the moisture out, the greater part of the troubles of winter plastering would disappear. No time is gained by not doing this, and it is a mistake to think that a building can be plastered quicker by starting the work before the building is properly heated. On the contrary, it is much quicker to delay starting the plastering until the heating apparatus is in working order, as the plaster dries out within a few days' time in this case, whereas it is liable to be weeks and months when this is not done.

With a temperature sufficiently high to evaporate the moisture the plaster dries quickly, and the rest of the work can follow at once, but the usual method is not to wait until the heating apparatus is in order, but to inclose the building with muslin screens and use stoves, salamanders or open fires to dry out the building. Usually the fires are not kept going at night, and in consequence the building (which has probably been overheated in the day time, as is always the case of the ceilings in the rooms in which the stoves or salamanders are placed) is allowed to become cold at night. The chances are, too, that no precaution has been taken during the day time to permit a draft of air to circulate through the rooms to carry off the moisture. What is the result? The heat of the day vaporizes the moisture, and the cold of the night, after the fires are out, again condenses it and it settles on the plastered walls and is absorbed, or if the temperature is very low the moisture freezes on the face of the plaster, which is found covered with ice the next morning. In many cases this process of heating by day and cooling by night is kept up for weeks, with the moisture for the greater part still in the building at the end of that time, or possibly a sufficient amount of it has been gotten out to make the plaster appear sufficiently hard to finish, and the finish coat is applied. Each coat should be thoroughly dry before the next coat is applied.

After applying the finish coat of plaster all moisture from the under coats has to dry through the finish coat, and as the finish coat is denser and more compact than the under coats it takes very much longer for the latter to become dry after the finish coat has been applied than if this drying had taken place before the application of the last coat. The results are usually as follows:

1. *The Effect of Dampness Remaining in Plaster.*—The most serious effect of plaster remaining damp and soggy and not drying out in proper time is to cause it to lose its set or strength, and in consequence it does not become hard. In other words, the result is the same as if the plaster has been retempered. It is a well-known fact that with plasters or Portland cements when they are retempered their strength is lost. As time goes by, therefore, the plaster that has been allowed to remain wet and soggy dries out, but it is very apt to fall from the wall or crumble away like so much sand.

2. *Staining Due to Dampness.*—The scratch and browning coats of plaster should be perfectly dry before the finish coat is applied. If the finish coat is applied before the scratch and browning coats are dry any staining from the wood lath (sap) or from brick or terra cotta walls will be carried by the dampness through to the surface of the finish coat, leaving a discoloration or stain. All moisture in the scratch and browning coats, and for that matter in the brick walls as well, dries out through the finish coat, with the result that the latter remains damp until this moisture has entirely dried out. This seriously injures the finish coat and it is liable to remain soft. In large office buildings where the walls are massive the dampness remains in the plaster for a long time and beads of water are frequently seen standing on its surface. In case of brick walls, when the water evaporates it leaves long, fine crystals of substances that have been brought to the surface in solution. Usually these substances are crystals of carbonate of soda, chloride of soda or other soluble salts. The use of damp proof paints on brick or terra cotta walls, before plaster is applied, prevents much dampness coming through the plaster, and they should be used whenever possible.

3. *Effect of Frost on Scratch and Browning Coats of Plaster.*—The general effect of frost on plaster is to seriously injure its binding qualities or strength. The plaster becomes soft and does not set hard, and the plastered wall that has been frozen is liable to fall. If the frost has gotten into the first or scratch coat of plaster and causes it to lose its strength, it will not be strong enough to hold up the two succeeding coats (browning and finish), even though no frost has gotten into these last two coats; but should the scratch coat not be injured to such an extent as to cause it to fall the frost will thaw out, and in this process push off the browning and finish coats.

It is not an uncommon thing to see the browning coat separate from the scratch coat in large sheets where frost has affected the latter. In like manner, if frost gets into the second or browning coat this will be damaged, as in the case of the scratch coat, and if the third or finish coat is applied while frost is still in the browning coat the finish will be pushed off in sheets when the frost thaws out, just as was the case of frost in the scratch coat.

4. *Effect of Frost on the Finish Coat of Plaster.*—Frost causes the finish coat of plaster to become soft and chalky, and without strength or hardness. The finishing coat rubs off like whitewash and is a constant source of annoyance to the occupants of the house.

5. *Plaster Appears Dry.*—Scratch and browning coats of plaster appear to be dry on the surface when, in reality, underneath the surface they are still wet. This appearance is often misleading, and the finish coat is applied too soon, with the result of having the finish coat remain damp until all the moisture has dried out from the under coats. As the finish coat is less porous than the scratch or browning coats it naturally takes longer for a wall to dry that has had the finish coat applied while the under coats are still wet than if the moisture in the under coats were allowed to dry out before applying the finish coat. This dampness in plaster is the cause of the disfigurement of decorations.

6. *Staining and Cracking Due to Use of Salamanders and Coke Pots.*—The sulphur and smoke from the coke or coal used in the salamander disfigure plaster. The smoke blackens the wall, but the sulphur of the coke unites with the lime in the finish of the plaster and forms sulphide of lime, which is yellow. These are the yellow spots or blotches that appear so often on the surface of plaster that has been applied in winter time. As the sulphur only unites with lime when it is damp, these yellow stains appear in round spots, the moisture drying out in small circles, just as if water were dropped on blotting paper and were allowed to dry. These small damp spots absorb the sulphur of the coke and cause an unsightly wall. The small furnace used by the plumber also adds to this yellow staining. Coke pots when placed too near the recently plastered wall are apt to dry it too quickly, and in consequence draw the wood lath, causing the lath to twist or buckle and the plaster to crack.

7. *Decorating on Plaster That is Not Thoroughly Dry.*—When plaster is damp, as shown above, the lime, which is a constituent of the finish coat of all plasters (there is no exception to this rule), acts as a bleaching agent. Paper applied on damp plaster therefore will fade or discolor, and paint or kalsomine will be similarly affected. Naturally, the more delicate the tints of paper or kalsomine, the more liable they are to be affected. Often rooms are repapered and repainted, and even the second application of paper or paint is spoiled. If the dampness in the wall is excessive the paint is pushed off from the plaster and peels off in spots several inches in diameter.

Walls should be thoroughly dried before they are decorated, and this takes time. If proper care has been taken in heating the building when the plaster was being applied, and this heat has been kept up until the trim is on and the walls are hard and dry, there is no reason why, with proper precaution, the walls cannot be decorated. Paint is very much less affected than kalsomine or paper. Delicate shades of either are more liable to damage, but if the walls are properly sized they can be decorated with satisfactory results. If very expensive decorations are to be made directly on the surface of the plastered walls it is best to allow the walls to become seasoned for at least one year. When decorations are on canvas, or if burlap is used instead of wall paper, little trouble is experienced. The trouble lies in the mistake that plaster that is hard and does not feel wet to the touch is considered by most persons to be dry, but this is far from the truth.

As poor drying conditions in winter are the cause of the troubles of plastering in winter, replace them with proper drying conditions and there will be no trouble. This can be easily brought about by observing the following simple precautions:

1. A building should be well inclosed. Nothing is gained in time by starting plastering before a building is properly ready to be plastered.

2. A building should be well heated by furnace, steam or hot water heat. Salamanders, coke pots, stoves or open fires should not be used. They are not necessary, and their use does not hasten the work. If, however, they are used their bad effects can be materially lessened if care be taken in their use. In case of coke pots or salamanders, have them lighted out of doors, so that the first smoke will pass away and the coke become well ignited before they are placed in the house. Coke should always be used and not coal, as there is less sulphur in coke and less smoke than in coal.

3. A building should be well ventilated. The windows should be opened from the top in the day time and closed at night. This allows the current of air to circulate through the building and carry out the dampness. It is a great mistake to keep the building tightly closed during the time it is being plastered. Fresh air is a good dryer.

4. If the precautions in regard to properly inclosing, heating and ventilating a building are looked after carefully there will be little trouble in winter plastering. It is not well to paper or paint too soon on new plastering. Even under the best conditions the plaster finish acts as a bleaching agent, and it should be well seasoned before it is decorated. When it is necessary to decorate quickly the precaution should be taken of using canvas

or an extra heavy coat of sizing before either papering or painting.

## Architecture of Hollow Block Buildings.

Among the interesting papers read at the recent meeting of the Concrete Block Machine Manufacturers' Association of the United States held in Chicago, was one by Frank L. Dykema, Grand Rapids, Mich., dealing with the subject indicated by the title above. He stated at the outset that he had endeavored to eliminate as far as possible any personal ideas he might have and to present the matter as nearly as he could from the standpoint of the architect. He pointed out that while manufacturers were not altogether dependent upon the architect for the success or failure of the sale of cement stone, still it was the architect finally who created the styles and developed the best methods of using a new material, and as a final result the manufacturers must produce that which the architect demands.

While it is true that three-fourths of the buildings constructed are never heard of by the architects, it is also true that practically all buildings are constructed along lines developed by architects, as sometimes the ideas are originated by the architect, and whether the plan is bought and paid for or whether the ideas are borrowed from work already done does not change the origin of the idea. Broadly speaking, the art of architecture is the art of combining the qualities of utility and beauty. A building properly designed must satisfy both as to proper interior arrangement, sanitation and convenience, combined with a satisfactory exterior effect, and in all a durable building as free as possible from the repair expense.

There is no question as to the use of cement stone in building construction. Even the most obtuse of the architects admit this, however grudgingly they may do it. The general desire to-day in any construction is to create something permanent. American life has been a hurried one, and the most desirable quality in any structure has been immediate utility rather than long life. The standard of values is changing and permanency is demanded as one of the first requisites. This is not alone apparent in building, but in nearly everything in which wood has been used, and in many cases in such structures as have been made of natural stone, brick and steel.

### Architects Demand Quality.

The first demand by the architect is quality. That we can supply. Little question is raised now as to the durability of cement in building construction. Freedom from the effects of the elements which tend to destroy other materials is too well known. The value of the hollow wall as a sanitary feature is a fact that has been recognized for many years and striven for with poor success and greater expense in other styles of construction. The fire proof quality is generally acknowledged by every one except the fire insurance people, with whom our good friend, Mr. Wiltse, has been making a good fight.

We have therefore to offer to the architect the ideal material so far as quality is concerned; but he asks more than this. To develop artistic effects he must have more to work with than mere durability. This is the work that is given us to do. We are the pioneers in a great movement and we must furnish the ideas for the architect to work with.

Cement stone represents a radical development in building construction. It is absolutely new. It is an honest material. It gives full service wherever used properly, and its use makes possible new and novel effects in the exterior of buildings.

To develop artistic effects the architect requires adaptability as to form, opportunity to use contrast in color, form, line or texture. The whole necessity finally develops into ability to develop contrast. As stated above, cement is an honest material; it is a good material and is amply able to stand for itself. Artificial stone, which we all started to make, is already a thing of the past. Cement stone is the material we are dealing with now, and as cement stone this new material must stand or fall. The architect does not recognize an imitation or anything artificial and will not deal with it as such. But there is no necessity of imitation. Cement is rich in possibilities both as to form and finish. The producton of any form demanded by the architect is only a matter of mechanical ingenuity, and the development of proper finishes and effects is a matter of study and thought to bring out the latent qualities in the material with which we are working.

## Mistakes in Building His House.

When one is building a home for himself it is always interesting to hear the opinions of his neighbors regarding the new structure and the many changes or improvements which they would incorporate if the building was being put up for them. Sometimes these ideas are suggestive and practical, and again they are more amusing than otherwise. Not long ago a railroad contractor by the name of O. M. Weand erected a home for himself at Reading, Pa., and to commemorate the completion of the building he published an illustrated pamphlet of 50 or more pages containing the criticisms of leading citizens. The title of the little book was "The Mistakes I Made in Building a House." These criticisms are of such a nature as to interest a great mass of readers and we have been permitted to copy those presented herewith:

"I would prefer one large window in the second-story front instead of the double window."

"Of course, you are building the house, but if it were mine I would run an open porch around the corner so as to connect the two porches."

"You'll make a mistake if you don't pebble dash the exterior."

"You'd better run 13-inch walls all the way up. It gets pretty windy out here sometimes."

"I think the ceilings are too low."

"My! how small your rooms are."

"You ought to be on the other side of the street."

"If it were my house I would prefer to have the cornice several inches higher."

"By all means put a double line of boards on the first floor. It keeps the cellar dust from coming through."

"Those chimney tops look like tombstones."

"The lawn steps should have been immediately in front of the main entrance."

"Why didn't you set the house in the middle of the lot?"

"Personally, I prefer steam heat to the hot water system."

"Why didn't you build the refrigerator in the den instead of the cellar? It's handier."

"Don't use sod. Sow lawn seed."

"I think your house is built too close to the ground."

"If you don't cover the pipes with asbestos you'll regret it."

"You certainly have made a mistake in putting in a concrete cellar. It makes everything very dry."

"Say. Oh! I was through your house on Sunday and I think it an ideal plan. I don't know when I saw a house that pleased me more, both from the exterior and interior point of view. It is perfect. Possibly the pitch of the roof is a trifle low, and I would have made the crest longer so as to provide a billard room on the third floor; and I would have built a separate addition on the ground floor and had my kitchen sort of detached, and—"

"I think it looks like a stable."

There are many interesting statistics in connection with the new State Capitol building which has just been completed at St. Paul, Minn., in accordance with designs prepared by Cass Gilbert, the well-known architect, not the least being the length of the structure, which is 433 feet; the width of the central part, 228 feet, and the greatest hight, 220 feet. The corner-stone was laid July 27, 1898. The dominant note in the design is Italian Renaissance, the ground story is of St. Cloud granite, and the upper stories and dome are of Georgia marble. The lantern of the dome rests upon a cone of steel and masonry, the dome itself, which is probably the largest of its kind in the country, being self supporting.

# MARKINGS ON BUILDING STONE.

BY CHARLES H. FOX.

A LONG time ago the attention of the writer was directed to an inquiry of a correspondent who desired to know the exact meaning of the different marks which are to be seen on building stone when it is brought to a structure from the quarry. Before explaining just what the correspondent wanted to know it may be best to give a short description of the quarrying of rough stone and then follow a block during its course of manipulation from a rough piece to a finished solid, and until it passes in the hands of the stone setter or builder and is by him set into the place in the building designed for it upon the working drawings. It is for the guidance of the stone setter in determining the proper position of the finished stone that the marks to which we presume the correspondent refers have been made or placed upon the stone.

Men who have been employed the greater portion of their lives either in the quarrying or in the cutting of stone work find it very difficult to realize how strange and interesting must appear to the uninitiated the process with which the former are so familiar. As a rule, the stone worker has been a great rover, moving from East to West or from North to South, almost as regular as the seasons come and go. He is so familiar with his calling that he can tell at a glance the State in which a particular stone has been quarried. He knows its texture

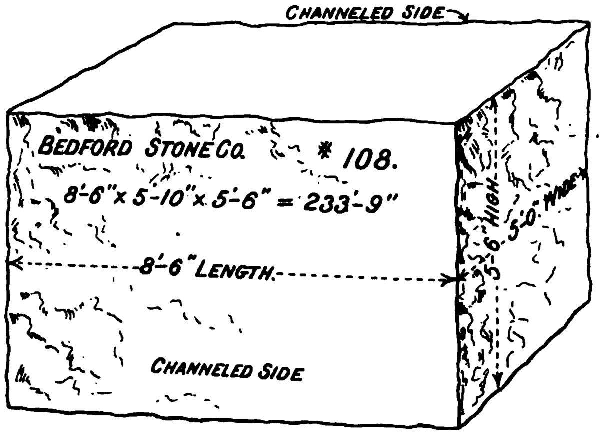



Fig. 1.—Block of Stone Ready for Shipment.

*Markings on Building Stone.*

and the proper finish, and, as a rule, the load it is capable of supporting. He therefore is at a loss to understand the ignorance that is shown in many quarters as to the most elementary facts in connection with stone and stone work. Comparatively few people appear to be able to distinguish between the various kinds of stone even when the differences are as strongly marked as between granite and limestone. Yet these same people would probably be ashamed of their ignorance if they could not distinguish between rosewood and mahogany or between pine and white wood.

To-day a very large portion of the stone used in the buildings erected in New York City and vicinity is a limestone that is quarried in the State of Indiana; hence it is named Indiana limestone. There are, of course, large quantities of marble, granite and other stones used besides limestone, but at this time it is our intention to take the readers to the limestone quarries. We may later, with the permission of the editor, visit the granite centers of Maine and New Hampshire, whence are brought the beautiful granite blocks such as one may see in the splendid mansion of Senator Clark on Fifth avenue and many other buildings erected in that vicinity. We may to save time assume that the reader has arrived either at Bedford or at Bloomington, Ind., for it is in the vicinity of these cities that the great limestone quarries are situated. Riding in the beautiful country surrounding either city one comes suddenly upon a fringe of high derricks and piles of stone that border the edge of an enormous yawning hole in the ground. The hole yawns more or less unexpectedly, because all around are fields and pastures, comfortable farm dwellings, with cattle and horses grazing peacefully, with all signs of a prosperous farming country. Yet it is here, cut out of the very heart of green fields and woods, that what is probably one of the largest stone quarries in the world is situated, yielding every year enormous quantities of stone blocks for building purposes, which are shipped to all parts of the country. In fact, there is hardly a city east of Denver, Col., but what has several buildings in which the cut stone used has been quarried and possibly cut at one of the Indiana quarries. To the stranger the first view of a quarry is somewhat startling, as he is apt to get the impression that it is the ruins or, rather, the excavation of the ruins of some ancient coliseum, for the walls are cut in shallow trenches which much resemble the seats in one of those antique open air theatres. Puffs of smoke and steam rise from the small but busy engine, veiling the work and workmen temporarily from sight. The air resounds with a clatter and clang of the machines at work upon the rock, while the tall masts of the derricks, with their long spare arms set at intervals all along the edge of the quarry, look like large undecorated May poles with their ribbons of rope and chains extending out in many directions. These gaunt modern machines are doing herculean work with the utmost apparent ease. Not all parts of the quarry yield the same quality of stone, as different qualities run in strata or layers, each layer being good for something in the general economics of the world. But it is only the choicest material which is made use of as facing or building stone.

In the quarry proper the principal machine made use of is the channeler, which is placed upon wheels and looks something like a small locomotive. It is, in fact, when at work able to propel itself either backward or forward as the operator may desire. Cylinders at either side operate cams which raise vertically rectangular bars of steel called cutters. These vary both in length and width according to the depth of cut required to be made. The cutting edges of the cutters are in sharpening made wider than the width of the bar proper. This is done in order to allow of clearance—that is, the shape so given to the cutters enables them to clear themselves no matter how deep the channel may be. Otherwise the tool would become stuck or jammed in the cut, and so cause loss of time in the operation of the machine. The cutter in the course of the quick downward motion strikes the rock and so cuts from it a portion rather longer and wider than the cutters. At the upward stroke the machine moves either forward or backward upon a temporary track a distance nearly equal to the length of the cut just made, and at the downward stroke the operation of cutting is repeated until the cuts called "channels" are made oftentime the whole width and length of the quarry and several feet in depth.

In many quarries the stone is situated in layers, each of which is of a different thickness and, as above intimated, of a different texture. The channels at such quarries are cut to meet one of the horizontal seams which divide the layers. Then by inserting in the seam wedge shaped tools of steel called wedges the quarrymen are enabled by the proper manipulation of the wedge to separate the two masses of stone. At quarries where such horizontal seams do not exist either steam, air or electric drills are used for the purpose of drilling a series of holes in the desired horizontal position. In these holes wedges are placed and are driven by the use of heavy hammers until the mass of rock is split in twain. Then in a similar manner by drilling holes along the top at right angles with the channel and again making use of the wedges the mass of rock may be subdivided into blocks of the commercial size usually termed "mill blocks." At other quarries the mill blocks are cut up by means of the channeler. When not channeled the blocks are, as a rule, "roughly squared up" by means of a tool similar to a pick. The derricks are then brought into use, and the blocks hoisted from the quarry and either placed in stock or loaded upon railway cars for transportation to any desired locality.

Before shipment the blocks are generally marked, first with the name of the quarry company, second with the number of the block, say, for example, No. 108, and third with the length, width, hight and cubic contents, as illustrated in the sketch, Fig. 1, which is self explanatory. Before leaving the quarry it will be interesting to visit the cutting sheds and take note of the large traveling cranes, stone saws and planers as they form the many shaped moldings with ease and rapidity, to say nothing of accuracy; for the molding is as perfectly formed at one end as it is at the other, and this in connection with a piece of stone some 15 or 16 feet in length.

We will now endeavor to give a brief description of the methods and machinery employed in the cutting proper of the stone, and in doing so will visit one of the large cutting plants in New York City or its vicinity. Should we happen to arrive at the wharf situated at one end of the stone yard at the time one of the large barges may be unloading its heavy cargo of stone we may be surprised at the ease and rapidity with which the large blocks are handled, some of them containing as they do in the neighborhood of 500 cubic feet of stone and weighing 45 or 50 tons. The blocks are unloaded and placed in piles on the wharf, after which a large traveling crane belonging to the equipment of the yard is used to place the blocks within the cutting shed. As required they are then placed upon the saw truck, which is a frame work of heavy timber resting upon wheels which run upon a permanent track similar to only wider than an ordinary railway track. The car with its load of stone is by means of suitable machinery brought immediately beneath the saws. These are called "gangs," and are so constructed as to be able to saw blocks of stone vertically into slabs of any size required, consistent of course with the capacity of the gangs.

Before describing the working of the gangs it may be well to first visit the drafting room, for it becomes necessary before we can proceed with the cutting of the stone to prepare a set of working drawings. These are generally made to a scale of ¾ inch to the foot. This working drawing is called a "setter's plan," and it is upon this that all working sizes, marks and letters of designation are placed such as may be required upon the finished stones. In general, the courses are arranged alphabetically—that is, the first course will be designated as Course A, the second course as Course B, and so on. In a similar manner commencing at the left hand corner, or the first stone at the left of course A, the consecutive pieces would be lettered thus: The first stone in the first course would be designated as A 1, the second stone as A 2, &c. In a similar manner the stones belonging to Course B, or the second course, would be described B 1, B 2, &c. Then by marking the stones in a manner corresponding to that given on the drawings the stonesetter can in a moment determine the exact position in which to place the finished stone in the building.

In an up to date shop after the drawings are completed a schedule, generally termed a "foreman's schedule," will be prepared, for it is obvious that the one who has made the drawings is better informed than one who has to go over them thoroughly in order to obtain the information necessary to get out the work. What we mean is this: In a large shop there are at least three heads—namely, foreman of the saws, foreman of the planers and foreman of the stonecutters. Now, supposing each of these in his own way took off the quantities, it would be almost impossible to have them agree or prevent errors creeping in; another thing, a great loss of time would of necessity ensue, and it is to obviate this that the draftsman is called upon to prepare a working schedule by which it is possible together with proper diagrams, templates, molds, &c., to properly cut and finish almost any piece of stone without any of the foremen who have the work in charge ever consulting the working drawings. This is true, of course, provided each one is a thoroughly practical stonecutter, for in the opinion of the writer no branch of the allied building trades calls for a more extended knowledge than does that of stonecutting.

Schedule Job # 309 Indiana Stone

| A | B | C | D | | E | | F | | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CHECK | NO. OF PIECES | DESCRIPTION | LENGTH | | DEPTH | | HEIGHT | | COURSE | MARK | SAWN | PLANED | CUT |
| | 9 | Sill | 10' | 4" | 3' | 6" | 1' | 10" | D | 4. 6. 8. 10. 12. 14. 16. 18. 20. | | | |
| | 8 | Closer Sills | 3' | 10" | 2' | 6" | 1' | 10" | D | 4. 7. 9. 11. 13. 15. 17. 19. | | | |
| | 17 | String | 6' | 3" | 2' | 0" | 1' | 3" | C | 2 to 18. | | | |
| | 2 | Cor. 1R. 1L. | 4' | 0" | 2' | 0" | 1' | 3" | C | 1 and 19. | | | |
| | 9 | Lintel | 9' | 4" | 1' | 6" | 1' | 9" | H | 4. 6. 8. 10. 12. 14. 16. 18. 20. | | | |
| | 8 | Closer Lintel | 4' | 6" | 1' | 0" | 1' | 9" | H | 5. 7. 9. 11. 13. 15. 17. 19. | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

Fig. 2.—Details of a Working Schedule.

*Markings on Building Stone.*

We present in Fig. 2 a copy of the working schedule. The check column is used by the person who may have charge of the shipment of the finished stone to the building. Column B shows required number of pieces; Column C is a very brief description of them, while the following columns indicate the dimensions, marks, &c. Thus we see that nine pieces of sill are required 10 feet 4 inches in length, 3 feet 6 inches in depth and 1 foot 10 inches in hight. These pieces belong to Course D, and require to be marked D 4, D 6, D 8, &c. Then consulting the working diagram, Fig. 3, it will be seen that the sills have lugs, which are 1 foot 6 inches in width, and that the wash has a drop of 2½ inches and a depth of 3 feet. The molding has a projection of 12 inches.

The joint mold, Fig. 4, made of thin zinc, gives the contour of the sections, &c. In fact, all information and directions can readily be obtained from the schedule diagram and mold for cutting the stone, and being properly marked with its designated letter and number its proper position in the building is determined. These remarks apply with equal force to the diagrams shown in Figs. 5, 6 and 7, which represent respectively the closer and string courses.

So much for the work of the draftsman. Now for that of the machines: Having consulted the schedule the foreman who has charge of the saws selects a block such as may contain as many pieces as possible of the required size and with the least quantity of waste. The block is loaded on the car, as previously mentioned, and the car is placed under the saw frame proper. The saw used in dividing the block into slabs is of steel 3-16 inch thick, from 4 to 6 inches in width and from 12 to 17 feet in length, according to the extent of the gang for which they may be made ready. The saws work in a horizontal direction, having a reciprocal motion, and the cutting proper is done by means of water and chilled steel. The water is fed to the saws by means of a centrifugal pump, the steel being distributed over the top of the block, while the water washes it into the cuts and so under the steel saw. Pressure is applied by means of screws which work in a vertical position and which have an automatic feed. The steel frame containing the saws is hung upon a framework of steel set at each end of the gang; these are called "hangers." Being thus constructed the saws in the course of their reciprocal motion describe an arc of a cut being light are carried away in the overflow.

The block after being sawn into slabs is well washed to prevent loss of the steel, and is then pulled out from beneath the gang. The slabs if of the desired size are then by means of the traveler carried to benches placed in front of the planers. If not of the required size they are turned and again placed beneath the gang to be resawn to the proper size.

While speaking of saws it may not be out of place to mention the "diamond" and circular. The diamond is the most expensive tool found in the stone yard, and consists of a single saw about 12 feet in length and very similar to the gang saws just described. It has a reciprocal horizontal motion, but instead of chilled steel being used as the cutting agent "black diamonds" are used. Some saws are furnished

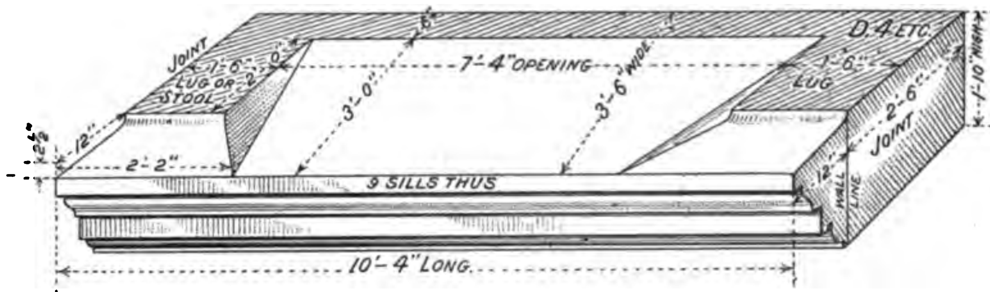



Fig. 3.—The Working Diagram.

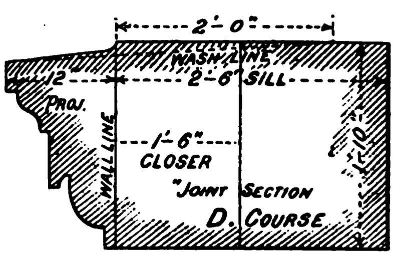



Fig. 4.—The Joint Mold.

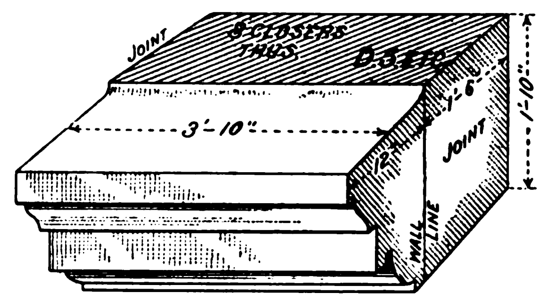



Fig. 5.—A "Closer."

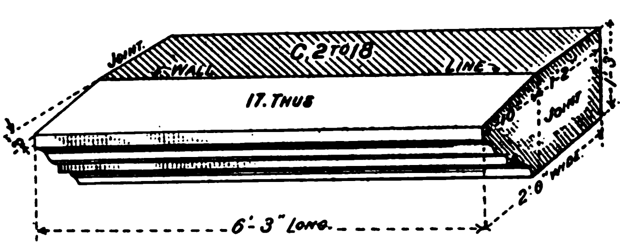



Fig. 6.—Stone for String Course.

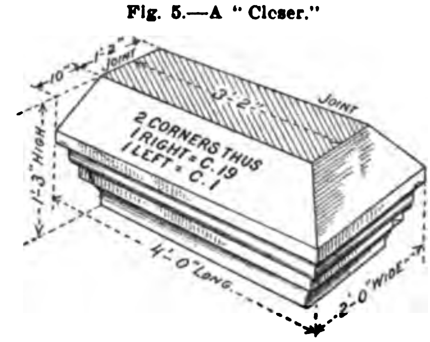



Fig. 7.—Stone for Corner.

*Markings on Building Stone.*

circle, so that at the commencement of a stroke they are in a manner lifted up from the surface of the cut, thus permitting the water and the steel to pass immediately under the saws. At this moment the saws are pushed downward by the automatic action of the screws, which causes the saws, especially at the central part of the stroke, to cut away a portion of the stone that is immediately beneath their surface. This operation is repeated at the return stroke and at each succeeding one, thus dividing the block into slabs and at the same time forming a plane surface. The steel shot are by the action of the saw after one or two strokes carried out at either end of the cut, where they fall into a large hopper shaped receptacle beneath the truck, and thence by means of a drain they are conducted to the well in which the pump is situated. The steel shot being heavy sink to the bottom, and are again by the action of the pump distributed over the block, and again used for cutting purposes until entirely worn out. The mud and refuse from the

with 71 to 75 cutting diamonds, worth from $3000 to $5000. The diamonds are imbedded in rectangular pieces of iron in such a manner that the hard surfaces of the diamonds project both at the sides and bottom of the iron. They are fastened into the iron in a rather novel manner. Slits, as it were, are cut into the iron sufficiently large to contain at the proper temperature the diamonds. The iron on cooling of course contracts and so firmly holds the diamonds in their allotted positions that it is possible to cut in a vertical direction from 4 to 5 feet per hour of limestone. The rectangular pieces of iron containing the diamonds are fastened into the steel saw, which, as above stated, is about 12 feet long. Owing to its capacity for fast sawing it is often spoken of as the "foreman's friend." If he should be short one or two pieces of stone he can very quickly rip them out from a block.

The principal work, however, done with this saw is that of ripping up long lengths of molded stone into shorter lengths. The most economical method of cutting out stone work for the planer is to saw out long pieces, and these after being planed can by means of the "diamond" be rapidly ripped up into such sizes as are called for by the drawings. The circular saw is very similar to that made use of in sawing wood, the principal difference being in the thickness of the plate, that of the stone saw being much thicker and heavier, and in the saws with teeth of steel the same method is employed in both cases of fastening the teeth into the circular recesses made in the plate for receiving the teeth proper.

In other machines "diamonds" take the place of the teeth of steel, and with these a greater quantity of stone can be sawn than with the other machine. The stone to be sawn is first secured firmly to a movable table, by means of tools constructed for this purpose specially; for unlike the operation of sawing lumber, where the wood is fed into the saw and the table remains stationary, in the sawing of stone it is the table which is made to carry and at the same time automatically feed the stone, keeping it pressed against the moving edge of the saw. In this manner a great quantity of stone may be sawn during the course of a day. Of course the stone is not fed into the saw at the pace at which wood may be fed, neither does the periphery of the saw travel at anything like the speed of the saw for ripping up lumber.

Now for a brief description of the planers and of the work which they perform: The stone planer is a heavily constructed machine, very similar to that made use of in the planing of iron and steel. The bed or table upon which the stone is placed is a movable one and is caused to travel backward and forward by means of cross belts and pulleys. The stones to be molded after being sawn to size are prepared for the planer by having an end roughly jointed; then the contour of the required section is cut in accurately for an inch or so at this jointed end. The operation is termed "setting in" of the mold. The stone is then transferred to the planer and firmly fastened to the movable bed. Steel tools are used for taking off the superfluous material, and when this has been done another tool is placed in the head for finishing the molding. This tool is of reverse shape to that of the member it is required to form—that is, if it is required to form a round member then the tool will be a hollow one, and *vice versa*. These tools are roughly drawn out by the blacksmith, and then by means of various shaped emery wheels are ground to shape and form desired.

For finishing plane surfaces a tool having a perfectly straight cutting edge is used. Some planers are by means of an auxiliary table fitted so as to form either straight or circular moldings, while others are constructed for circular work exclusively.

## The Origin of the Gargoyle.

The origin of the gargoyles and the grimacing figures which one finds in such large numbers on the French cathedrals was an orifice in the stone coping of the cathedral through which the rain water was carried. Then some inventive genius added a lip to carry the water out beyond the walls, and the name of gargoyle was bestowed upon the orifice. It is interesting to note that the name was derived from the Latin word from which the word gargle came, burgulio. The lipped orifice came into use about 1220 A. D., and thenceforth until the Renaissance the sculptors employed on the cathedrals in France turned their imaginations loose, and on the gargoyles their fancy ran riot. In those days there was a belief that unseen imps and monsters, witches and wehr wolves, abounded in the air, and so those who worked upon the cathedrals sought an opportunity to express this side of their religious belief. This the gargoyle afforded. They put into the midst of their beautiful stone angels and their flowering pinnacles grotesque figures of men and animals symbolizing these hideous creatures.

The gargoyle was found to be effective from an architectural point of view, so in course of time it was applied to the cathedral with less regard for its value as a channel for water. Eventually it became purely an architectural feature, without any utilitarian object to serve. Its gutters were closed up, and the mouths of the grinning animals, birds and human figures no longer belched forth water. On some of the French cathedrals, dating back to the fourteenth century, says a writer in an exchange, scores of these bizarre creations are to be found. It is said that in all France there are not to be found on the cathedrals two gargoyles which are alike. The gargoyles stick out everywhere on the edifices—from the junctions of gables and arches, from cornices, and they ring the spires like the spikes around the crown of the statue of Liberty.

Perhaps the cathedral which has attracted the most attention because of its grotesque figures and gargoyles is that of Notre Dame in Paris. Apparently the inventive genius which conceived the idea of carving fantastic figures representing the unseen powers of the air here flowered most luxuriantly. Not only are there many gargoyles of hideous mein, but away up, leaning over the parapet which surrounds the towers, may be seen looking down into the plaza curious faces. A closer look shows them to be monsters of all kinds, that of Biscornette in many shapes, fabulous birds, demons, dragons; they are sitting or crouching down, or standing upright, leering, grinning, grimacing. Epiphanius Wilson, in his "Cathedrals of France," has said of them: "These creatures symbolize the powers of evil and the evil things that cannot enter into the Holy City which the church upon whose exterior they have alighted represents. By a strange piece of irony, the convention of 1793, as well as the Calvinists that preceded them as iconoclasts, left these monstrous figures standing, while they demolished and dragged from their niches the beautiful statues of kings, bishops and saints with which the old church was then adorned, both within and without. The imagination of painter and sculptor never reveled in the creation of more hideous and revolting shapes than are gathered on the roofs and towers of Notre Dame. Among them, however, is represented an angel of God with his finger on his lips, imposing silence upon them, and silent they have been ever since they took the position they now occupy. As if to form the climax to the allegory, on the gable end of the nave a gigantic angel is blowing the trumpet of the last judgment."

There is a singular and interesting legend connected with the construction of the wonderful wrought iron work on the western doors of Notre Dame. Mr. Wilson tells this legend as follows:

"The popular mind in mediæval times always made a mystery of transcendant skill or knowledge in those who were superior to others. Thus the mathematician was an astrologer, the chemist a wizard, and the smith or mason of extraordinary skill in league with an evil spirit. Biscornette, a two horned fiend, such as is so frequently represented among the grotesque carvings of this church's exterior. Biscornette, it was alleged, in exchange for the soul of the workman, gave him power to excel his companions. But Biscornette could never forge the iron work for the central door of the west end, through which the Holy Sacrament was carried in solemn procession. He is forever wandering about the exterior of the church, into which he may not enter; and this is intended to suggest that the refuge for the Christian workman is in God's house, wherein all is good. . . . It is not without meaning, profound and practical meaning, that Biscornette is represented by the mediæval builders as perched on the outside of God's temple, which is guarded and safely kept by saints, apostles and martyrs."

AMONG the changes in the Building Department made by the new Superintendent of Buildings in Newark, N. J., is that of redistricting the city, assigning an inspector to a certain district instead of to a number of wards. This change is regarded as of great importance, as each district is now to be presided over by an inspector who will be held responsible for all the work done therein. Under the old arrangement the wards allotted to an inspector were sometimes situated in different parts of the city not adjoining each other, and this made the work of the inspectors unusually difficult.

# CORRESPONDENCE.

### Details of Tool Chest Construction.

*From* S. A. T., *Bayne City, Mich.*—I send with this sketches of a tool chest which I have just finished for my own use. The one great advantage of the box is that all the tools are handy to reach and when the lid is closed there is nothing that can get out of place and rattle around. The dotted lines in Fig. 1 indicate the planes standing on a slant on a felt pad which can be oiled and will keep the planes from rusting. The hand box in Fig. 2 that shows the corners cut out extends only far enough to admit the miter box. The second lid is also covered with felt in order to keep the bits and chisels from rusting. I would like very much to hear from some of the other readers on the subject, as it is one in which many are interested.

### Heating Capacity of Air.

*From* W. M. T., *Natick, Mass.*—We note in connection with the article on "Cooling the New York Stock Exchange," which appeared in the September issue, that to heat 1 cubic foot of air 1 degree requires about 0.0178 heat unit. We would ask if this is correct, as we have always figured 0.02056 heat unit to heat 1 cubic foot of air 1 degree, which seems to be the accepted standard for this amount of work. We would ask if there was a mistake in the paper or if we have been wrong.

*Answer.*—To show how the figure given in the article in question was obtained it would probably be well to explain what is involved in heating any body of matter. The amount of heat imparted to any substance depends on the range of temperature through which that body is warmed, upon the mass of the body and upon the specific heat of that body, the specific heat being its relative capacity to absorb heat as compared with some standard, as water, the specific heat of which is 1. The specific heat of air at constant pressure is 0.2375. The weight of air per cubic foot varies, of course, according to the temperature of the air. In the problem in question the air was cooled from 85 degrees to 55 degrees, so that we may say that its average temperature was 70 degrees. One cubic foot of air at 70 degrees weighs 0.075 pound, which is its mass per cubic foot. Therefore to heat 1 cubic foot of air 1 degree requires $0.2375 \times 0.075 = 0.0178$, which was the number used in the article in question.

Our correspondent's figure, 0.02056, is the amount of heat that air will take up per degree rise in temperature when the air is at zero, for then its weight per cubic foot is 0.0865 pound, and $0.0865 \times 0.2375 = 0.02056$. A figure which is perhaps more commonly used than that given by our correspondent is 0.019. This will be found to be the figure that corresponds to air at about 32 degrees F. (or the average when heating from zero to 68 or 70 degrees), when the air weighs about 0.08 pound per cubic foot.

In all these calculations no account has been made of the humidity contained in the air. Any such calculation would be altogether too refined. It will be seen that it would involve multiplying the weight of the dry air in a cubic foot by the specific heat, 0.2375, and adding to this product the product of the weight of the moisture in 1 cubic foot of air in question by the specific heat of moisture. The specific heat of moisture is not necessarily 1; as a matter of fact, some regard the moisture as in a vaporous state and give it a value less than unity.

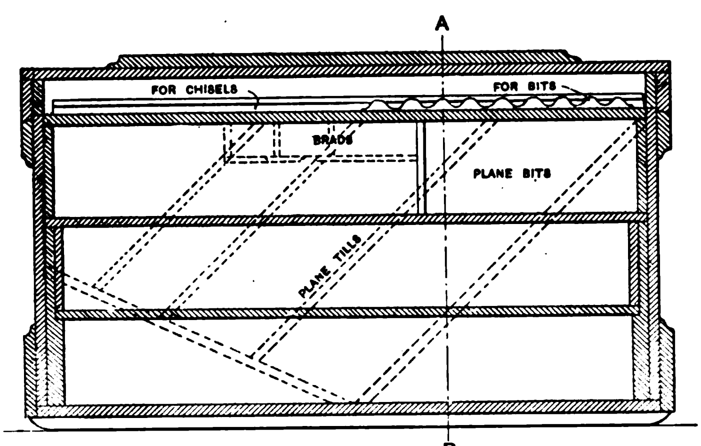



Fig. 1.—Longitudinal Vertical Section of Tool Chest.

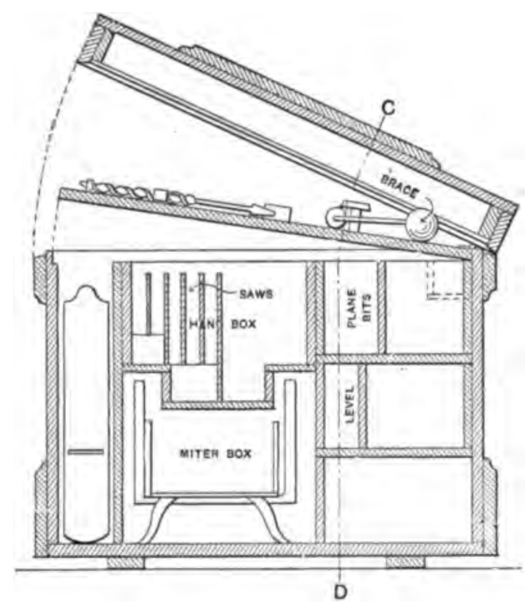



Fig. 2.—Vertical Cross Section of Tool Chest.

*Details of Tool Chest Construction.*

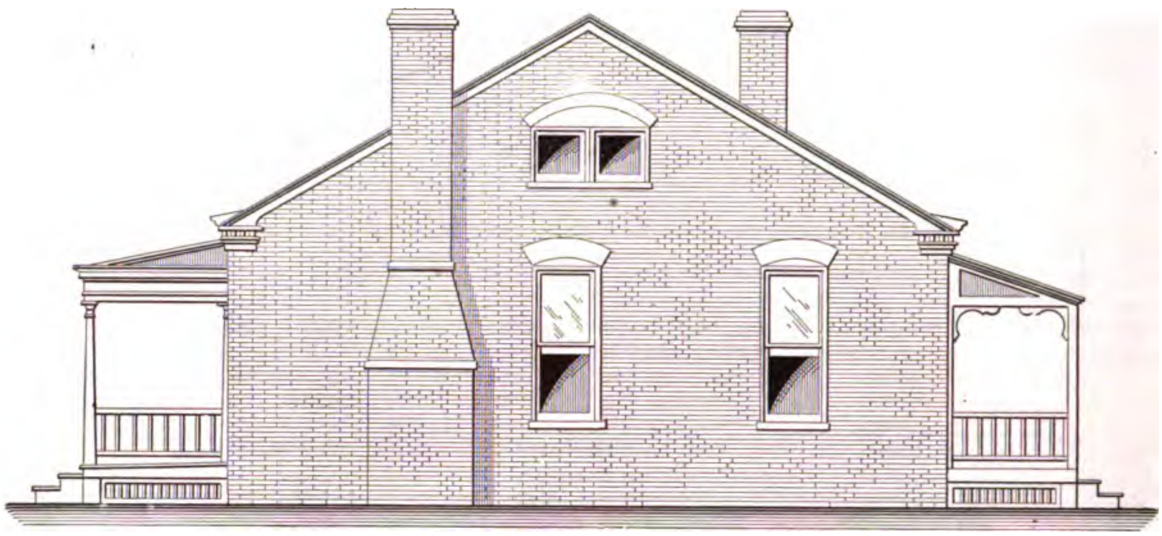
### Manipulation of Hollow Blocks in Building Construction.

*From* OBSERVER, *Cincinnati, Ohio.*—I have been much interested in the construction of dwellings from hollow blocks and have noticed some of the difficulties which appear to be encountered in the manipulation of the blocks during the work of erection. The principal troubles as they appeared to me were found in the fitting to small corners. It was only yesterday that I observed the method pursued in a case of this kind. A concrete block was required for a small space of about 8 inches in width. The workman took an ordinary stone mason's hammer and with the sharp edge first indented a line across the face and reverse side of the block to the extent of about ¼ inch in depth, then using the hammer side of the tool he gave it a number of severe taps, eventually breaking it off in a comparatively straight line. This seems to be the method used when it is necessary to do anything in the way of patching or fitting. The regular blocks used are made to dimensions on the ground with the machine, the flask, if I may so term it, being simply shortened or lengthened, widened or thickened, in order to produce the necessary size of combination required between openings or between side angles or straight corners. This is very readily accomplished, as the concrete blocks being very seldom thoroughly dried out before being put in position the interior for about ½ inch of the surface of the hollow part is more or less moist and a fracture is therefore readily accomplished. The moisture in the hollow concrete blocks, I am informed, is retained for some considerable time after the blocks are put in position, and in this respect they are, in my opinion, not as good as hollow vitrified brick. In addition to this the hollow cavity of the concrete block is very small as compared with the hollow brick, and this of course tends to retard the drying qualities of the former. I think, however, it is a cheaper material on the whole, because it can be made ready on the spot, but I find that a great many houses in this section are going up where the material is shipped ready for use rather than being made on the ground.

To sum up the advantages of the hollow concrete block over any other similar material, I would state that it can be made on the ground if desired and that it can be cut to fit all purposes with very little liability of damage, the first making it a cheaper proposition and the second more convenient than hollow vitrified brick, for example. The disadvantage arising from the retention of moisture for a great length of time can doubtless to a great extent be overcome by furring it, leaving an air space between the plaster and the block itself, but in some instances where the plaster is applied directly to the side of the block the results are not altogether satisfactory. Some years ago I constructed a dwelling house in which the blocks were of vitrified tile, or vitrified hollow brick, and while the formation and character are different from concrete the general manipulation was somewhat similar, and I closely watched the process of construction, with the results above indicated.

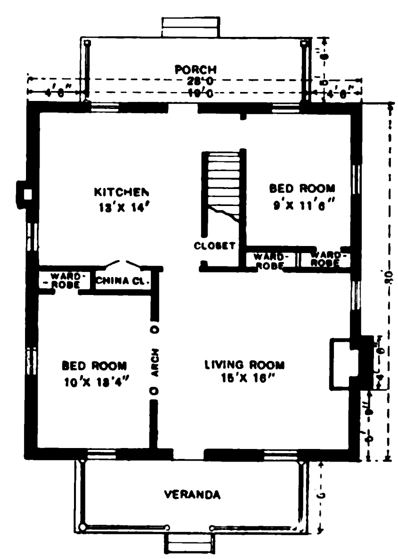
### A Cheap Brick Cottage.

*From* L. H. H., *Vincennes, Ind.*—During my stay in Cape Girardeau, Mo., an old Spanish mission town, I noticed a number of plain brick cottages which, while very inexpensive to build on account of their absolute plainness, had a cozy and homelike appearance. Acting on the idea suggested by these cottages I drew up the plans of such a one as I inclose herewith, and which may be of possible interest to some of the many readers of *Carpentry and Building.* The cottage is designed for a workingman and his family, and while no upper floor plan is shown, there is space for two good sleeping rooms on the attic floor, or the place may be left unfinished and used for storage. The cornice on the sides is entirely of brick, while the end cornice is a simple barge board 5 inches wide with a 2½-inch crown mold. The eave gutters are of galvanized iron. All the work is severely plain but substantial. The inside finish is of yellow pine with 8 inch base boards and 4½-inch casing finished in hard oil. In case it is desirable to have a cellar, entrance to it may be had under the attic stairs. The cost of such a house as that shown would closely approximate $900 in the locality named.



Side (Left) Elevation.

Front Elevation.




Floor Plan.

*A Cheap Brick Cottage.*

### Method of Constructing a Steel Hip Roof.

*From* X. Y. Z., *Washington, D. C.*—I would like to see published a graphic method of ascertaining the strains in a steel hip roof truss and the best manner of constructing the same. For example: Take a roof slated on boards 1½ inches thick; the load, including wind and snow, 50 pounds per square foot; the truss 60 feet span; 30 degrees pitch, spaced 15 feet apart.

*Answer.*—In reply to the above Frank E. Kidder says:

There are two methods of framing a steel roof of this span. One is to put a heavy truss across the building, half the width of the building back from the end, and frame the trussed hips and intermediate half trusses to it.

The other method is to use two styles of trusses, as illustrated by Figs. 1, 2 and 3. Thus truss 2 is of the same shape as if the roof had a gable end, and need be no heavier than truss 3. Truss 1 is made of such hight that its top chord answers as a purlin to support the jack rafters between X and Y. To support purlins A and C across the ends I-beams are framed from truss 2 to truss 1 and from truss 1 to the wall. The hips are commonly made of I-beams, but a plate and angles can also be used. The detailing of a high roof requires considerable experience, on account of the connections, but the computation of the stresses is not more difficult than for a gable roof. Figs. 2 and 3 show the most economical

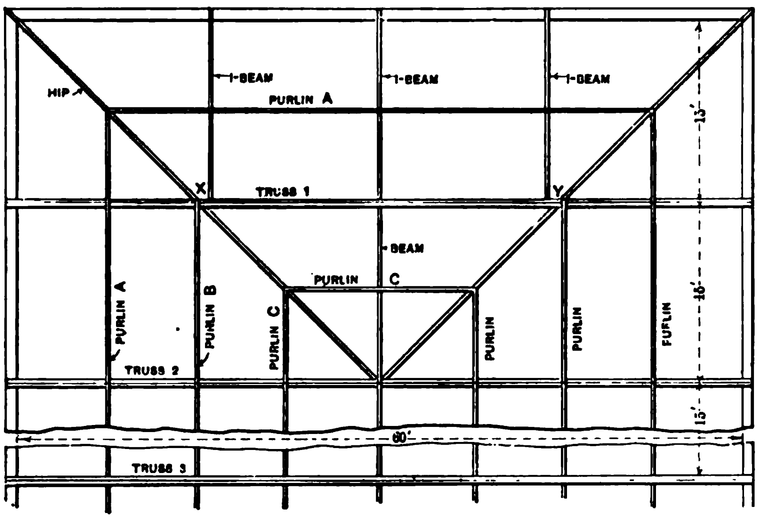



Fig. 1.—Plan of Steel Hip Roof.

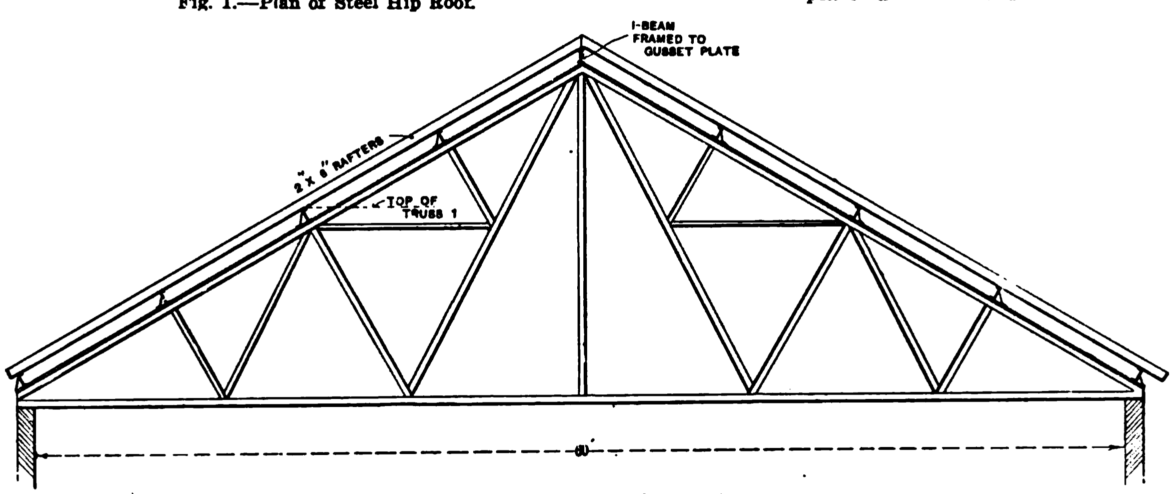



Fig. 2.—Elevation of Truss 2.

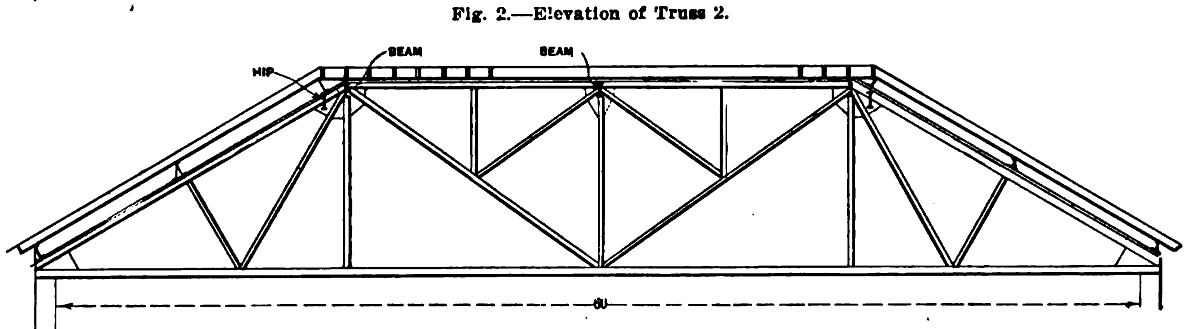



Fig. 3.—Elevation of Truss 1.

*Method of Constructing a Steel Hip Roof.*

types of steel trusses. Where the roof is sheathed it is customary to use wooden jack rafters.

To explain the method of finding the stresses would require more space than is available in these columns, but if "X. Y. X." will look in Chapter XXVI of the "Architects' and Builders' Pocket Book" (Fourteenth Edition) he will find the method of determining the stresses graphically fully described, and in Chapter XXVII several details of joints for steel trusses.

### Laying Tar and Gravel Roofs.

*From* J. B., *Lansing, Kan.*—Although somewhat late perhaps to be of any great value to the correspondent making the inquiry, I desire to say a few words in regard to the subject indicated by the above title, the suggestions being presented for the consideration of "F. C.," Van Buren, Maine, whose letter of inquiry is to be found on page 288 of the volume of the paper for last year. I have followed the specifications here given for four-ply gravel roofs for about 15 years and they have always given entire satisfaction. Over the sheathing place one thickness of rosin sized sheathing paper, weighing not less than 5 pounds per 100 square feet. The tarred felt shall weigh not less than 14 pounds per 100 square feet single thickness. The pitch shall be of the best quality of straight run coal tar pitch, distilled direct from American coal tar, and there shall be used not less than 96 pounds gross weight per 100 square feet of completed roof. The nailing shall be done with 3d. barb wire roofing nails, driven through tin caps. The gravel shall be of such a grade that no particles shall exceed ⅝ inch or be less than ¼ inch in size. It shall be dry and free from dust or dirt. In cold weather it must be heated immediately before using. Not less than 400 pounds of gravel shall be used per 100 square feet.

The material shall be used as follows: First lay one thickness of rosin sized sheathing paper, lapping each sheet 1 inch over the preceding one and nailing only so often as may be necessary to hold in place until covered with the tarred felt, the nailing being omitted entirely if practicable. Over the rosin sized sheathing paper lay four full thicknesses of tarred felt, lapping each sheet 24½ inches over the preceding one and nailing as laid every 3 feet not more than 7 inches from the upper edge. When the felt is thus laid and secured mop back with pitch the full width of 24½ inches under each lap, then spread over the entire surface of the roof a uniform coating of pitch, into which while hot sweep the gravel.

A roof laid according to this specification and by a reliable man will easily last ten years without repairs and cost about $4.50 per square complete. A man engaged in the business to do this class of work will give an absolute guarantee covering ten years. If the work is given to responsible and experienced roofing contractors the result cannot fail to be satisfactory. Experienced workmanship and the proper quality and quantity of material is the only combination from which satisfactory results follow.

### Sand Lime Brick.

*From* F. K. T., *Portland, Maine*.—In answer to "E. H.," Hailey, Idaho, who asks in the March issue for information about brick made of sand and lime, I offer the following comments, which may be of interest not only to him, but also to other readers: The manufacture of sand lime brick has been carried on in Germany for a number of years, but its manufacture in this country is a comparatively new industry. The process consists of binding the sand particles with calcium carbonate, calcium hydrosilicate, or a mixture of both. The plant required for what is, perhaps, the simplest process consists usually of a main building containing the mixing machinery and pressroom, an "L" containing the power plant and a shed for the hardening cylinders. The sand is first brought to the outside of the factory, and if very wet, so that it would stick to the elevators and other machinery, it is first run through a specially designed dryer consisting of a large hopper containing a coil of steam pipe. From the dryer the sand is carried by a conveyor into the factory and dropped into a bin alongside the lime. The lime is brought from the kilns as required in lumps and is neither ground, pulverized nor slacked. In this condition it is fed into a crusher, which reduces it to such an extent that it can be readily fed into a measuring machine with the sand, which discharges the proper quantity of each into a mixer. The mixer consists of a tube mill of special design in which the sand and lime are not only thoroughly mixed, but the sand is ground to any desired fineness for making coarse grained or fine face brick regardless of the original texture of the sand. The latter is never perfectly dry, consequently while the materials are being mixed in the tube mill this small amount of moisture is readily taken up by the finely ground lime, which in this way is partially hydrated. During the grinding considerable heat is developed, resulting in a partial chemical action, which causes the fine particles of lime to adhere to the sand and prevents their separation. The mixture, being now pulverized and dry, is discharged into a puddle mixer resembling a pug mill, where the necessary water is added to complete the hydration of the lime. From this mixer the material is carried by an elevator into bins, where it is left for a few hours and is then carried by a belt conveyor to the press hopper. From this hopper the material is put into the press and pressed into any desired shape.

As the bricks are taken from the press they are hard enough to be stacked on steel cars, which are run into the hardening cylinder. This cylinder consists of a steel tube with movable head, which holds from 9000 to 20,000 bricks, according to the capacity of the factory. After the cars are run in the head is closed and high pressure steam turned into the cylinder for about ten hours, this being usually done at night. The cylinder is then opened, the cars run out, and after cooling a short time the bricks are ready to be laid up in the wall, the entire process requiring only about 24 hours.

Any sand that is suitable for making mortar will answer for making sand lime brick, but the higher the percentage of silica contained in the sand the better it is for the work. River, bank or sea sand, waste rock from quarries, slag, cinder, or any material of a siliceous character may be used. Likewise any lime can be used, but lime containing the highest percentage of calcium oxides is preferable, as the purer the lime the smaller will be the quantity required. Usually about 4 per cent. of lime is used.

A wide range of color effects can be produced by adding one or a combination of lime proof mineral colors The addition of this coloring matter is made at the time of mixing the raw materials, and, it is claimed, does not detract from the quality of the product, nor does it further disintegration. Numerous tests made by the German and Swiss Governments, also tests made in the United States, prove conclusively that when properly made of good materials sand lime brick is durable and fulfills all the requirements of a high class building material.

### Computing Radiation.

*From* W. B. G., *Ottawa, Ontario*.—A class room, 26 x 32 x 14 feet, to seat 40 pupils, is to be heated by low pressure steam, using direct radiation for the heat losses through walls and windows, and indirect radiation for ventilation. The temperature sometimes goes as low as 15 degrees below zero. What are the steps to be taken in figuring out the radiation required, providing for a change of air every eight minutes? What should be the size of the ventilating shaft, and how much radiating surface should be placed in it to create a draft?

*Answer*.—To compute the direct radiating surface necessary to offset the loss of heat through walls and glass in the room stated, let us assume the glass to be 20 per cent. of the exposure, equals 162 square feet. This gives about 1 square foot of glass to each 5 square feet of floor space, which is considered a good allowance. Reduce the exposure to equivalent glass surface (E. G. S.):

| | |
|---|---|
| Exposure .............. = $(26 + 32) \times 14$ = | 812 square feet. |
| Glass ................................ | 162 square feet. |
| Net wall ............................ | 4)650 square feet. |
| E. G. S. of net wall ................ | 163 square feet. |
| Actual glass surface ................ | 162 square feet. |
| Total E. G. S ....................... | 325 square feet. |

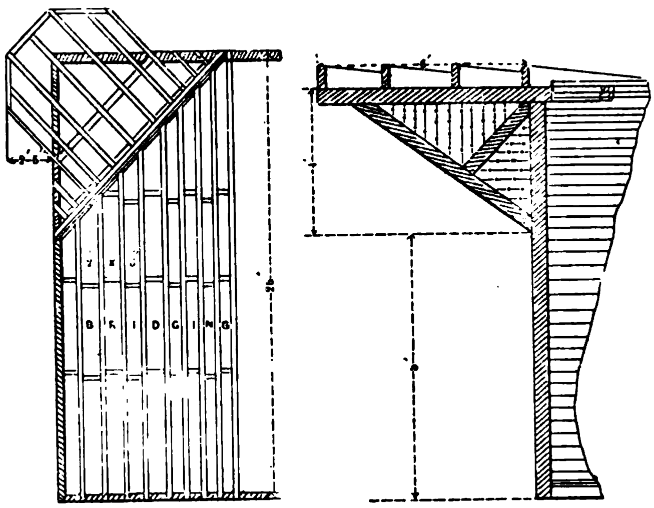
The heat loss per hour = E. G. S. $\times$ 85 $\times$ 1.25, for a northwesterly exposure (85 being the heat units lost through 1 square foot of glass per hour with 70 degrees difference in temperature and 1.25 the exposure factor), $325 \times 85 \times 1.25 = 34{,}600$ heat units approximately. With 15 degrees below zero this heat loss would have to be multiplied by $\frac{85}{70}$ increasing the heat loss per hour to 42,000 heat units per hour. With 250 heat units emitted per square foot of direct radiating surface per hour for ordinary loop radiators, $42{,}000 \div 250 = 168$ square feet of direct radiating surface would be required. With, say, 325 heat units emitted by wall radiators, or coils, the total would be 129 square feet. If we were not to allow for change of air by ventilation separately, the computed surface should be increased to allow for air leakage.

Forty pupils should have about 30 cubic feet of air per minute each, equals 1200. The contents of the class room is about 11,650 cubic feet; hence 1200 cubic feet per minute would give a 9.7 minute air change. An eight-minute change, as stated in the inquiry, would require about 1500 cubic feet per minute. This air must be heated to at least 70 degrees to avoid chilling the room. As 1 cubic foot of air at 70 degrees weighs 0.0747 pound, 1500 cubic feet would weigh about 112 pounds. The heat required to raise the temperature of this weight of air from — 15 to 70 degrees would be $112 \times 85 \times 0.238 = 2270$ heat units (0.238 is the specific heat of air; that is, about one-quarter as much heat is required to raise the temperature of 1 pound of air 1 degree as to raise the temperature of 1 pound of water the same amount). The heat per hour would be $60 \times 2270 = 136{,}200$ heat units. One square foot of indirect radiation, with a free air supply and properly spaced sections, will give off at least 500 heat units per square foot of extended surface per hour. Hence $136{,}200 \div 500 = 272$ square feet of indirect surface would be required, based on the above assumption.

With air passing to the indirect radiators at — 15 degrees and 90,000 cubic feet per hour passing through each stack or bench of indirect radiators, we could probably count on at least 600 heat units per square foot of indirect radiating surface per hour. This higher rating would reduce the computed surface to about 230 square feet, or, say, an indirect radiator of 15 sections, each exposing 15 square feet of surface and leaving about ½ square foot free area between each two sections, or 7½ square feet free area.

Care must be taken to have this area ample. Seven and a half square feet is not any too great, corresponding to 200 feet velocity between the sections. The supply flue should have an area that will give the required volume of air when the flue temperature is not more than 40 degrees above that of the room in mild weather conditions.

Consulting a table of flue velocities, like that, for example, in "Furnace Heating," published by the David Williams Company, we find that with 40 degrees differ-




*Constructing a Second-Story Tower.*

ence, a flue to the first floor, say 15 feet high, would have a velocity of 275 feet per minute, and one to the second floor, say 30 feet high, would have a velocity of 390 feet per minute. The flue area would be volume supplied per minute divided by the velocity = 1500 ÷ 275 for first floor equals approximately 5½ square feet; 1500 ÷ 390 for second floor equals approximately 4 square feet. The exhaust vent flue should be somewhat larger, say 50 per cent., if possible. Too much air will escape through it in cold weather unless it be throttled down by a damper to prevent this action. It should be made large to be of service in mild weather, and should have an aspirating coil for use when the natural difference in temperature between the air in the flue and that out of doors is not sufficient to produce the required air movement.

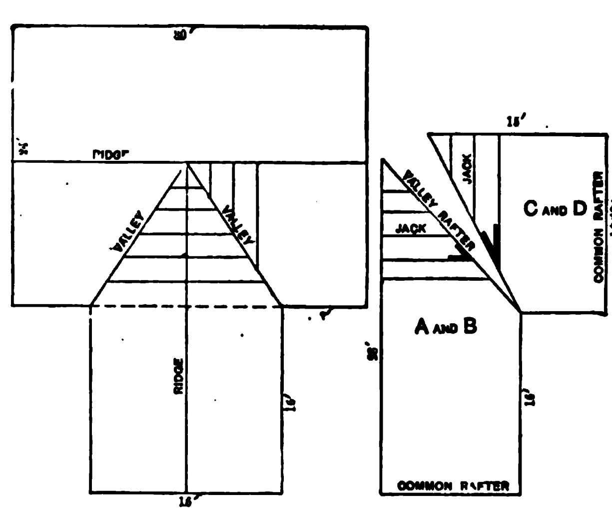
The amount of surface depends on the hight of the flue and its size for a given duty. Space forbids going into a detailed description of the method of computing its size, which is done in a manner similar to that explained for determining the size of the air supply heaters. Suffice it to say that in standard size school rooms, 28 x 32 x 12 feet—that is, in rooms approximately the size of the one in "W. B. G.'s" inquiry—20 square feet to 30 square feet placed in the flue just above the vent register gives the desired results. The further below the top of a flue the aspirating coil is placed the more effective will it be.

### Finding Lengths of Valley Rafters in Roof of Varying Pitch.

*From* T. D. G., *Council Bluffs, Iowa.*—Framing rafters and filing saws are subjects of general interest to carpenters, and I notice in a late number that "S. H." of Minneapolis asks for information on finding lengths of valley rafters, so I will tell him my method of framing roofs in general. I first aim to obtain the superficial shape or development of the part of roof I desire to frame. Suppose, for example, a case like that referred to by "S. H.," two intersecting roofs spanning rooms of different width with ridges of roofs level (for I can hardly conceive how a valley rafter can serve when the ridges are not level), one part 16 feet square joining a building 24 x 30 feet in the center, the 16-foot part being one-half pitch and the 24-foot part one-third pitch. Without considering any projection at the eaves or gables, the superficial shape of the sides of the roof on the 16-foot part will be two trapezoids, A and B of the diagram, while the shape of the surface of the roof on the 24-foot part will be two trapezoids, like C and D of the sketch. The shape of the roof surface on the other side of the 24-foot part will of course be a rectangle 30 feet long and 14 feet 5¼ inches wide. The bevels for the roof boards and planceers are the same as the trapezoids, while the bevels for the jack rafters and the lengths of the same are as shown in the sketch. The plumb cuts for the jacks on A and B are one-half pitch, and for C and D one-third pitch. In framing rafters I always establish a certain distance plumb over the outer edge of the plate, say in this case 2 inches, and make the valley rafters and hips the same at the edge of the plate. Always measure from the top of the rafter plumb over the outer edge of the plate and the results will be satisfactory. I hope to have something to say on saw filing later.

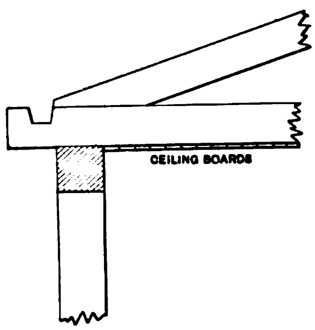
### Constructing a Second-Story Tower.

*From* T. M., *San Francisco, Cal.*—In answer to the inquiry of "T. A.," Joliet, Ill., who asked in the issue for November last about constructing a second-story tower, I beg to offer a few suggestions, although they may be regarded as somewhat late in the day. They may, however, be of some practical use to him, even if it be not the best nor yet the worst solution of the problem he gave the readers of the paper. Under the circumstances it will probably answer all the duties to which it may be put, besides it has the merit of being the cheapest and easiest way out of the difficulty according to my way of thinking. In looking over the plan of "T. A." I notice there is no chance to put in a brace in the front wall. Considering the width of span, 26 feet, without a support, what does he do but put the last straw on the camel's back by "sticking" a tower out on the corner, but which, I presume, is intended for an octagon bay window. Now to solve the problem in the most approved manner, taking into consideration all these bad features, calls for a treatment in a peculiar manner and time permitting I will do this in the near future. Now, a bay window "stuck" out on the corner of the building without any apparent support other than what its mechanical construction affords looks very bad and gives an impression of unstability. In order to obviate this impression I would suggest that the top wall plates of the first story be extended to the corner, meeting directly under the center of the bay and bracing them as suggested. Now the plates, where they extend beyond the intersection of the corner of the bay, may be dressed and chamfered or left rough and cased. If he puts in the open bracket it would be preferable to dress them. In order to strengthen the cut off corner still more he can truss the wall over




*Finding Lengths of Valley Rafters in Roof of Varying Pitch.*

the door on the corner and this will serve to brace the front wall besides giving an additional support to the octagon bay on the second story. In the sketch sent herewith it will be seen I have thrown a double header diagonally across the corner, having a length of 14 feet. This header is made of two pieces of 2 x 14 spiked together with 20d. wire nails, the latter being driven with the grain of the timber, and at the same angle across the depth of timber, each nail to be driven in opposite to the other from both sides of the timber. The joist of the main floor and of the bay window is cut at a bevel of ⅝ inch to nothing from the square on the ends of the joist that rest on the header, the latter being scarfed to receive them. Place on each side of the header and between the joists a row of straight bridging consisting of 2 x 4 stuff cut for a driving fit. This bridging is to be placed standing the 4-inch way, and spiked to the header and to the joist. All the bridging should be placed before driving home, then drive home the two pieces of bridging at each end of the header. Continue thus, alternating from one end to the other of the header until the center is approached, as this cambers the header and makes it more effective against depression.




*Construction of Porches.—Fig. 1.—Framing at the Cornice.*

The bridging, of course, stands flush with the upper end of the joist. Run out the bay window joist so that it will meet the intersection of the bay window chords and run flush with the face of the outside frame. The other bay window joist is cut 2 inches short, as shown in the sketch. The floor requires at least three double rows of herring bone bridging cut from 2 x 4 inch material and spiked to each bearing with three 10d. nails. It is well to nail the bottom and top of the bridging at the same time and not wait for the plasterer to put up his scaffold before nailing the bottom. There is a good and sufficient reason for this which it is not necessary to detail at this time.

### Some Further Comments on Saw Filing.

*From* G. F. E., *Los Angeles County, Cal.*—I notice that the editor has published my comments on saw filing and hasten to assure him and the readers that the subject is not yet exhausted and there is no danger it will be by me. for it is full of thought. Every one knows that when material to be cut moves at right angles to the cutting edge of the tool the latter does not cut, but scrapes. This is more noticeable in wood turning and in shaving, which rapidly dull the tool and do not make a smooth cut. When sawing diagonally across the grain of the wood the saw runs to one side of the true diagonal line. If it is a rip saw it runs to one side, and if the same diagonal cut be attempted with a cross cut saw it will constantly run toward the other side, unless the saw is filed with the teeth resembling yet differing from both kinds of saws. Perhaps it would be better to make the teeth longer on one side of the saw than on the other for diagonal cuts, but then they would have to be filed longer on the opposite side for the opposite diagonal, and this would require a different saw for every different cut that is more or less an approximation of a square cut. Now another idea presents itself to me, and that is to make a saw cut diagonally of the grain so that every tooth shall be alike—that is, to use gouge shaped teeth a little wider at one end to avoid setting, and with the end longest in the center of the cutting edge, which should be round like a finger nail. Such a saw would of course have to be sharpened in a different way than filing right and left with a three-cornered file by hand. Perhaps the teeth might be stamped when made independently and inserted in large saws. Then when they are dull they can be taken out and sharpened by grinding with a small emery or carborundum wheel. If the edges of the gouge shaped tooth are sharp it seems to me that the saw kerf ought to be smooth. If there is any money in this I will leave it to others to complete it and reap the benefit.

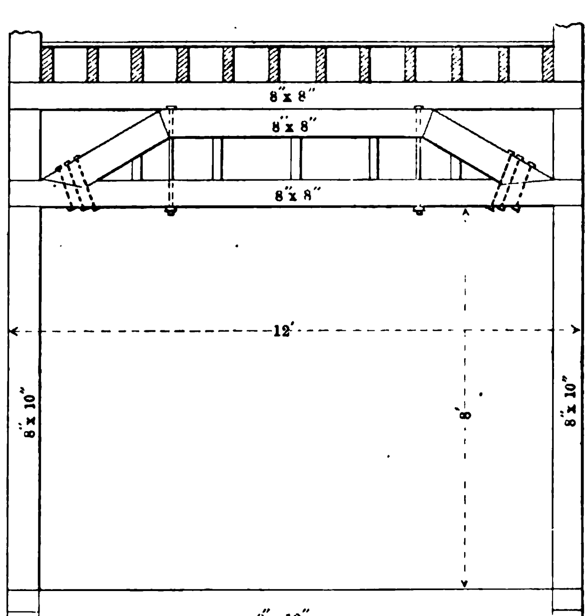
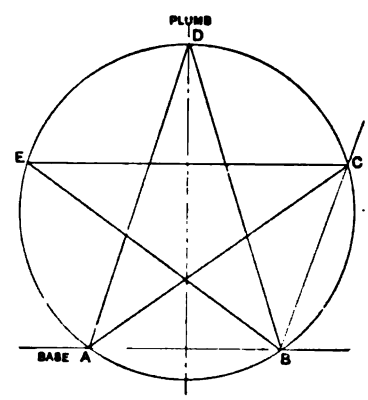



*Fig. 2.—Showing the Truss Construction.*

### Construction of Porches.

*From* A Reader.—In a recent issue "C. A. P." of Monongahela, Pa., made some inquiries with regard to the best method of framing a porch, or veranda. I inclose sketches which indicate my idea of framing a porch, the drawing so clearly indicating what is intended that extended comment would seem to be unnecessary.




*Constructing a Five-Pointed Star.*

### Constructing a Five-Pointed Star.

*From* H. M. B., *Roxbury, Conn.*—In looking over some of the back numbers of the paper I note the comments by various correspondents as to their methods of constructing a five-pointed star when the diameter is given. Although somewhat late in the day it may not be altogether without interest if I describe my method of solving the problem in question. In the first place, multiply the diameter of the circle in which the star is circumscribed by 3.1416 and divide by 5, which will give the position of the points of the star. Referring to the accompanying diagram, draw a line for the base measure equal to the length of one side, draw a plumb line from the center of the base and place the square on the base line at the figures 3½ and 12. This gives the angle (72 degrees) of a pentagon. Measure off the length of the base on this line and draw from A to C; take the length of the line from A to C and measure from B to where it intersects with the plumb line D. Now intersect A with D, draw a line parallel with the base from C to E equal in length to A C; intersect B with E and the star is complete. The star can be made without all this trouble with the aid of a pair of dividers. Strike a circle the desired size, space it off into five equal parts and then draw lines from point to point, completing the star.

## An Example of Farm Plumbing.

It is generally recognized in these progressive times that one of the important requirements of a successfully conducted farm is plenty of water for watering the stock, washing wagons, sprinkling the gardens, wetting down the lawn or yard from time to time and for ordinary household use. The farmer whose surroundings are such that he desires to keep up with the times is likely to have a well installed plumbing system in connection with his various buildings whereby the water supply is both convenient and economical. Unless, however, the farm buildings are of a modern and rather pretentious character comparatively little attention is as a rule given to the sanitary aspects of the case and relatively few plumbing installations are of a character to command anything more than passing notice. The matter, however, is one in which builders of farmhouses, barns, &c., are more or less interested, as is also the architect who designs them, and as offering a suggestion in the way of a convenient rural water supply for farm purposes we present some illustrations dealing with the plumbing work recently installed on the farm of George Mould in Orange County, the work having been done by Brown Brothers, Montgomery, N. Y.:

The general location of the wind mill, tanks, watering trough, buildings to be supplied, as well as the direction of the pipe line, is indicated in the diagram, Fig. 2, which shows the size of the pipes used, as well as extent of the system, while an idea of the character of the buildings and the kind of a farm on which a system such as this can advisably be used can be gained from the half-tone engraving, Fig. 1. The house of the owner is shown at the extreme left, the wind mill near the right hand side of the picture, while the barn in which the troughs are used is directly back of this wind mill.

In many instances the source of power has to be located where-ever there is an existing supply, and in this case the well near the road was so situated that the wind mill could be advantageously placed directly over it. The wind at this point was not cut off by any large buildings or any high hills. In installations of this kind other sources of power have been advantageously used. The hydraulic ram is applicable to a farm supply when enough running water is available for use in driving purposes, and gasoline or hot air engines have been used in like cases. They not only serve the farmer with an ever ready supply of water, but the source of power in these cases is available for other work on the farm, such as grinding meal.

The pipe leading from the well has three branches near the top, one 1¼ inches in diameter leading across the road to a watering trough in the field. This trough is, however, used only during warm weather. Another branch leads to the creamery, where water is kept constantly circulating around the milk cans in order to keep the milk at a uniform low temperature. In unusually hot weather it is necessary to supply ice to cool it further, but ordinarily where a large supply of water is available this is not necessary. The other pipe is 1¼ inches in diameter and leads to a 3000-gallon tank in the barn. This tank is made of 2-inch planks and is lined with 24-gauge galvanized iron, the seams being soldered. As this tank is located practically in the middle of the main hay mow, there is little or no danger of freezing, owing to the heat insulating properties of mounded hay. The tank not only furnishes a large supply with its 3000 gallons of water in the case of a continued calm so the mill cannot be operated, but it affords a measure of protection against fire and at the same time acts as a static head, causing water to flow through all the pipes and to give a constant pressure at all fixtures. But one pipe is used leading from the ground to this tank, and it will be seen that this pipe has water flowing upward through it at one time and downward at another. This arrangement affords a saving in the amount of pipe used.

In the basement of the barn is a supply system for the stock. There are also other outlets at the stable, pig pen and house. The arrangement of water supply in the stables is one which has a number of advantages that are readily seen by the plumber, but up to the present time there have been comparatively few installations of this character. As will be seen in the sketch, Fig. 3, the system consists primarily of a large leveling tank having a ball cock so arranged that the water is at all times at a predetermined level from the bottom of this tank. The pipe leads from the tank supplying water to the bottom of the troughs placed between every two stanchions. The water flows into the bottom of these troughs until the water level within them is at the same hight as the water in the leveling tank. In this way cows and other stock are supplied at all times with an abundance of water.

Fig. 1.—View of the Farm Buildings, Showing the Wind Mill.

*An Example of Farm Plumbing.*

Where stables are on two sides of a passageway, as in this case, it is well to have a branch pipe leading across the passageway at frequent intervals, so that the pressure can be quickly equalized and also in case of a temporary stoppage occurring in one pipe the water can flow through another. The outlet at the other building consists simply of a bib placed on the end of the pipe, and as a protection during the cold weather a stop and waste cock is placed in the ground and a rod is used to turn this valve on or off. In the house cold water is brought to each floor and also to the cellar. In this particular instance there has been no further extension of the plumbing system, but in systems of a similar character the owner after learning its convenience has in a few years' use provided a complete set of toilet fixtures, with a hot and cold water supply. An installation of this character is not at all expensive and it is well within the means of most farmers. The one described in this article costs not more than twice the price of an 8-foot wind mill erected in place.

THE United States Department of Agriculture, Washington, D. C., has issued Bulletin No. 58 relating to the mechanical properties of red gum wood. The report deals with a tree and wood formerly held of little value but of present increasing importance, and the information presented will be found of special interest to those anxious for data as to the qualities of the wood and its fitness for various purposes.

## Architecture in Central Africa.

The advent of British rule is bringing many changes to countries that a few years ago were scarcely marked on the maps then available, says a London paper. In Uganda, Central Africa, railways are by no means the only evidence of constructional science, for the capital of that country now possesses a permanent and well built cathedral, designed by the architect-missionary, who has instructed the inhabitants in brick making, carpentry and other mechanical arts. The new cathedral is the first really noteworthy public building erected in the country. The walls and two rows of columns are of sun baked bricks, while the foundations are of bricks burnt in a kiln. It would be scarcely correct to regard the roof as a permanent structure, for it is merely covered with thatching of long grass. But the reed work forming the ceiling is described as being a remarkably fine piece of work, and the palm stems serving as beams and rafters also appear to possess considerable interest.

The building, which is capable of accommodating a congregation of 3500 persons, includes three aisles and transcepts, meeting below a central dome, a well appointed chancel and the usual adjuncts of a cathedral. In the consecration of the cathedral by Bishop Tucker, assisted by 50 European and native clergy, we find striking testimony to the advances being made in a country that has only been rescued from savagery within quite recent times.

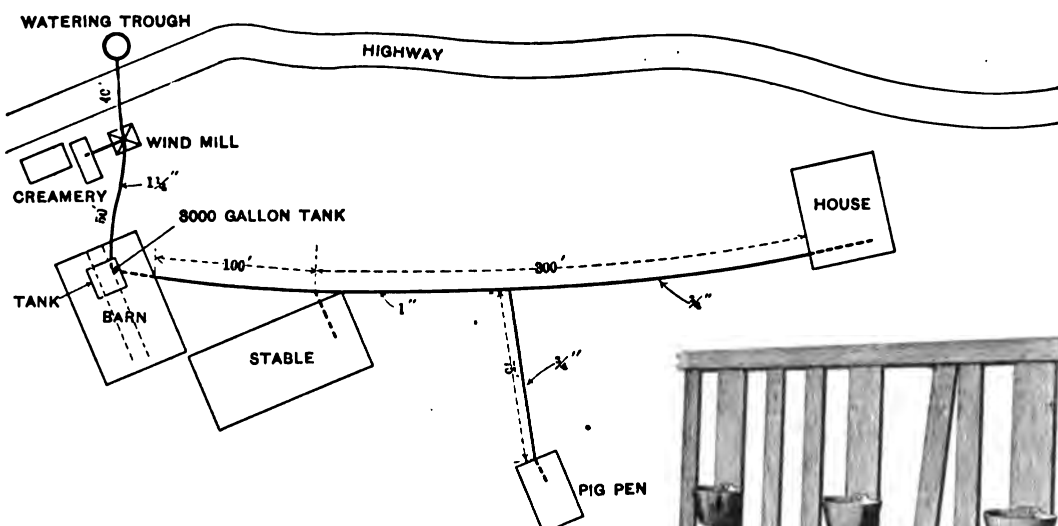



Fig. 2.—Ground Plan, Showing Relative Position of the Buildings, Also the Water Supply Piping.

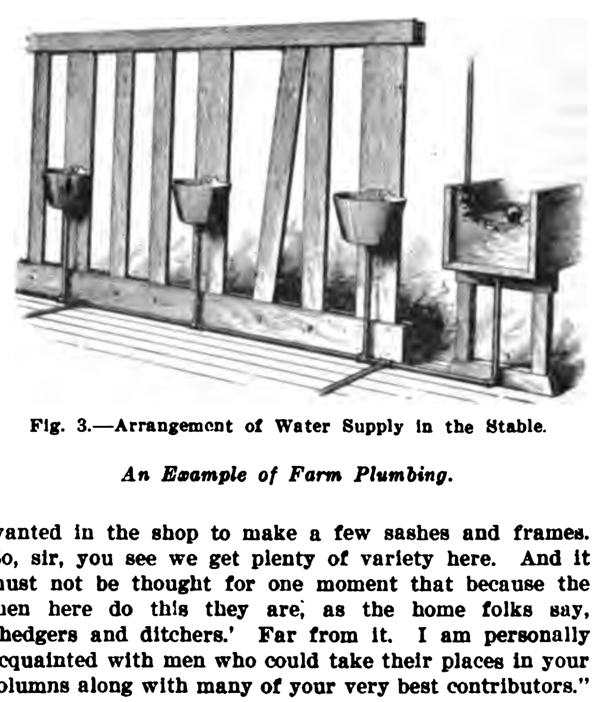


Fig. 3.—Arrangement of Water Supply in the Stable.

*An Example of Farm Plumbing.*

## Labor and Wages in New Zealand.

Members of the building trades in America are more or less interested in what is going on in their particular lines in other parts of the world, and there may be some points in a letter from New Zealand contributed to one of the London building papers which will appeal to building mechanics on this side of the world. The writer states that it is his purpose to give English readers a fair idea from a workman's standpoint of the conditions of labor and wages in New Zealand. Among other things he says: "To begin with, New Zealand is in a fairly prosperous condition at the time of writing, and has been very fair for this last six years. The present Government has been in office for over ten years and have at the present time a good working majority. They have passed some very beneficial laws for the masses and are, I hope, destined to pass more. One of these acts, the Arbitration and Conciliation act, has been working about four years or more, and under it the workman is protected from the sweater and the boy-labor man to a great extent.

"The Arbitration Court consists of three members—one represents the masters, one the men, and the president is a judge of the Supreme Court of New Zealand. One provision of the act is that cases where unions are asking to have a code of rules registered prevents lawyers from appearing, so that the cases are usually brought before the court by presidents, secretaries or some other trusted person. But I'm afraid your space is too precious for me to go on at this rate. Our wages (fixed by the court) are, for carpenters, 10 shillings 8 pence per day of eight hours. That is the minimum. 'Mill hands,' our equivalent of your 'joiners,' are paid at the rate of £3 per week of 46 hours. On the building the week's work is 44 hours; start at 8 a.m. and knock off at 5 p.m., with one hour for dinner. In winter we usually take half an hour for dinner and knock off at 4.30.

"Now, as to a man's chances of work here. In the first place, I imagine that a man who will succeed at home will succeed here, and if he is a failure there he will fail here; but any man who is not afraid of hard graft and will turn his hand to anything will get on here. Sometimes he will need to turn to and mix concrete, or dig post holes; sometimes a bit of excavating, but always at his carpenter's wage, and the day following he may be wanted in the shop to make a few sashes and frames. So, sir, you see we get plenty of variety here. And it must not be thought for one moment that because the men here do this they are, as the home folks say, 'hedgers and ditchers.' Far from it. I am personally acquainted with men who could take their places in your columns along with many of your very best contributors."

A FOUR-STORY fire proof banking building, 50 x 95 feet and costing $150,000, is to be erected at 31 to 33 Pine street, New York City for Henry Redmond & Co. According to the plans of the architects, Bruce Price & De Silbour and John Russell Pope, the building will have a classic façade of white marble. There will be entrances at the east and west ends, and columns at the first story will support an ornamental cornice.

THERE was recently completed at Troyes, France, a church which was begun in the third century and has therefore taken 1600 years to build. The foundations were laid during the lifetime of Pope Urban and though the structure has long been consecrated the last remaining stones were laid the present year. The church is said to be a gem of Gothic architecture.

# WHAT BUILDERS ARE DOING.

A BIRD'S-EYE view of the building situation of the country shows a remarkable degree of activity in all branches of the trade and in practically every leading center. In the aggregate it is probably safe to say that operations are more extensive at present than at any previous time in the history of the country. Exceptional gains over the corresponding period of last year are to be noted in many of the smaller places, where, of course, the total amount involved is small compared with the capital which is being invested in building in the principal cities. The building trades are comparatively free from labor troubles at the present time and there seems to be a growing tendency to a better understanding between capital and labor in these departments of industry.

### Baltimore, Md.

The amount of building undertaken in the city during the month of August was somewhat less than for the same period last year, indicating an approach to more nearly normal conditions after the exceeding impetus given to building operations by reason of the great fire which visited the city in February, 1904. According to the figures available, the value of the new work for which permits were issued in August was $1,450,000, while in August of last year the valuation was placed at $1,692,000. From these figures, however, it must not be inferred that there is any appreciable let up in the amount of work that is going forward.

The members of the Builders' Exchange, together with many of their friends, enjoyed their second annual crab feast on Labor Day at Kiefer's Park, Middle River. The committee in charge of the affair, Messrs. Frank G. Boyd, Albert D. Klein and Arthur F. West, made provision for over 150 and fully that number were in attendance. A luncheon was served upon the arrival of the excursionists at the Park, after which various kinds of games were started, baseball teams organized, &c. The crab feast proper was held late in the afternoon, a plenteous supply of this sea delicacy having been provided in addition to the supplementary edibles required on such an occasion.

### Buffalo, N. Y.

While the building situation may be described as rather quiet, there is enough doing to show a gain in the volume of operations as compared with a year ago. The figures of the Building Commissioners show that during August 356 permits were issued, covering operations valued at $885,055, as against 311 permits, calling for an expenditure of $612,561, for August last year.

The members of the Builders' Association Exchange celebrated Labor Day by a trip around Grand Island on the steamer Argosy, which left the foot of Ferry street at 10 a.m. There were more than 100 builders and their friends aboard and mirth and good fellowship prevailed. An elaborate luncheon was served and a musical programme rendered which included many original songs, which were accompanied by a string orchestra of six pieces. In the programme, issued in pamphlet form, are to be found the words of the various songs which were sung.

Stops were made at Eagle Park, Edgewater and Grand Island, where contests of various kinds were decided, the baseball game between the carpenters and the masons resulting in a victory for the former by a score of 4 to 3. H. C. Harrower proved the champion bowler, and Frank N. Farrar won the prize in the shooting contest. The judges were Henry Rumrill, William B. Ogram and Frank N. Farrar. Prof. Guy M. Springer was director of the chorus, and M. G. Farmer and G. J. Hager officiated as policemen.

The Committee of Arrangements, to whom the success of the outing was largely due, consisted of John H. Black, N. I. Holloway and Frank C. Kempf. The invitations which were sent out were upon illuminated cards printed in colors and with humorous references to places and to some of those officially connected with the outing.

### Chicago, Ill.

Building continues active in various sections of the city and the outlook is of a most encouraging nature. The amount of new work projected in August was not quite up to the June record, but permits were issued for 913 buildings, calling for an outlay of $6,401,150, as compared with 717 buildings, valued at $3,548,280, in August of last year. One of the interesting phases of the building situation in the city is the difficulty some contractors are experiencing in obtaining competent mechanics to complete the work in hand. It does not seem to be confined to any one branch of the trade, but embraces bricklayers, carpenters, cabinet makers, plumbers, painters and plasterers. It is also said that good draftsmen are difficult to secure.

### Los Angeles, Cal.

During the month of August 854 permits were issued for new buildings to be erected at an estimated cost of $1,414,821. This is the highest record both in number of permits and in their value which has ever been reported from this city. The records for previous Augusts are as follows: For 1904, 690 permits, of an estimated value of $1,182,111; for 1903, 602 permits, of an estimated value of $1,127,119; for 1902, 428 permits, of an estimated value of $777,712; for 1901, 235 permits, of an estimated value of $337,607, and for 1900, 163 permits, of an estimated value of $193,376.

Builders report that the tendency seems to be toward a large increase in the number of small buildings. Two-story residences, cottages and bungalows seem to be favored at present. Several large buildings are being planned for, but apparently the present year will not make as good a showing in large construction work as last year.

### New York City.

The only important development affecting the building situation in the city has been the strike of the sheet metal workers which occurred the first week in September, the trouble growing out of a demand on the part of the men for an increase in wages from $4 to $4.50 a day and the employment of fewer apprentices and helpers. The Executive Committee of the Joint Arbitration Board of the Building Trades Employers' Association and the unions declared the strike to be a violation of the arbitration agreement and ordered the men to return to work. The strikers refused to obey the order and the matter went to the Board of Governors of the Employers' Association, who were to meet on the afternoon of September 13. Early that day the General Arbitration Board of the Building Trades Employers' Association had ordered the men back to work at once or else be expelled, which decision being conveyed to a meeting of the strikers then in progress caused a motion to prevail that the strike be declared off pending arbitration and the men returned to work.

Building activity in Greater New York continues unabated, this being especially noticeable in the Boroughs of Manhattan, Brooklyn and the Bronx. For the month of August the value of the building improvements for which permits were issued aggregated in the Borough of Manhattan $12,439,303, as against $5,308,715 in August of last year. In Brooklyn the figures for the two periods were respectively $7,165,669 and $5,660,245, while for the Bronx they were $4,400,150 and $1,228,600, respectively. These indicate an enormous increase in percentage and show the efforts which are being made to meet the unusual demand for living accommodations growing out of the lack of building during the period of labor troubles in the metropolis two years ago.

For the first eight months of the year the value of the building improvements projected in the Borough of Manhattan was $88,724,940, as compared with $50,906,810 in the corresponding period of 1904. In the Borough of the Bronx the figures for the two periods were $28,849,275 and $14,109,675, respectively. The showing in the Borough of Brooklyn for the periods named is indicated by the figures $45,811,524 and $24,877,823, respectively. In no instance do the figures cover the cost of alterations.

### Philadelphia, Pa.

There is no let up in the building activity, especially in those wards where development work is proceeding upon a large scale. The report of the Bureau of Building Inspection for the month of August shows that 848 permits were issued, covering 1601 operations, involving an estimated outlay of $2,876,200, which in value is an increase of only $700,000 as compared with the corresponding month of last year. A noticeable feature of current operations continues to be the number of dwellings which are being erected. The figures for August show that permits were issued for 901 dwellings, to cost $1,867,850.

### Portland, Ore.

There is no abatement in building in this city, and, according to the plans drawn and contracts already let, the coming fall and winter season will be an unusually active one. Most of the structures now under way are dwellings, with a few large buildings and a number of fire proof and semi-fire proof structures in contemplation. Contractors report that they have work ahead for several months to come and that there are many projects which are being held back because builders are too much occupied to take them up. It is believed that building on account of the fair is now practically concluded and that the work now under way is due to a permanent local demand. The demand for flats is becoming more noticeable, and builders are finding that this line of construction work is attracting greater interest.

Among the larger work to be undertaken in the near future are a $70,000 four-story brick furniture warehouse for F. S. Harmon & Co., a $150,000 eight-story brick building for Wells, Fargo & Co. and a $50,000 building for the Women of Woodcraft.

### Rochester, N. Y.

There appears to be no cessation in building operations in and about the city, and there is nothing in the outlook to indicate a let up until cold weather sets in. The month of August was a record breaker in the building line, the report of the Fire Marshal showing that permits were granted for the erection of 191 buildings, of an estimated value of $607,147. This valuation compares with $244,388 for August, 1904, and with $54,130 for August, 1903. Out of the 191 buildings planned during the month 137 were for dwelling purposes and ranged in cost from $1800 to $5000 each. The new fire headquarters on Central avenue, to cost $90,000; the new restaurant at the Public Market and the new freight house on Portland avenue for the New York Central Railroad, to cost $40,000, are among the improvements.

For the eight months of the current year the total value of the building improvements for which permits were issued was $3,668,499, as compared with $3,010,414 for the corresponding period of 1904 and with $1,233,505 for the first eight months of 1903. It is thought that the value of the buildings erected during the entire year will exceed the $4,000,000 mark.

### San Francisco, Cal.

Building was not quite so active in San Francisco and in the tributary territory during August as in the earlier months of the summer. Contractors report that while they have been busy there is a noticeable dropping off in the amount of new work given out. At certain times during the month a great many contracts were let, but these have as a rule been for small amounts. Several structures of considerable size are, however, in contemplation. Builders are inclined to think that the remaining months of the year may show a slight falling off as compared with previous months, but there seems to be no fear of any decided reaction. Architects report numerous plans for residence building, and in several cases plans for large fire proof buildings in the downtown district are about completed.

Building materials are at present abundant and prices are on the whole not considered high. There has been no change in the price of lumber and the supply is ample for all requirements. Brick manufacturers report that there is now an abundance of brick, terra cotta and fire proofing for all requirements. Brick prices, while nominally the same, are actually considerably lower than earlier in the year, owing to the severe cutting which has been indulged in.

As a result of the recent collapse of a building in course of construction on Ninth street and of the shoddy condition of an apartment house which was partially burned a few days ago a movement is in progress to secure a more strict supervision of construction work in the outlying districts of the city. Districts within the fire limits are not criticised, but it is claimed that considerable faulty construction work has been done in outlying sections of the city.

The largest and most expensive building to be undertaken this year will be the California Bank Building, which is to be constructed on the bank property situated on California, Sansome and Halleck streets. It is given out that the building will cost in the neighborhood of $1,000,000, but detailed plans have not yet been made public.

### Seattle, Wash.

During the month of August there was a slight falling off in the value of building permits issued in this city, the record for the month showing 738 permits, with a total valuation of $449,778, as compared with 587 permits, with a valuation of $1,117,114, for the month preceding. While this shows a gain of 151 permits it represents a loss of more than $600,000 in valuation. This is largely accounted for by the fact that in the month of July two permits for office buildings, aggregating $600,000 in value, were issued.

Of the permits issued during August 247 were for alterations, valued at $35,901; 80 were for repairs, valued at $10,299; 125 were for sheds, valued at $4577; 99 were for one-story frame buildings, valued at $60,605; 35 were for one and one-half story frame buildings, valued at $42,755; 67 were for two-story frame buildings, valued at $170,550; two were for three-story frame buildings, valued at $23,000; one for a two-story brick building, valued at $7000; one for a three-story brick building, valued at $7000; one for a five-story brick building, valued at $40,000; 18 for foundations, valued at $13,395; one for a wharf, valued at $2500; 40 for miscellaneous work, valued at $29,108, and 21 for moves, valued at $12,368.

A very large proportion of the work now under way consists of residence building, with a tendency toward a better class of structure. Of the larger work under way the bulk is for apartment houses and hotels.

### Springfield, Mass.

A local paper in commenting on the building situation says that the boom has raised the wages of the building trades to the highest notch in the history of Springfield. Building activity in other cities has not only drawn from Springfield's little army of workmen, but has increased the difficulty in obtaining recruits outside. The union scale calls for $4 for an eight-hour day for bricklayers, but so scarce is this class of labor that $4.50 and $5 a day is being paid. One contractor has had an advertisement in the papers a week offering work throughout the fall and winter at $5 a day.

There is a scarcity of painters, lathers and plumbers, which is seriously delaying work on many structures. The lathers were granted an increase of 2 cents a bundle this spring, making the union scale 25 cents a bundle. Ability to "do" 15 bundles a day is requisite for membership in the union. Average wages of lathers are from $4.50 to $5 a day.

The Painters' Union scale is $3 a day, but most of the journeymen are receiving $3.50.

A year ago the carpenters, who were then receiving $2.75 per day, struck for $3.25. The strike resulted in the overwhelming defeat of the carpenters and even threatened the disruption of the Carpenters' Union. In face of this apparent disaster, which many predicted would be followed by an attempt on the part of the contractors to reduce wages, journeymen carpenters are being paid $3 and $3.25 a day.

The building season promises to last well into the winter; in fact, several large structures are being planned for which ground will be broken in a few weeks, with the intention of continuing work until spring. Plans already outlined for next season insure more building than Springfield has ever before known in a single year. Real estate men report that houses have been sold the past season as fast as they could be built, and the activity in this line will be continued another year. The building of cheap cottages has been on a limited scale. There is an increasing demand for apartment buildings and flats.

### Tacoma, Wash.

During August 170 building permits were issued, the total value of improvements being $206,770. As compared with August, 1904, the month just closed shows a small gain in both number and value of permits. Work is keeping up fairly well, owing largely to the favorable weather which has prevailed. Residence building is the most noticeable feature of present building operations. The largest building undertaken during the month of August was a $50,000 building, being erected by Manager Rust of the Tacoma Smelting Company.

### Washington, D. C.

The monthly report of Building Inspector Ashford shows that during August 468 permits were issued for building improvements, calling for an estimated outlay of $954,600, of which amount $291,900 covered the estimated cost of 86 new brick dwellings. Permits were issued for ten new apartment houses, to cost $251,000, and additions and repairs projected accounted for nearly $100,000 more. One church, 60 frame dwellings, five stores, two laundries and two warehouses were among the other improvements for which permits were issued during the month.

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ONE of the interesting plants that is under way in Chicago is the addition to the great store of Marshall Field & Co. on Wabash avenue. D. H. Burnham & Co. are the architects and they are working out an elaborate system for furnishing heated air in cold weather and refrigeration in warm weather, besides equipping a laundry in the attic of the new building sufficient to take care of the laundry requirements of the dry goods store and the large restaurant which is operated in connection with it. The refrigerating system will also be placed in the attic or twelfth story of the new structure. Ventilating and pumping machinery will be driven by individual chain drive motors. All the piping for all the buildings that comprise this store will be centralized in the third basement underneath Holden court, the alley which separates the State street from the Wabash avenue store. All the buildings will be heated by one central high pressure plant and steam for cooking will be furnished from the same plant. Heating and plumbing contracts have not yet been placed

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ACTIVE OPERATIONS are in progress on the foundations for the new 16-story office building which is going up at Madison avenue and Huron street, Toledo, Ohio. The work involves the sinking of something like 1500 oak piles, 26 feet in length. After being driven, the tops will be cut off and for a depth of about 15 feet there will be a filling of concrete. The plans were drawn by Bacon & Huber, and call for a structure which will be a credit, architecturally considered, to the city. It is hoped to have the structure ready for occupancy within a year.

# ENTASIS AND DIMINUTIONS OF CLASSIC COLUMNS.

TO the cultured eye many of the columns used from the classic orders are unshapely and unbecoming on account of not having a perfect and gradual diminution. Columns used by the ancients in imitation of trees, from which they derive their origin, were tapered in straight lines, so that the shaft was the frustum of a cone; but finding this form abrupt and disagreeable they made use of some curve which, springing from the extremities of the superior and inferior diameters of the column, swelled beyond the sides of the cone, and this gave the most pleasing figure to the outline. In the specimens of antiquity, says Franklin L. Naylor in the *Monumental News*, the diminution is variously performed; sometimes beginning from the foot of the shaft, at others from one-quarter or one-third of its hight, the lower part being left perfectly cylindrical. The former of these methods was most in use among the ancients, and being the most natural seems to claim the preference, though the latter has been almost universally practiced by modern architects, from a supposition, perhaps, of its being more graceful, as it is more marked and strikingly perceptible. Vitruvius in the second chapter of his third book mentions this practice, but in so obtuse and cursory a manner that his meaning has not been clearly understood, and several of the modern architects, intending to conform themselves to his doctrine, have made the diameters of their columns greater in the middle than at the foot of the shaft, as shown in Fig. 1 of the diagrams.

Leoni Baptista Alberti, with several of the Florentine and Roman architects, carried this practice to a very absurd excess, for which they have been justly blamed, it being neither natural, reasonable, nor beautiful. Alberti divides the hight of the column into seven parts, and places the greatest swelling at the hight of the third division of these parts from the base; so that he assumes the doctrine of Vitruvius by the strict letter, conceiving his meaning to be that the swelling is very near the middle of the hight of the column.

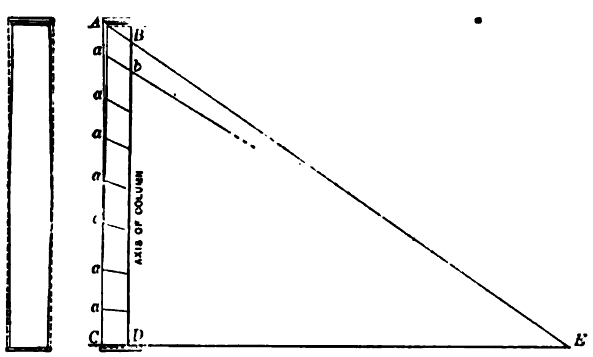
Sir Henry Wotten, in his "Elements of Architecture," says, in his usual quaint style, "And here I must take leave to blame a practice grown (I know not how) in certain places too familiar of making pillars, swell in the middle, as if they were sicke of some tympany or dropsie, without any authentique pattern or rule to my knowledge, and unseemingly to the very judgment and sight," and, indeed, his saying is extremely just and founded on what is observable in the works of antiquity, where there is not a single instance of a column thicker in the middle than at the bottom, though all or most of them have the swelling hinted at by Vitruvius, all of them being terminated by curves.

The following method of obtaining the true entasis of a column is a discovery of Vignola's, and although it is less known than any other it will be easily comprehended by the illustration herein. Having therefore determined the dimensions of your column, Fig. 2 (that is to say the hight of the shaft and its inferior and superior diameters), C and A, draw a line indefinitely from C through D, at right angles to the axis of the column; this done, set off the distance C D, which is the inferior semidiameter, and from A the extreme point of the superior semidiameter to B a point in the axis, the interval C D. Then from A, through B, draw the line A B E, which will cut the indefinite line C D at E, and from this point of intersection E draw through the axis of the column any number of rays as E *b a*, on each of which, from the axis toward the circumference, setting off the interval C D, you may make any number of points *a*, *a*, *a*, through which, if a curve be drawn, it will describe the swelling and diminution of the column and produce a most graceful contour.

The columns in the Pantheon at Rome, accounted the most beautiful among the antiques, are traced in this manner, as appears by the exact measures of one of them to be found in Desgotez's "Antiquities of Rome." In the remains of antiquity the quantity of diminution at the upper diameter of the columns is various, but seldom less than one-eighth of the inferior diameter of the column, nor more than one-sixth of it.

The last of these columns is by Vitruvius, esteemed the most perfect, and Vignola has employed it in four of his orders, as we have in all of them, there being no reason for diminishing the Tuscan column more in proportion to its diameter than any of the rest; though it is the doctrine of Vitruvius and the practice of Palladio Vignola Scamozzi and almost all the modern architects. On the contrary, as Monsieur Perrault justly observes, its diminution ought to be rather less than more, as it actually is in the Trajan column at Rome, being there only one-ninth of the diameter. For even where the same proportion is observed through all the orders, the absolute quantity of the diminution in the Tuscan order, supposing the columns of the same hight, exceeds that in the Corinthian in the ratio of ten to seven; and if, according to the common practice, the Tuscan column be less by one-quarter at the top than at its foot, the difference between the diminution in the Tuscan and in the Corinthian columns will be as fifteen to seven, and in the Tuscan and Doric nearly as fifteen to nine; so that notwithstanding there is a considerable difference between the lower diameters of a Tuscan and of a Doric column, both being of the same hight, yet their diameters at the top will be nearly equal, and consequently the Tuscan will not in reality be any stronger than the Doric one, which is contrary to the character of the order.

Vitruvius allots different degrees of diminution to columns of various hights, giving to those of 15 feet one-sixth of their diameter, to such as are from 20 to 30 feet, one-seventh, and when they are from 40 to 50 feet high, one-eighth only; observing that, as the eye is easily deceived in viewing distant objects, which always appear less than they really are, it is necessary to remedy the




Figs. 1 and 2.—Diagrams Showing Method of Obtaining True Entasis or Convex Swelling of a Column.

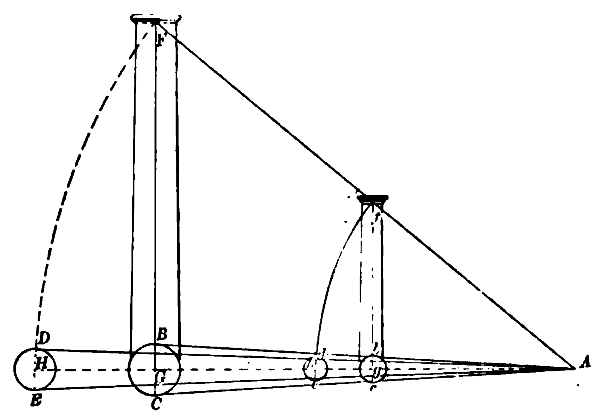



Fig. 3.—Diagram Proving Perrault's Theory.

*Entasis and Diminutions of Classic Columns.*

deception by an increase of the dimensions, otherwise the work will appear ill constructed and disagreeable to the eye. Most of the modern architects have taught this same doctrine, but Perrault proves the absurdity of this theory, which will be herein explained and illustrated. For if the validity of Perrault's arguments be not assented to and it is required to judge according to the rigor of optical laws it must be remembered that the proper point of view for a column of 50 feet hight is not the same as for one of 15; but on the contrary more distant, in the same proportion as the column is higher; and that consequently the apparent relation between the lower and upper diameters of the column will be the same whatever the size.

For if we suppose in Fig. 3 A to be a point of view whose respective distance from each of the columns *f, g*, F G is equal to the respective hights of each the triangles *f* A *g*, F A G will be similar; and A *f*, or A *h*, which is the same, will be to A *g*, as A F, or its equal A H, is to A G; therefore if *d e* be in reality to *b c* as D E is to B C it will likewise be apparently so; for the angle *d* A *c* will then be to the angle *b* A *c* as the angle D A E is to the angle B A C, and if the real relations differ the apparent ones will also differ.

The eye of the spectator is supposed to be in a line perpendicular to the foot of the shaft, but if the columns be proportionately raised to any hight above the eye the argument will remain in force, as the point in view must of course be proportionately more distant; and even when columns are placed immediately on the ground, which seldom or ever is the case, the alteration occasioned by that situation is too trifling to deserve notice.

Scamozzi, who esteems it an essential property of the delicate order to exceed the massy one in hight, has applied the above cited precept of Vitruvius to the different orders, having diminished the Tuscan column one-quarter of its diameter, the Doric one-fifth, the Ionic one-sixth, the Roman or Composite one-seventh and the Corinthian one-eighth.

In the preceding part of these definitions upon the subject the fallacy of Vitruvius' ideas has been shown upon principles which cannot be set aside—that is, with respect to the hights of his orders, and where the error of reducing the Tuscan column more than any of the others has been proved, and which diminution is explained by the foregoing arguments, so it is sufficient to say that in anything further said upon the subject the same reasoning may be employed in continuation.

However, it must not be imagined that the same general proportions of the esteemed works of the Romans and Grecians, who in the opinions of the most eminent writers carried architecture to the highest degree of perfection, will on all occasions succeed, because consideration should always be given as to the position of the column or monument, and to the several altitudes or depressions from which it will be seen, where majesty and grandeur of manner should be extended to their utmost limits.

WHILE reference has been made in a general way to the New York Hippodrome, recently completed at Forty-third and Forty-fourth streets and Sixth avenue, New York City, it may not be without interest to mention a few facts in connection with its gigantic size as a playhouse. It is without doubt the largest theatre in the country, having a seating capacity for 5200 people, an unobstructed view of the stage from every part of the auditorium, roomy comfortable chairs and admirable acoustic properties. The stage is 200 feet wide and 110 feet deep, a goodly portion of it being in the "apron" which is outside the curtain line and contains a big tank of water which is used in the final scene, but which is covered during the rest of the performance. The general scheme of the coloring of the interior decorations is Roman red as a background with the structural features done in ivory, gold and silver. The promenades and lobbies, which are extensive, are finished in marble and Caen stone relieved by illumination of the ornamental parts in gold and silver. Elephants heads serve as capitals of the columns and pilasters.

## A Carpenter Driving a Nail.

How many hammer strokes does a carpenter use in driving a nail?

Perhaps not one carpenter in a thousand or one layman in ten times that number can tell, or ever thinks of it, says the Chicago *Tribune*. The truth of the matter is this: The carpenter takes seven strokes in driving a nail into ordinary wood and twelve regular strokes and two finishing strokes in driving nails into hard wood.

These figures are furnished by a man who works at night and sleeps—or tries to sleep—by day, and whose bedroom window opens out upon a flat building in course of erection. He figured the average number of hammer strokes for nine mornings, and having learned them moved to a hotel until the new building is completed.

He discovered that the carpenter drives an average of three nails a minute in soft wood and a fraction under three in hard wood. At this rate he would drive 1440 nails a day in soft wood, if he keeps up the gait steadily, and 1282 in hard wood. He would give 10,080 hammer strokes in soft wood and 20,160 in hard wood.

## Removing Paint and Varnish from Any Surface.

In answer to the question of a reader of its columns as to what will remove old paint and hard oil from any surface a recent issue of the *Painters' Magazine* contains the following, which may not be without interest to some of our own readers: When the surface is to repainted, in which case a slight raising of the grain of the wood is no objection, the simplest method of preparing the remover is as follows: Dissolve 4 pounds caustic soda 98 per cent., or as many pounds concentrated lye, in 1 gallon boiling water and allow to cool. In another vessel mix ½ pound each of starch and china clay in 1 gallon of hot water. Beat this well, so as to have no lumps, and when cooled off some add it to the soda or lye solution, stirring well in the meantime, when it forms a thick, smooth paste. Apply this paste with a fiber (not bristle), brush to the surface in a heavy film, and when the paint or varnish is raised wash with warm water. To remove any traces of causticity give the surface a coat of vinegar and allow to dry before repainting. For removing varnish from wood that is to be refinished in the natural a mixture of 3½ pints American fusel oil and ½ pint turpentine will lift the varnish without raising the grain or discoloring the wood.

## A San Francisco Newspaper Building.

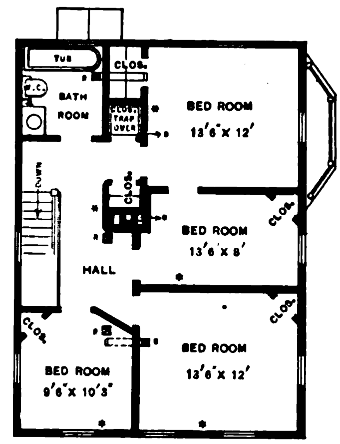
Work is now under way on the new San Francisco *Chronicle* Building in San Francisco, which will be 219 feet high and contain 17 stories and a deep basement. It has a frontage of 50 feet on Kearny street and a depth of 81 feet. The frontage on Kearny street will be of plate glass and terra cotta to the sills of the third story, above which the construction will be of red pressed brick and terra cotta to match the old *Chronicle* Building, which adjoins it. The story hights of the new building will correspond with those of the old, so that the lines of windows will be uniform throughout the two buildings. The entrance to both buildings will be in the old structure on Market street, the present entrance being entirely rebuilt in white marble and an inlay of glass mosaic. Four new high speed passenger elevators of large size will be put in. In the basement of the building, which is 18 feet high in the clear, will be installed the presses of the San Francisco *Chronicle* and two 200 horse-power boilers for the operation of the mechanical plant of the building.

The first story of the new building will contain three stores with plate and prism glass fronts. The eighth floor will be used as composition rooms for the *Chronicle*, giving space for a large number of linotype machines. On this floor will also be located the art, etching and routing rooms as well as the telegraph rooms of the paper. The remainder of the building will be occupied by offices. The corridors will be finished in white Vermont marble.

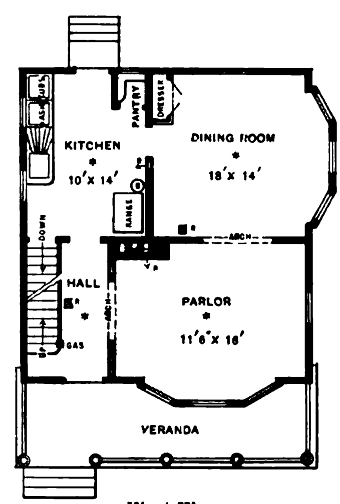
# DESIGN FOR LOW COST HOUSE.

THE elevations, floor plans and details which we present upon this and the following pages relate to a two-story frame house of moderate cost. The interior arrangement shows a parlor, dining hoom and kitchen on the first floor and four sleeping rooms and bathroom on the second floor. The foundation walls, 18 inches thick, are of local stone laid in cement mortar. The frame is of balloon style and the timber used is hemlock. According to the specifications of the architect the girders are 6 x 6 inches, the sills and posts 4 x 6 inches, the plates 4 x 4 inches, the studding 2 x 4 inches, the first and second floor joist 2 x 9 inches, the third-story joist 2 x 7 inches, the valley rafters 2 x 9 inches, the common rafters 2 x 7 inches. The sills for the veranda are 4 x 6 inches, the floor joist 2 x 7 inches, the plates 4 x 6 inches and the ceiling joist 2 x 7 inches. The outside frame of the house is covered with ⅞-inch hemlock sheathing, over which is placed Keystone hair insulated sheathing paper, this in turn being covered with white pine clapboards laid 5 inches to the weather. The roof is covered with cypress shingles laid on 1 x 2 inch shingling lath and exposed 5 inches to the weather.

Section and Front Elevation.—Scale, ⅛ Inch to the Foot.




Second Floor.




*Design for Low Cost House.—Frank Burrows, Architect, Jersey City, N. J.*

First Floor.
Scale, 1-16 Inch to the Foot.

All interior trim is of well seasoned white pine, the outside casings for doors and windows being ⅞ x 4½ inches. The gables are shingled, as shown on the elevations.

The walls and ceilings are lathed and plastered three coats. The openings marked on the plans "arched flats," are trimmed and framed the same as door openings, except they are not rabbeted for doors. The flooring of first and second stories is ⅞ x 3½ inch North Carolina pine, while the attic floor is of ⅞ x 4½ inch spruce. The kitchen is wainscoted 3 feet 6 inches high and the bathroom 4 feet high with ⅝ x 2½ inch yellow pine. The mantels in the house are marbleized slate with large mirrors. The interior wood work is finished with a good wood filler and treated to two coats of hard oil varnish. The kitchen, pantry and bathroom are grain filled and finished with one coat hard oil and one coat spar varnish. In the kitchen is a 30 x 24 x 8 inch galvanized iron sink, a 30-gallon galvanized iron boiler, a set of Alberene stone washtubs and a No. 118 French Rossmore range. The bathroom has a 14 x 17 inch oval basin, a 5½-foot bath tub and a wash out closet.

All exterior wood work of the house has two coats of paint, the body of the work being Colonial yellow, trim, including water table, corner boards, casings, bands and veranda posts, of bottle green; the blinds are bronze green and the sash an Indian red. The shingles on the gables were dipped in buff creosote stain and brush coated after laying, while the shingles on the roof were left natural.

The drawings of the house were prepared by Frank Burrows of 197 Claremont avenue, Jersey City, N. J., the cost of the structure being estimated in the neighborhood of $2000.

## Water Proofing Concrete Structures.

One of the very interesting papers read at the recent meeting of the Cement Users' Association was that by W. H. Finley on the water proofing of concrete structures. Ever since concrete has entered so largely into the field of construction as a substitute for stone masonry there has been much discussion as to its permeability, and various expedients have been tried in order to prevent dampness working through the material. Concrete as usually built in many engineering structures is not impervious to moisture, and some method of water proofing is, in the opinion of the author, vitally necessary. That this is appreciated by engineers is clearly evidenced by the amount of water proofing that is now being done on concrete arches, retaining walls, abutments, &c.

Some years ago, says the author, I had occasion to repair some masonry arches built in 1862 that were rapidly disintegrating owing to the infiltration of water. These arches were uncovered, the damaged stone replaced, and the extrados of the arch was plastered with cement concrete and then thoroughly water proofed with asphalt. Time has demonstrated that this work was very successful. I have since uncovered a number of arches that were leaking and found that the concrete backing did not prevent the entrance of water. These were cleaned off and water proofed with asphalt in each case. It is now the practice on a number of railroads to thoroughly water proof all arches, abutments, retaining walls, &c. The method generally employed is to use as a first coat asphalt cut with naphtha, to be applied as a paint to the concrete after the same is perfectly dry, and then cover the surface with an asphaltic mastic composed of one part of asphalt to four of sand; this to be smoothed off with hot smoothing irons and thoroughly tamped and pressed into place. If the filling over the arch is ordinary gravel or dirt no other work will be necessary, but if it is filled with broken stone or stone chips it is better to cover the surface of the asphalt with washed roofing gravel, so that the broken stone will not cut or damage the asphalt surface.

There are various other methods employed in water proofing concrete surfaces with asphalt, such as the use of burlap or other fabric imbedded in the asphalt coating. It is very difficult to make hot asphalt adhere to a concrete surface, however dry the same may be, unless it is heated by artificial means. Hot asphalt laid on ordinary dry concrete will not adhere and can be rolled up like a blanket after it has cooled. I have had some success in applying hot asphalt direct to concrete surfaces after the same had been dried and heated with hot sand, but much prefer the use of the asphalt cut with naphtha, applied as a painting or swabbing coat.

The cost of this work with present prices of first-class asphalt will range from 10 to 20 cents per square foot, depending upon local conditions. It does not require any special expert knowledge for its application. After a brief coaching the forces as usually employed can produce a satisfactory job.

It might be well at this time to say something about the quality of the asphalt to be used for water proofing purposes. In the past few years there has been a large development of asphalt for this purpose, and it is now possible to get, at a reasonable price, a pure asphalt that will not flow under a temperature of 212 degrees, and not become brittle when spread thin on glass at 15 degrees below zero. Also it will assist the action of the acids and the alkalies.

The following specification is one that I have used with good results in water proofing work:

"Asphalt shall be used which is of the best grade, free from coal tar or any of its products, and which will not volatilize more than one-half of 1 per cent. under a temperature of 300 degrees F. for ten hours. It must not be affected by a 20 per cent. solution of ammonia, a 35 per cent. solution of hydrochloric acid, a 25 per cent. solution of sulphuric acid, nor by a saturated solution of sodium chloride.

"For metallic structures exposed to the direct rays of the sun the asphalt should not flow under 212 degrees F. and should not become brittle at 15 degrees F. when spread thin on glass. For structures underground, such as masonry arches, abutments, retaining walls, foundation walls of buildings, subways, &c., a flow point of 185 degrees F. and a brittle point of 0 degree F. will be required. The asphalt covering must not perceptibly indent when at a temperature of 130 degrees F. under a load at the rate of 15 pounds per square inch, and it must remain ductile at a temperature of 15 degrees F. on metal structures and at 0 degree F. on masonry structures underground.

"Before applying asphalt to a metal surface it is imperative that the metal be cleaned of all rust, loose scale and dirt, and if previously coated with oil, this must be burned off with benzine or by other suitable means. The metal surface must be warm to cause the asphalt to stick to it, and the warming is best accomplished by covering it with heated sand, which should be swept back as the hot asphalt is applied. When water proofing masonry structures, if the surface cannot be made dry and warm it should be first coated with an asphalt paint made of asphalt reduced with naphtha. This is particularly necessary for vertical surfaces.

"The asphalt should be heated in a suitable kettle to a temperature not exceeding 450 degrees F. If this is ex-

*Design for Low Cost House.—Side (Right) Elevation.—Scale, 1/8 Inch to the Foot.*

ceeded it may result in 'pitching' the asphalt. Before the 'pitching' point is reached the vapor from the kettle is of a bluish tinge, which changes to a yellowish tinge after the danger point is passed. If this occurs the material should be tempered by the addition of fresh asphalt. The asphalt has been cooked sufficiently when a piece of wood can be put in and withdrawn without the asphalt clinging to it.

"The first coat should consist of a thin layer poured from buckets on the prepared surface and thoroughly mopped over. The second coat should consist of a mixture of clean sand or screenings, free from earthy mixtures, previously heated and dried, and asphalt, in the proportion of one of asphalt to three or four of sand or screenings by volume. This is to be thoroughly mixed in the kettle and then spread out on the surface with warm smoothing irons, such as are used in laying asphalt streets. The finishing coat should consist of pure hot asphalt spread thinly and evenly over the entire surface, and then sprinkled with washed roofing gravel, torpedo sand or stone screenings, to harden the top. The thickness of the coating will depend on the character of the work and may vary from ¾ to 2 inches in thickness.

"Where a quantity of asphalt concrete is required, such as in trough floors on bridges, a concrete should be made in the proportion of one part asphalt, two parts sand and three parts limestone screenings, thoroughly mixed and rammed into place with tamping irons on the first coat of pure asphalt with which the metal was originally covered. At all drainage holes large sized stone should be carefully placed by hand to insure perfect drainage."

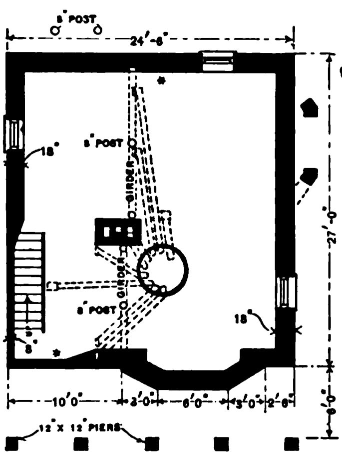
It may not be out of place in discussing the question of water proofing to call attention to the necessity for provisions for drainage in all concrete and masonry structures. This has not been given as much attention as it should receive. Whether water proofing material is applied or not, the question of thoroughly draining the structure is of the greatest importance.

In ordinary building construction sufficient attention has not been given by architects and builders to the proper water proofing of their foundation walls. I have observed recently in this vicinity a number of buildings in process of construction where the excavations for the cellar and lower foundations were made in a clayey material, and concrete foundation walls put in without making any attempt to apply a water proofing or damp proof coating to the wall or provide suitable drainage to carry off the ground water.

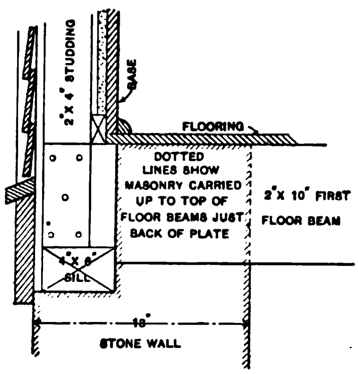
In this particular we are falling away behind even the early Roman architects and builders. In all the examples of their work it is evident they gave the greatest consideration in their construction to proper methods for keeping their foundation walls dry, and we cannot do better to-day in such matters than follow the advice of the great architect Vitruvius, who, writing about 25 years B. C., described methods of water proofing and ventilating foundation walls that compare favorably with the best methods used to-day, excepting that we may have better materials for water proofing than were known at that time.

Asphalt, I believe, makes the best damp proofing or water proofing material than can be used in foundation walls and for all structures where such provision is necessary. It has been used from the earliest times for the purpose of protecting material from air and water and we have examples of it in our museums where the mummy cases were sealed with this material more than 3000 years ago.

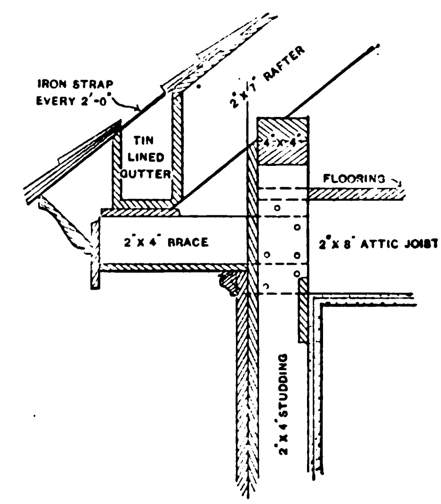
I think the various makes of hollow concrete block offer a good field for the application of water proofing. It is in line with the ideas of the early Romans in building hollow walls to take care of the question of dampness. I am of the opinion that these blocks laid up in asphalt, and the surface next to the ground thoroughly



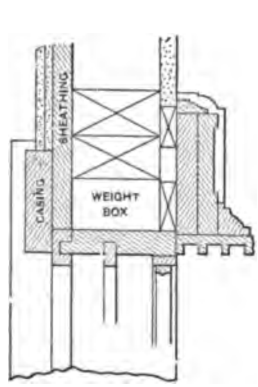
Foundation.—Scale, 1-16 Inch to the Foot.



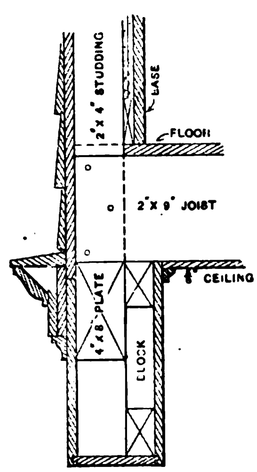
Details of Main Sill and Water Table.—Scale. ¾ Inch to the Foot.



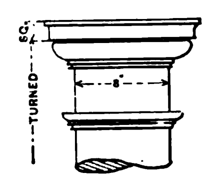
Main Cornice.—Scale, ¾ Inch to the Foot.



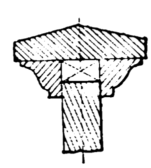
Section through Window Frame. —Scale, 1½ Inches to the Foot.

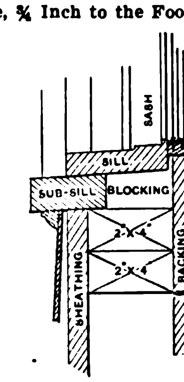


Section through Veranda Cornice and Plate.— Scale, ¾ Inch to the Foot.



Veranda Column.—Scale, ¾ Inch to the Foot.


Section of Hand Rail of Veranda.—Scale, 1½ Inches to the Foot.



Section through Window Sill.—Scale, 1½ Inches to the Foot.

*Miscellaneous Constructive Details of Low Cost House.*

coated with the same material, make an ideal damp proof wall.

I have found that the water proofing qualities of asphalt, even when used under water pressure, are all that could be desired. When repairing a stone reservoir recently the following method was used: A single course of brick was laid up in front of the wall, this brick being heated until the moisture was driven out and then soaked in hot asphalt and laid in place, the space between the brick and the stone being filled with an asphaltic concrete of limestone screenings and asphalt in the proportion of about one to four. These brick were anchored into the stone wall at intervals and the work has given very good satisfaction.

## Some Comments on Oil Stones.

The oil stone is an important adjunct of every carpenter's kit of tools, but its proper care and use is not always fully understood by the mechanic. Much has been printed on the use of the oil stone, but much more may be said about it as the topic has not by any means been exhausted. Our readers are therefore likely to be interested in what a correspondent in a recent issue of the *Patternmaker* has to say about oil stones, and, although written from the standpoint of the patternmaker, it applies with equal force to other branches of wood working:

The oil stone is such a simple thing that one is liable to neglect it and not to give it the attention which it should have, and yet for the patternmaker it fills a very important place. Until within a few years all of the oil stones used were of the natural stone variety. Among the different stones found and used for sharpening tools only two have ever found very extended use in this country. These are the Arkansas and the Waukesha. Both of these are fairly fine grained stones, of which silica is the principal ingredient. The prime requisite of any cutting stone is that it shall be composed of small angular particles of the cutting material, which are bound or cemented together with a suitable bond. This bond must be of such a strength that it will hold the particles until they have done a considerable amount of cutting and have become quite dull. When the particles have become dull enough to exert considerable resistance to the object being cut, the bond should give away and allow them to pass off with the material ground from the tool, and this removal of the particles would expose fresh surface or cutting edges.

### Object of Oil or Water.

The object of oil or water on an oil stone is two-fold. First, it is used to remove the material cut from the tool in being sharpened, and, second, for the removal of the particles worn from the stone. From this it is evident that the oil or other fluid used on the oil stone must be of such a nature that it will carry off these particles and that, too, without forming a gum, which would smear and stop up the space between the cutting points. The trouble commonly known as glazing in an oil stone comes from the filling of the spaces between the cutting points, mainly with metal cut from the tool being ground, through the presence of some thick oils hastens the process greatly, and the glazing material generally contains some of the particles ground or cut from the stone, as well as that cut from the tool. To prevent glazing, a considerable amount of fluid must be used for carrying away the particles of steel and stone. The natural oil stones mentioned above possess especially fine cutting properties, coupled with an extremely fine grain, which fits them for fine work.

Natural stones, however, do not run uniform, and the stone beds are interlaced with small veins of quartz, which makes it impossible to obtain large stones clear from these quartz seams, and such seams injure the quality of the stone greatly.

The finer the oil stone the greater care should be taken with it, and upon fine stones nothing but the best of oils should be used. Nothing will gum up an oil stone quicker than a thick, heavy machine oil. The best oils for the ordinary grades of oil stones are olive oil or sperm oil, the latter being preferable. Plenty of oil should be used, and the surface wiped off frequently with a piece of waste or cloth. It must be remembered that the proper function of the oil is to carry away the cuttings, and that this cannot be done unless the oil itself is removed after it has become charged with the cuttings. Too many persons think that the oil is simply for a lubricant, and seem to imagine that the material cut from the steel is going to evaporate in some mysterious way. If the bond of one of these oil stones is weak it sometimes overcomes all difficulty itself by breaking down readily under the heavy pressure necessary to overcome the partially glazed surface, and the necessary wiping of the tools with shavings or waste removes the oil and cuttings. But the best and highest grade oil stones do not break down as freely as this, and hence greater care should be taken with them. Frequently it is well to clean a stone which has become somewhat gummed up with gasoline or benzine. This will dissolve the oil and leave the stone with a fresh surface for work.

If the stone has become badly gummed with the heavy machine oil, it is necessary to soak the stone in a strong lye for several hours and then rinse it off in clean water and wipe it dry. The lye will cut the grease and serve to put the surface of the stone in better shape. In many shops where soda kettles are used it is common practice for the men to dip their oil stones into the soda kettle to clean them.

### Truing up Stones.

If the surface of one of these natural oil stones becomes worn out of true it may be smoothed or trued up in any one of a number of ways. Small stones may be ground true very readily by applying them to one side of the grindstone. If no grindstone is at hand, emery may be placed on a cast iron plate, water added, and the stone ground down by hand upon the iron surface. The plate should be planed true, both to produce a true surface and to remove the scale so that the grains of emery can get a better grip on the iron.

A sheet of lead placed upon a true, flat surface or a sheet of zinc may also be used to support the emery and water. If the stone is fairly soft, good, sharp sand may sometimes be used in place of emery, but it will not cut so fast. Where none of the above mentioned metals is available the emery and water are sometimes used on the surface of a smooth board. Sometimes an oil stone is dressed off by placing a sheet of sandpaper or emery cloth upon a board and rubbing the oil stone over its surface dry. In like manner, a dressing surface for the soft stones may be made by placing glue on the surface of a smooth board, sprinkling it with emery, applying another coat of glue and another coat of emery, &c., until several coats have been applied and dried upon the surface. The oil stone may be very quickly trued upon the surface.

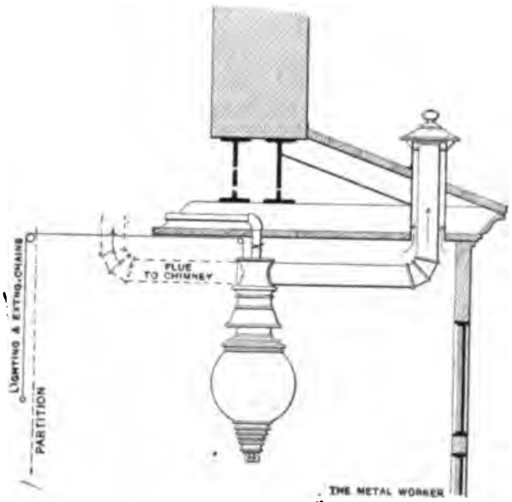
While all of the above named processes apply very well to natural stones, the artificial oil stones come under a very different class. There are three kinds of artificial oil stones now made. First, plain emery slips or blocks, second, Indian oil stones, which are made from Indian corundum, and third, the carborundum oil stones. All of these are so hard that they cannot be ground or trued up on a grindstone. They may be trued, however, by using emery, corundum or carborundum upon an iron plate or lap, as above described.

What has been said as to the use of oils on an oil stone applies as well to the artificial stones, except that some of them will cut as well with water as they will with oil, providing plenty of water is used.

They say a good workman is known by his tools, but no good workman can keep his tools in good shape if he does not possess a good oil stone, and hence great care must be exercised to keep the oil stone in proper condition. No regular sharpening oil stone should be used without having a definite place to keep it, where it will be protected from the dust and dirt. For this purpose it is best to set the stone in a wooden block and provide a wooden cover for it. Some parties recommend the placing of a piece of hard wood, such as hickory, at each end of the stone and dressing it off level with the stone, so that the entire surface of the stone can be used without fear of damaging the point of the tool by dragging it back off from the edge of the stone, as with the piece of wood flush with the surface of the stone the tool would simply glide over it.

## Preventing Moisture on Store Windows.

At the last meeting of the National Gas Association, held in Jackson, Mich., Engineer R. B. Brown of the Milwaukee Gaslight Company gave an idea with diagram for preventing frost and moisture on show windows that is deserving of presentation, says the *Acetylene Journal*. This gentleman reports that his company has introduced a ventilating device, as shown by the diagram, to secure ventilation for windows lighted by gas in a way that prevents the trouble named, and which has met with great success as used by local merchants. The products of combustion are carried off by means of a simple 6-inch galvanized iron conductor pipe fitting tightly over the top of the lamp and extending upward and outward into the open air in whatever manner or direction the construction of the window or of the building may require. The illustration shows the outlet through the roof of the window, but where there is no roof to the window it may connect with the chimney, as shown




*Preventing Moisture in Store Windows.*

by the dotted lines. The lamp is turned off and on by means of chains, extending over pulleys, if necessary, into the store itself. The lamp can if desired be placed so close to the ceiling as not to hang down in the window in an unsightly or inconvenient position, and the trouble from the frost and moisture is entirely obviated.

## Reviving the Lightning Rod.

It is not so long ago that buildings, especially the isolated ones, were generally not considered complete or safe until their uppermost parts were continued skyward by means of a number of scattered needlelike rods for protection against lightning. The rod or rods, as the case might be, were connected with a system of electric conductors to carry lightning charges through them to the earth without damage to the building. It is a common experiment in the elementary study of electricity to show how great is the tendency for electrification to collect in quantity about a point, and hence lightning rods were made with the upper ends sharpened in order that they might in that way handle the maximum amount of charge in the shortest possible time. In this particular they seem to have demonstrated the correctness of the theory, but what does not seem to have been realized is that a lightning discharge represents an immense amount of energy which must not only be dissipated in some way without destruction to property but must also, owing to its sudden rushing character, be allowed the choice of any or all of several paths to earth. The natural assumption was that, like current electricity, the lightning discharge would take the path of least resistance; but for the very fact that a railway train in rapid motion cannot safely be brought to a sudden stop, the great amount of energy in the lightning discharge makes it advisable that the lightning rods and conductor system have a relatively high resistance, to lengthen, so to speak, the time of the discharge. However, the main point is that the lightning discharge, which has been likened to an avalanche, does not necessarily, any more than the avalanche, take the easiest path. It is these unrecognized peculiarities, then, that have probably been chiefly responsible for the widespread disfavor into which the lightning rod fell succeeding the period when it was regarded as an important adjunct to the dwelling house and barn.

During the decadence of the lightning rod the phenomena of lightning discharges have nevertheless been studied by scientists, notably by Sir Oliver Lodge, and considerable attention has of late been paid to the subject both by the National Fire Protection Association in this country and by the Lightning Research Committee in Great Britain. The conclusion is that efforts are being made to restore the lightning rod again to favor and it is the recently published suggestions of the British Committee, offering relief from the failures of the old lightning rod, that are the reasons for the present article. The recommendations are as follows:

Two main lightning rods, one on each side, should be provided, extending from the top of each tower, spire or high chimney by the most direct course to earth. Horizontal conductors should connect all the vertical rods (1) along the ridge or any other suitable position on the roof and (2) at or near the ground line. The upper horizontal conductor should be fitted with points at intervals of 20 to 30 feet. Short vertical rods should be erected along minor pinnacles and connected with the upper horizontal conductor. All roof metals, such as finials, ridging, rain water and ventilating pipes, metal cowls, lead flashing, gutters and the like, should be connected to the horizontal conductors. All large masses of metal in the building should be connected to earth either directly or by means of the lower horizontal conductor. Where roofs are partially or wholly metal lined they should be connected to earth by means of vertical rods at several points. Gas pipes should be kept as far away as possible from the positions occupied by lightning conductors, and as an additional protection the service mains to the gas meter should have a metallic connection with the house service leading from the meter.

## New Publication.

**Strength of Beams, Floors and Roofs.** By Frank E. Kidder, consulting architect and structural engineer; 222 pages. Size, 5¾ x 8½ inches. Illustrated with 164 engravings from original drawings. Bound in board covers with side and back titles. Published by the David Williams Company, 232 to 238 William street, New York City. Price, $2 postpaid.

The matter contained within the covers of this valuable and interesting work originally appeared in the columns of *Carpentry and Building*, the articles bearing on the strength of wooden beams, floors and roofs having been prepared especially to meet the requirements of carpenters and builders who were anxious to progress in their chosen calling. The work includes directions for designing and detailing roof trusses, with criticism of various forms of timber construction. The matter has been put into such shape as to make it valuable to the student and builder, and also for reference. It is purposely very elemental, being prepared for those members of the trade who have had only a common school education. A few new tables have been added and the material divided into chapters with the tables and engravings numbered consecutively.

There are nine chapters, the first of which deals with the strength of wooden beams, the second gives the method for determining the strength or safe load of wooden floors, while the third tells how to compute the size of floor timbers for new buildings. Beginning with the fourth chapter the author discusses types of wooden roof trusses, showing the number and correct position of the members and the action of the stresses. In consecutive sections he tells how to determine the stresses in roof trusses, how to compute the size of truss members, proportioning the joints of wooden roof trusses, and discusses wind bracing of buildings, towers and spires. The last chapter in the work is given up to examples of truss construction with criticisms by the author.

Those readers who are desirous of pursuing still further the subjects indicated are referred to the author's "Architects' and Builders' Pocket Book" and the volumes on "Building Construction and Superintendence." The third volume of the latter work, which is nearly ready, will contain examples of almost every form of trussed roof construction and a vast amount of information relating to roof trusses. For young mechanics and draughtsmen who are taking up the study of these subjects without other assistance the work under review will probably be found easier to understand and a valuable preparation for more advanced treatises. The author expresses the hope that the book will be of practical value to a great many carpenters and builders, both young and old, and result in a more intelligent use of building materials. The work is in fact one which the ambitious carpenter and builder should not neglect, as the information contained will prove of inestimable value to him in the solution of problems which are constantly arising in every day practice.

## Some Famous Desks.

The desk of Salmon P. Chase, a plain piece of furniture made from mahogany, is in one of the rooms of the Treasury Department at Washington. There are many of these old desks scattered about the country, their chief claim to interest being that once some well-known man leaned over them. Alexander Hamilton's traveling desk, made of mahogany and measuring 12 x 16 inches and 10 inches high, is an interesting object. Upon this desk was written much of his literary work, and the worn green baize with which it is lined attests to the use to which it was put. There is a drawer in one side and several compartments for pens and ink, while upon the top is inlaid a silver plate with the name "General Alexander Hamilton" engraved upon it. Within the top is a strip of parchment which says: "Given by Mrs. General Schuyler to her daughter, Mrs. General A. Hamilton." No doubt the convenient size was what recommended it to the General. Nathaniel Hawthorne's desk is preserved at the Custom House, Salem, Mass. A desk at which he wrote some of his inimitable romances was just a board standing out from the wall at an angle. This is still in the Tower Room at "Wayside," his home at Concord, Mass. Victor Hugo, says a writer in the October *Delineator*, had in his Guernsey house a study built almost entirely of glass and perched upon the roof. Like Hawthorne, he, too, stood at his writing, and his desk was a mere shelf fastened by hinges to the wall.

## Massachusetts Charitable Mechanic Association Trade School.

Those of our readers living in the vicinity of Boston, Mass., may be interested to know that the M. C. M. A. Trade School, which will open for its sixth term in the Mechanics' Building, Boston, on October 9, has, besides classes in plumbing, sheet metal work and masonry, a carpentry class which is unique in many respects. An instructor is in attendance three evenings each week who has had wide experience in all branches of wood working, and to some of the students he gives instruction in cabinet making, others devote themselves to house framing or to interior and exterior finish, while lessons in boat building are given to a few particularly interested ones. That really practical results can be obtained in this way is shown by the character of the students. Most of them are young men who have already become apprentices or helpers in the trade in which they study. Some, of course, are clerks or men of other sedentary occupations who find pleasure in the exercise and development of whatever mechanical aptitude they may possess. The aim of the class, however, is not to amuse amateurs, but to train competent workmen. Many articles of furniture are built which possess both beauty and ingenuity; framing problems are studied out first on paper and then in pine: a frame cottage 8 feet wide by 10 feet long has been built in the shop entirely by the students, and the frame of a small boat constructed from plans drawn by a young designer.

In this class is found a demonstration of the value of just the kind of trade instruction which has been so much discussed during the past year by the leading men in business and educational circles in Massachusetts. However much such instruction may appeal to these men, it is found that it is even more highly prized by the actual employer of masons and carpenters and by the ambitious young man in search of an honest and respectable means of earning a living. Experience has shown that the mere fact of attendance at an evening trade school is an excellent proof of industry and perseverance. Many discerning employers accept a certificate of such attendance as the most valuable recommendation which a young man can possess.

IN DEFERENCE to a superstition which has prevailed for many years, there was, on June 1, a complete cessation of work at Lord Penrhyn's slate quarries at Bethesda, in Wales, where 4000 men are employed. The superstition owes its origin to a succession of fatal accidents on Ascension Day. Several years ago the management succeeded in inducing the workmen to remain at their posts, but, strange to relate, a fatal accident occurred.

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# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.

DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
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NOVEMBER, 1905.

## Nine Months' Building Operations.

The reports which reach us from leading centers of the country indicate no let up in the enormous volume of building that is in progress, and the figures for the first nine months of the year, when compared with the corresponding period of 1904, strikingly illustrate the remarkable growth which has developed in this particular branch of industry. There are comparatively few cities of importance which do not show an appreciable gain in the value of the building improvements projected, and the opinions voiced early in the spring regarding the amount of work likely to be executed are being confirmed in a most practical manner. Locally the volume of operations is far ahead of last year, the report of Superintendent Hopper showing that for the third quarter of the year plans were filed in the Borough of Manhattan for new buildings estimated to cost $44,179,304, which is more than double the figures for the same period of 1904. For the nine months of the current year plans were filed for 2028 new buildings, to cost $101,640,910. The importance of this gain is apparent when it is stated that for the 12 months of 1904 the value of the new construction work amounted to only $84,172,185. Including the Borough of the Bronx, where operations have been conducted upon an unprecedented scale, the figures for the nine months reach an approximate total of $132,000,000, exclusive of the cost of alterations and repairs, which for the two Boroughs named amounted to something over $11,500,000. In the Borough of Brooklyn the rate of increase over a year ago is strikingly illustrated by the statement that the cost of the operations for the nine months is nearly double the cost of the improvements projected during the same period in 1904. In Queens the ratio of activity is maintained and new records are being made almost every month. The work under way is composed very largely of buildings intended for dwelling purposes, although business structures are by no means an absent factor in the equation.

## The Unit in Building.

The enormous amount of new tenement house building which has been going on in Greater New York in the Boroughs of Manhattan and the Bronx has developed a tendency to abandon the 25-foot lot, upon which heretofore five and six story structures, with four apartments to a floor, have been built and to accept as a unit 37½, 40 or 50 feet. The importance of these changes in their bearing upon the city's sanitation, comfort and morals can hardly be overestimated. Tracing the evolution of the tenement system shows that, first, the old New York City dwellings were remodeled for several families, but as rental values increased it became profitable to tear down the old dwellings and erect tenements, the new building naturally covering exactly the same space as the dwelling it displaced—namely, 25 feet. Even though the builder at that time wished to put up a wider structure he could not do so, owing to the fact that in nine cases perhaps out of ten the adjoining property was owned by some one who could not or would not sell. In the early days the houses were built only four or five stories high and could frequently be ventilated over adjoining property, but there was, however, a gradual increase in the number of rooms, with no corresponding increase in the site. Entire blocks were eventually rebuilt so that no ventilation was obtained except at the front or rear of the tenement. The idea seemed to prevail that nothing but a 25-foot lot could be utilized for buildings of this nature, and when outlying sections of the city where land was cheap and plentiful began to be improved architects and builders reproduced practically all the evil conditions to be found in the crowded districts of the East Side. Manifestly the only thing that would bring about a change in this respect was the passage of a law making the 25-foot lot unavailable and that was the effect of the tenement measure of 1901. By its provisions so much space is taken out for light and ventilation that four apartments cannot be squeezed into the floor of a building erected on a lot having a frontage of 25 feet, but three apartments can be arranged, and in sections where land is cheap many 25-foot houses have been built. On the lower East Side, however, the width has been increased either to 37½ or 50 feet, and as the lot remains still 25 feet builders purchase three lots, giving a frontage of 75 feet, and then on the site erect two houses instead of three as formerly. The disappearance of the 25-foot building means for the masses of the people of the city a more adequate supply of light and air and a generally more satisfactory sanitary condition.

## Labor in New York State.

Much valuable information relative to the labor situation in New York State is contained in the quarterly report of the Commissioner of Labor, which has just been sent out from Albany. According to this authority there are now relatively fewer idle wage earners in New York than there were even in 1902, which was regarded as the most prosperous year of the present decade. Returns made to his Department from trades unions embracing a membership of about 100,000 show that the average monthly number of unemployed members was only 151 per 1000 in the first half of 1905, as compared with 202 last year and 168 in 1902. At the beginning of May the idle men among the wage earners in the State were only 118 per 1000, as compared with 153 per 1000 in 1902, while at the beginning of last July the proportion was 91, as against 145 in 1902. In the second quarter of 1905 the Bureau of Mediation and Arbitration recorded 56 new disputes, as compared with 43 in the corresponding period of 1903. One-half of the disputes were strikes for higher wages and resulted in 19 cases in the complete or partial success of the workmen. The number of employees involved in trade disputes, however, was only one-third as large as it was a year ago, and this is mainly due to the progress of the joint agreement system, which substitutes arbitration for industrial warfare.

## Concrete Structures for Water Supply and Drainage.

Almost every day some new kind of work is described as being made of a mixture of cement, stone and sand, commonly called concrete. In the city of Boston, owing to rather stringent regulations regarding the number of apprentices on brick sewer work, a large number of concrete sewers have been built or are in process of construction. For similar reasons an intercepting sewer in Utica was built, for the most part of concrete. A large number of cesspools and tanks are now constructed wholly of concrete because of the many advantages this form of construction offers in that it can be done without skilled labor, as the material can be placed in practically any position and readily conforms to unusual lines. Reservoirs, wells and dams built of concrete are of every day occurence. At Attleboro, Mass., a standpipe is being built of reinforced concrete, which, it is claimed, will be the largest of its kind in the world. This standpipe is to be 50 feet in diameter, 100 feet high, with a capacity of 15,500,000 gallons. Not among the least of the advantages claimed for this style of construction is the less cost for maintenance, a steel standpipe of this size costing about $400 a year for painting, aside from the loss of the use of the structure when it is being painted on the inside.

## Wages in England in 1904.

The annual report of the Labor Department of the Board of Trade, London, on changes in rates of wages and hours of labor in the United Kingdom in 1904 contains statistics enabling a comparison with the years from 1895 to 1903. The industries principally affected were building, iron and steel manufactures, shipbuilding, coal mining and iron mining. The decline in wages in the building trades was the first which has taken place since the changes were first recorded in 1893. So far as could be ascertained by the department, nearly 801,000 working people had their rates of wages changed during the year. Of these nearly 785,000 sustained decreases amounting to about $202,000 per week, while about 16,000 obtained advances amounting to approximately $6000 a week. The net result of all these changes was a decrease, therefore, of about $196,000 per week. If, however, the effect of the wage changes be calculated from the date of each change to the end of the year it is found that the aggregate decrease in wages in 1904 was $4,690,000.

The number of working people affected by changes in 1904 was less than in any of the years from 1898 to 1903, though greater than in the years 1895 to 1897. The number whose wage changes resulted in net decreases in 1904 was smaller than in either of the years 1903 and 1902, though larger than in any of the years 1895 to 1901, while the number of working people who obtained net increases in 1904 was smaller than in any of the previous years covered by the department. Of the years under review, 1895 and 1901 to 1904 were years of falling wages, while in the other years net increases were recorded. The aggregate of these increases was considerably greater than that of the decreases, the net amount of increase being approximately $914,000 per week. These figures relate only to the net increase due to changes in rates of wages and do not take into consideration fluctuations in the total amounts of wages paid owing to changes in the state of employment or altered conditions of work.

Over 11,000 of the working people whose hours were changed were in the building trades. Of that number 4000 were carpenters and joiners at Manchester; 2000 were building trade operatives in the potteries, and 750 carpenters and joiners at Aberdeen. At each of these places a reduction resulted from the change in the hours of labor during the winter months.

THE "Model Homes" which are about being erected in the First Ward of Allegheny, Pa., through the munificence of Henry Phipps, the Pittsburgh iron magnate, will consist of three buildings fronting 200 feet in South avenue and Rebecca street and extending 275 feet along School street. They will be six stories high, thoroughly fire proof, and will be separated by 30-foot streets going through from South avenue to Rebecca street. On every floor of the different groups of buildings there will be two three-room apartments and six four-room apartments, every one of which will have direct outside light for a distance of 30 feet or more in front of the window and bathroom. Each floor will be steam heated and lighted by electricity. In the finished basements will be the most modern laundry appliances, bowling alleys, &c. The group of buildings referred to will be followed by a smaller group farther down Rebecca street, the aggregate capacity of all the groups giving accommodations for [illegible] thousand persons. We understand that the rentals [illegible] be at the rate of $1.00 to $1.25 a week for [illegible] The work is being done by the Pittsburgh Buil[illegible] pany of New York City, this being the title [illegible] the persons who have put up for Mr. Phipps the [illegible] mer Building, the Phipps Power Building, and the [illegible] story warehouses on Penn avenue, in the city of [illegible] burgh, as well as a big tenement in New York City.

## Examples of "Mission" Style of Architecture.

(*With Supplemental Plates.*)

We present this month as one of our supplemental plates some interesting examples of buildings in the "Mission" style of architecture, an adaptation which is at present very popular on the Pacific Coast and which is gradually finding favor in some of the other sections of the country. The upper picture represents the Woman's Club House in Los Angeles, Cal., and was erected in accordance with drawings prepared by A. B. Benton of that city. The lower picture shows a residence in the "Mission" style erected in West Lake Park of the same city. The picture shows the detail to excellent effect and is presented for the suggestive value which it may possess to readers and builders interested in this particular style of work.

## Tedesco Country Club House.

(*With Supplemental Plates.*)

One of the supplemental plates which accompanies this issue of the paper shows an exterior and interior view of the Tedesco Country Club House situated at Swampscott, Mass., and which was constructed in accordance with plans prepared by Bodwitch & Stratton, Winthrop Building, Boston, Mass. The upper picture gives a general view of the building and affords an excellent idea of the external architectural treatment. The lower picture is a view in the tearoom and serves in a measure as a study in interior treatment of a room designed for the purpose named.

## Cost of City Halls.

In discussing the cost of city halls a recent issue of the New York *Sun* states that the 175 chief cities of America have $100,000,000 invested in city halls. Philadelphia leads with a $27,000,000 city hall, and San Francisco follows with one worth $8,300,000. After these cities come Boston, with a city hall representing $7,500,000; New York, with one standing for $7,000,000, and Baltimore, with a $5,000,000 structure and grounds. The value in each case is based upon the value of the city hall itself and the park or grounds surrounding it.

Every American city of more than 300,000 population has at least a million dollar city hall with the exception of New Orleans. St. Louis, Cincinnati and Detroit have buildings worth more than $2,000,000 each. Chicago falls $250,000 below that figure. Pittsburgh and Milwaukee follow.

Among minor American cities which have elaborate city halls are Richmond, Va.; Minneapolis and Providence. Indianapolis, which has a stately State House, has an inferior city hall. Toledo and Atlanta have small municipal buildings. The Denver city hall is valued at $265,000; that of East St. Louis, a place of much less importance, has one that cost $425,000. Houston, Texas, has a $550,000 city hall, and Memphis one costing only $35,-000.

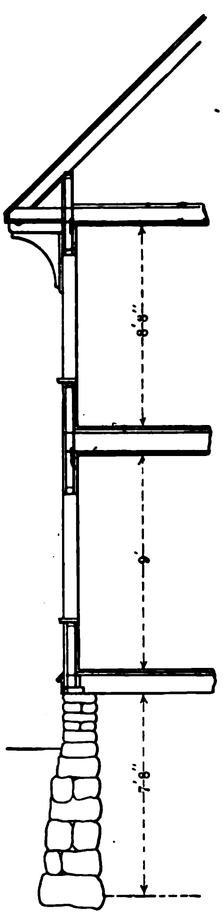
# DESIGN FOR A SUBURBAN RESIDENCE.

A NOTICEABLE feature of the present tendency in the architectural treatment of frame houses, especially those to be found in the suburban districts and even in the smaller cities and towns of the country, is the use of shingles to cover the entire exterior of the wooden frame. The advantages of this style of treatment are sufficient to render it of growing popularity, not only by reason of the added durability, but also of the color effects which may be produced by properly staining the shingles or by leaving them in their natural state to become "weathered" by the elements. A good example of suburban architecture in which shingles play a conspicuous part in the external treatment is the design which we present upon this and the pages immediately following. The design is sufficiently striking to invite more than passing attention on the part of the interested builder or prospective home seeker, while the internal arrangement indicates a convenient disposition of the space available. On the main floor are four rooms so arranged as to give practically direct communication between the kitchen and the front door without the necessity of passing through any but the reception room, or, as it is designated on the plan, the "living room." Communication between the parlor and dining room is established by means of a sliding door, while the dining room may be reached from the kitchen through a commodious and conveniently equipped pantry. Each room on the main floor may be reached from the hall without the necessity of passing through another room. On the second floor there are four sleeping rooms and bathroom, and in the attic is a finished chamber with ample space for storage purposes.

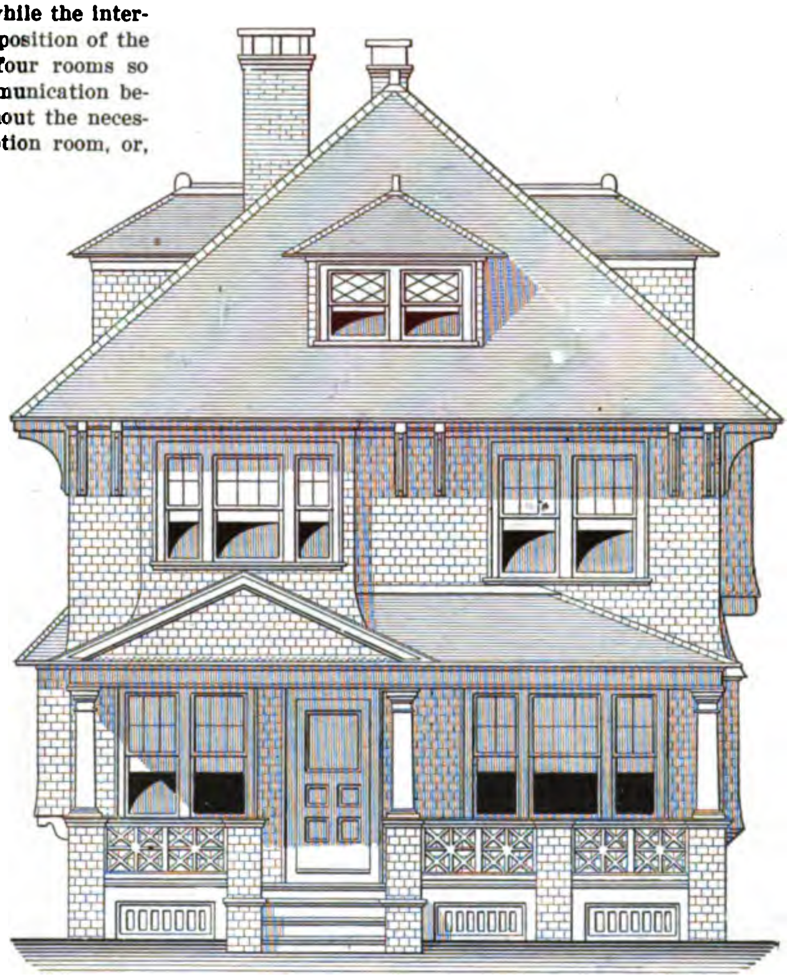
According to the specifications of the architect the foundation walls and underpinning are of cobblestones laid up in Portland cement mortar and giving above grade the appearance indicated on the side elevation. The house is balloon frame, the sills being 4 x 6 inches; the girders in the cellar, 8 x 8 inches; the floor joist, 2 x 8 inches and 2 x 7 inches; the plates, 2 x 4 inches doubled; the rafters, 2 x 6 inches; the partition studs, 2 x 4 inches and 2 x 3 inches; the exterior wall studs, 2 x 4 inches; the hips, 2 x 8 inches; posts, 4 x 6 inches, and the ceiling joist, 2 x 6 inches. The floor joist are doubled under all partitions; all joist and studding behind plastering are spaced 16 inches on centers and all others 20 inches on centers. There is a row of 1 x 3 inch bridging in the center of each span of floor joist.

The entire outside walls, including the roofs, are covered with ⅞-inch dressed hemlock and the same kind of material is used under the floors of the first and second stories. The attic floor is single and consists of ⅞-inch matched spruce. Over the hemlock sheathing is laid No. 1 water proof paper and the same material is also placed between floors over the cellar. The side walls of the house are covered with clear butt 16-inch cedar shingles exposed 5 inches to the weather, while the roofs are covered with 16-inch cedar shingles laid in 4½-inch courses. The hips are overlaid with alternate laps. All the outside finish is of cypress worked to details as shown. The piazza floors are of 1¼-inch spruce, while the ceilings are ⅞ x 3 inch matched and beaded North Carolina pine. The columns of the front piazza are turned from white wood and those of the rear are 6 x 6 inch square spruce.

The interior finish is of North Carolina pine. The floors of the vestibule and living room and the border of the dining room are of ⅞ x 2¼ inch oak, while those of the kitchen, passageways, lavatory, stair landings, pantries and bathroom are of North Carolina pine. The finish-



Section.—Scale, ⅛ Inch to the Foot.



Front Elevation—Scale, ⅛ Inch to the Foot.

*Design for a Suburban Residence. William H. Harvey, Architect, Worcester, Mass.*

ing floor in the parlor is of spruce and in the center of the dining room it is of pine. The outside front door is of oak 1¾ inches thick, made as per details. The interior doors throughout the first and second stories are of cypress 1⅜ inches thick, while those on the third floor are of cedar 1¼ inches thick. The kitchen, bathroom, rear entry and lavatory are wainscoted, finishing with cap and mold, as shown in the details. The main stairs have treads of birch, while the risers, newel, rail and balustrades are North Carolina pine.

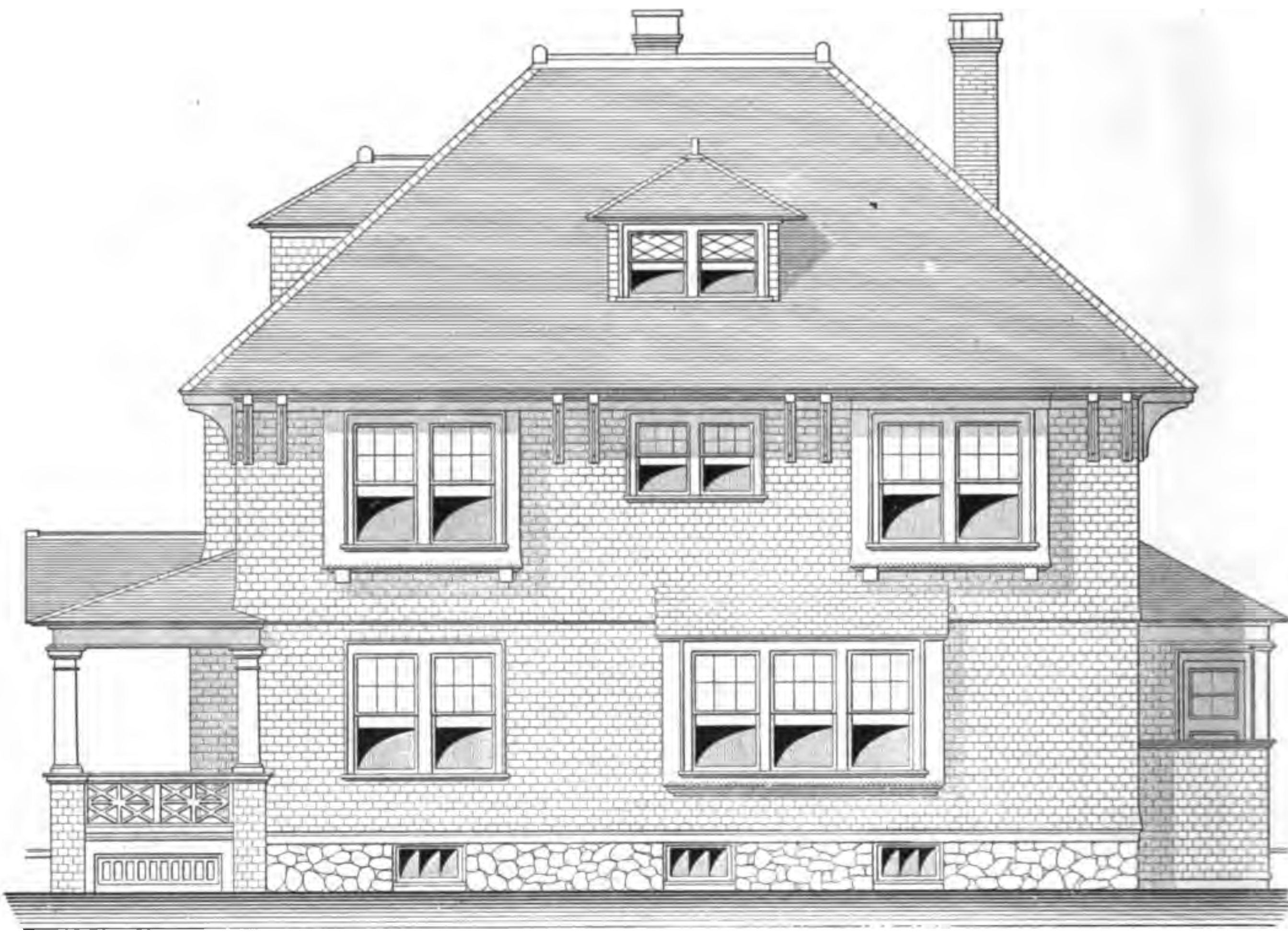
The kitchen is equipped with an enameled iron sink and slate wash trays, a 30-gallon copper boiler with tank, range and hot water pipe connections to fixtures. On the first floor is a combined flushing rim short hopper water closet fitted with oak seat and lid, oak flushing tank and nickel plated trimmings. In the lavatory is an enameled iron wash basin with high back. The bathroom is fitted with a combined earthen ware flushing syphon jet water closet with oak seat and lid, a combined enameled iron basin and slab supported on nickel plated brackets and fitted with nickel plated trimmings and porcelain enameled iron roll rim bathtub, also fitted with nickel plated trimmings. In the attic is a copper lined wooden tank supplied from the street main and fitted with overflow to kitchen sink and connections to hot water boiler.

The house is piped for gas and is heated by a Forbes furnace with 20-inch fire pot.

All the exterior mill planed wood finish has two coats of Lowe Brothers' prepared paint. All the shingles on upright walls are stained one coat in linseed oil. The interior standing finish is treated to show the grain of wood by using one coat of oil stain, one coat of shellac and one coat of deadlac. The hardwood floors have a coat of grain sealer finish, with two coats of Johnson's floor wax, well rubbed in.

The house here shown was designed by William H. Harvey, 311 Main street, Worcester, Mass., and in connection with the drawings it may not be without interest to give his detailed estimate of cost, which is as follows:

| | |
|---|---|
| **STONE MASON WORK.** | |
| Cellar excavations | $28.00 |
| Foundation walls | 97.50 |
| Grading | 15.00 |
| Underpinning | 68.00 |
| Total | $208.50 |
| **BRICK MASON AND PLASTERER.** | |
| Chimneys and fire places, &c | $105.00 |
| Lathing and plastering | 182.40 |
| Pointing and whitewashing | 14.00 |
| Total | $301.40 |
| **IRON AND TIN WORK.** | |
| Iron doors and thimbles | $10.00 |
| Tubing for posts | 16.00 |
| Iron work for fire place | 3.00 |
| Tinning and flashing | 35.00 |
| Total | $64.00 |
| **CARPENTER WORK.** | |
| Spruce framing timber | $173.76 |
| ⅞-inch hemlock inclosing | 78.00 |
| ⅞-inch hemlock flooring | 38.00 |
| Grounds and beads | 10.00 |
| Sliding door sheathing | 6.00 |
| Cellar partitions | 14.00 |
| Bulkhead and cellar doors | 15.00 |
| Sheathing paper | 12.00 |
| Rear piazza floors and finish | 9.13 |
| Front piazza floors and finish | 64.46 |
| Roof shingles | 74.00 |
| Side wall shingles | 94.50 |
| Outside finish stock | 42.00 |
| Outside steps | 8.45 |
| Cellar frames and sash | 8.20 |
| Window frames | 52.50 |
| Window sash and glass | 63.50 |
| Window weights and cord | 12.50 |
| Outside doors and frames | 11.50 |
| Top floors (soft wood) | 62.00 |
| Top floors (hard wood) | 42.15 |
| Interior door finish | 76.84 |
| Interior window finish | 43.20 |
| Interior doors | 70.00 |
| Interior room base | 16.26 |
| Interior wainscot and cap | 15.40 |
| Interior pantry finish | 8.00 |
| China closet finish | 7.50 |
| Closet finish | 8.00 |

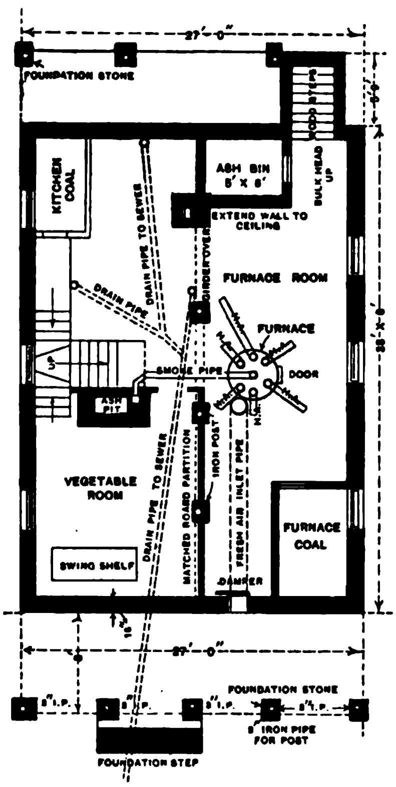


*Design for a Suburban Residence.—Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.*

| | |
|---|---|
| Front and attic stairs | 24.00 |
| Mantel and beams | 18.00 |
| Window seats | 12.00 |
| Cuttings for mechanics | 12.00 |
| Spikes, nails and screws | 20.00 |
| Total | $1,222.85 |

MISCELLANEOUS.

| | |
|---|---|
| Electric work | $12.00 |

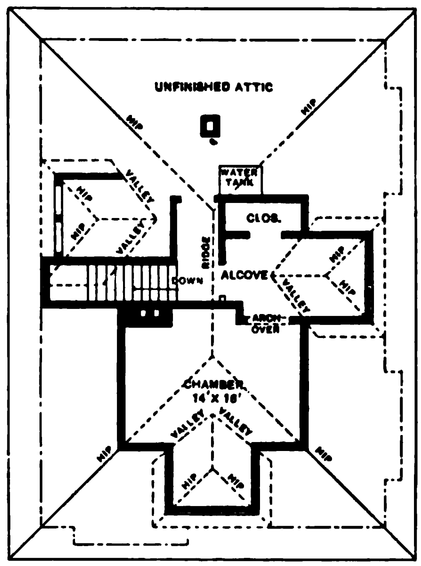



Basement.

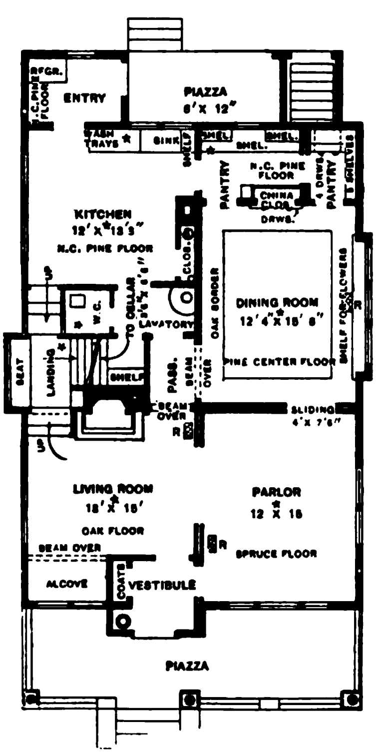
RECAPITULATION.

| | |
|---|---|
| Stone mason work | $208.50 |
| Brick mason and plasterer | 301.40 |
| Iron and tin work | 64.00 |
| Carpenter work | 1,222.85 |
| Miscellaneous | 1,701.00 |
| Total cost | $3,497.75 |

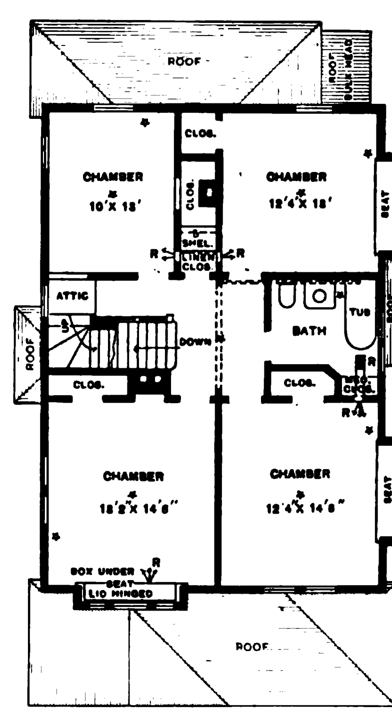
PLAYROOMS FOR CHILDREN in the basement of a group of tenements houses are the notable feature which is to be incorporated in some low rental buildings about to be erected by Henry Phipps. While there is a good deal being done in the large cities to provide places for recreation for children, they are largely open playgrounds and recreation piers and really do not offer much for children in the congested districts during winter or especially inclement weather. It will therefore be very interesting to see how this arrangement of providing a large basement room will work out. While at this writing we are not informed as to the number of tenants the building in question will house, it is understood that the basement space will accommodate 200 children and that it will eventually be furnished with simple and unbreakable apparatus.




Attic, with Outline of Roof.




First Floor.




Second Floor.

*Design for a Suburban Residence.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

| | |
|---|---|
| Hardware allowance | 55.00 |
| Painting contract | 285.00 |
| Plumbing contract | 400.00 |
| Gas piping | 22.00 |
| Sewer connections | 26.00 |
| Water meter connections | 28.00 |
| Heating apparatus | 185.00 |
| Carpenter labor | 688.00 |
| Total | $1,701.00 |

# WOOD PATTERN MAKING.

AT one of the meetings of the Pittsburgh Foundrymen's Association, one of the papers presented was that by J. C. Warne, on the subject of pattern making. As this is a topic concerning which many of our readers are interested, we reprint the paper herewith:

In this paper I shall confine myself to remarks on wood pattern making as distinct from metal pattern making, being more familiar with that branch of work. I have divided my subject under the following heads: Materials, Machinery, Men and Patterns.

White pine is almost universally used in the making of wood patterns, it being well adapted in its nature for such service, light, easy to cut, permits of a nice finish, retains its shape, not warping or twisting like other varieties of the fir woods, and if properly taken care of in the foundry will stand a good deal of wear, especially if rapping plates are provided. Its availability in large quantities to meet an ever increasing demand is also in its favor. Taken altogether, it is hard to find a wood equal to it, its first cost being considered.

Of all woods for pattern work mahogany is the best, partaking of the nature of both hard and soft woods, being practically impervious to damp, therefore retaining its original shape. As it stands a great deal of hard usage it is oftentimes used in preference to iron patterns, particularly so in Europe. Its high cost, however, almost precludes its use.

Among the hard woods cherry is by far the best, retaining its shape fairly well, is not so hard to cut as other hard woods, makes an excellent finish and stands ordinary wear and tear admirably. Patterns of white pine faced up with cherry in the wearing parts will last for years of the hardest kind of service if kept well varnished. A good example is furnished by car wheel patterns. The writer has had car wheel patterns in almost daily service for ten years, 16 to 20 molds being put up each day from a single pattern. They were only withdrawn from service to have repairs made to flanges and rim.

### GRADES OF LUMBER.

The grades of lumber to be used should vary according to the job. Patterns from which only one casting is to be made, with little probability of another being made in the future, can be made economically of cheaper material so long as the lumber is sound and free from checks; a few sound knots do not signify, as these can oftentimes be cut out with advantage by a little discretion of the pattern maker when marking out his material. Lumber full of fine checks, although it may be perfectly clear, is an abomination to the pattern maker and a source of loss to the buyer, both in time and material.

Where large quantities are used it pays to buy largely and store. Kiln dried lumber is never so good as the naturally seasoned lumber, and where large quantities are used it will pay to take the trouble to paint the ends of the planks or boards, as this will prevent checking of the ends and will effect a considerable saving of material.

For standard patterns the lumber cannot be too good. All lumber used in pattern work, whether No. 1, 2, or 3 quality, should be well seasoned. It is no economy either for the pattern maker or his fellow worker, the molder, to make patterns from lumber such as is sometimes used, from which the water oozes out in front of a chisel cut or flies about when turned in the lathe. Patterns made from such never give satisfaction, and if wanted again in a month or so, owing to shrinkage in wood, must be dressed over again. If this is not done and the molder gets it, then he has his own troubles in drawing from sand and patching breakdowns, &c., and the job is one of anything but comfort to him and poor satisfaction all around. I am aware it cannot always be avoided, but should be eliminated as far as possible.

Racks for keeping lumber on edge and easy of access should be provided in all pattern shops. At the high price at which the best pattern pine is now bought supervision should be kept on the pattern makers, who at times are apt to use the very best where a cheaper grade would answer the purpose fully as well.

Gum shellac varnish is the standard article for varnishing wood patterns. The best results are obtained from the best gum shellac and grain alcohol, and many pattern makers prefer to make it themselves rather than trust to the uncertainty of results obtained from that bought from varnish makers. Still there are some good brands on the market, and when you get the one that satisfies yourself and the molder, who will soon complain in unmistakable terms if his pattern clogs the sand, stick to that brand and do very little experimenting with any other, if you wish to keep yourself out of trouble.

Leather fillets are now used almost universally and have come to stay, especially for a quick job, but for permanent pattern work nothing surpasses the wood fillet. Fillets of putty are also quickly put in, and inexpensive if time can be allowed for it to get hard. When varnished over it forms a permanent hard fillet.

Glue necessarily enters largely into the construction of patterns. Avoid cheap grades. The desirable glue to get is one that will set quickly and hold fast. This can be obtained, but if not to be had, as a rule the slow setters are the strongest. If time is the object more than strength, then use the quick setters.

### Machinery.

Machinery plays a most important part in the pattern shop. Thirty years ago a circular rip saw, band saw and lathe were about all to be seen in an ordinary pattern shop, and sometimes the lumber was not even planed. Hand work was then a very large factor in the production of patterns. To-day most pattern shops are, or ought to be, equipped with the best machinery possible to get.

The jointer is a most useful machine and a great labor saver. No jointer should be permitted to have shop room that will not plane absolutely true so that work can be glued up straight from the machine. If it takes the place of a hand jointer plane, from which it takes its name, instead of a jack plane, then it fulfills its mission and is appreciated by its users, for pattern makers, like most other craftsmen, desire to get along with the least expenditure of muscle where possible.

A good band saw with wheels not less than 36 inches diameter, with tilting table, such as can be bought from a reliable house, is also desirable. A small and a large wood turning lathe should be provided, also wood trimmers, universal circular saw table, and for large shops a swing cut off circular saw. Work benches should have quick acting vises and steam heating glue pots, and a liberal allowance of these should be supplied.

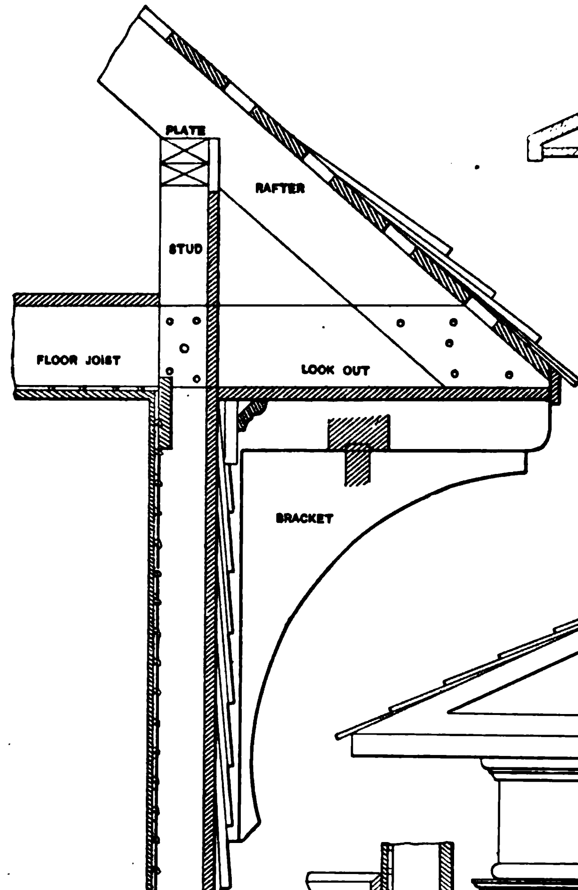
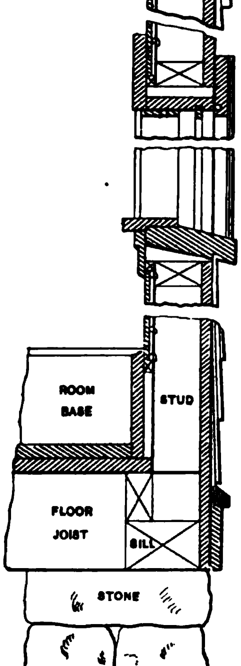
For a well equipped pattern shop I would recommend the purchase of machinery from makers who have made a special study of pattern shop requirements, and even if first cost is more, it will be cheaper in the end.

I have outlined the machinery required in most pattern shops, but machinery should be bought suitable for the particular line of work the company is engaged in, which the foreman in charge will soon discriminate in favor of.

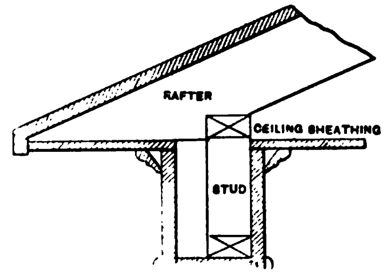
The end and aim of the best machinery in the world will be defeated if proper care of it is not taken. In most shops it will be usually found there is one man who has the special knack of getting the machines to run just so. That is the man to keep at that work. I do not believe in every Tom, Dick and Harry fixing the machines. What is andbody's job is nobody's job, and you get nobody's results. Employers should get all that is coming from the investment, and the pattern makers will appreciate nice, true cutting machinery.

### Men and Patterns.

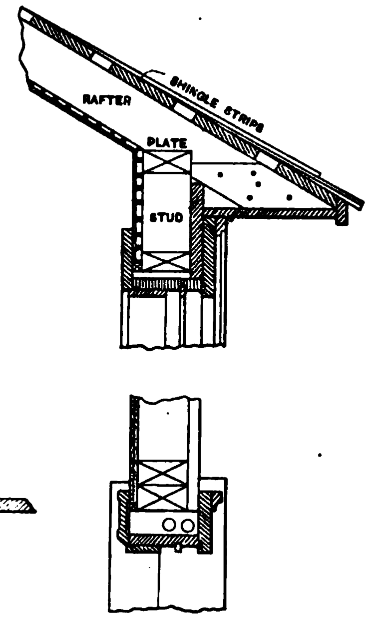
Accuracy should be the first law with every pattern maker. Speed is also a very important factor, but if accuracy is sacrificed to speed there is too often sorrow all along the line from the pattern maker to the machinist, and much valuable time and considerable loss of money

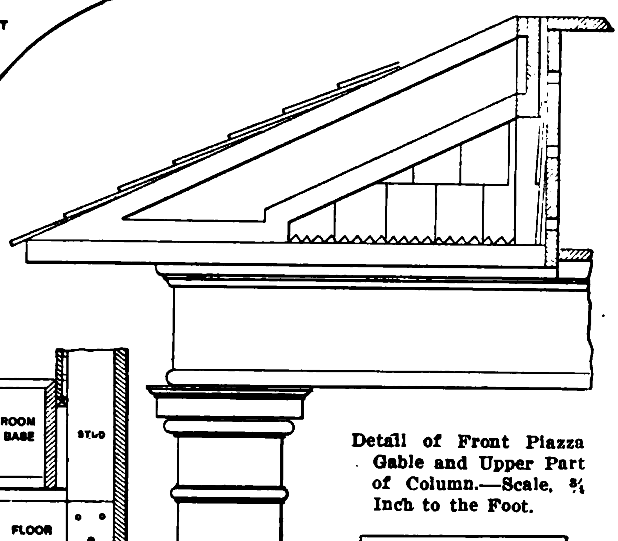

Section Through Main Cornice, Window Frames and Water Table.—Scale, ¾ Inch to the Foot.



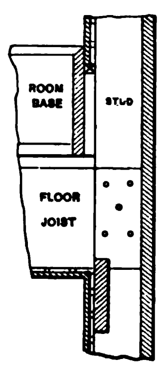

Section Through Front Piazza Cornice and Soffit.—Scale, ¾ Inch to the Foot.



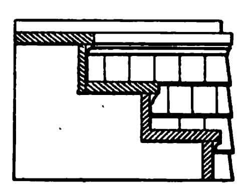

Details of Dormer Window Cornice and Horizontal Section Through Window Frames.—Scale, ¾ Inch to the Foot.



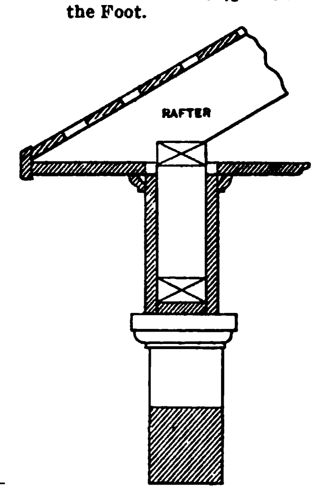
Detail of Front Piazza Gable and Upper Part of Column.—Scale, ¾ Inch to the Foot.



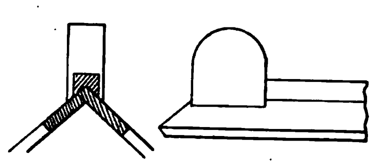

Section at Second Floor.—Scale, ¾ Inch to the Foot.



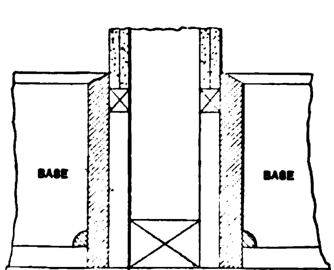
Detail of Front Outside Steps.—Scale, ¾ Inch to the Foot.



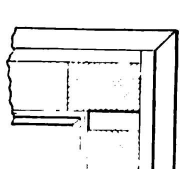

Detail of Piazza Cornice and Column.—Scale, ¾ Inch to the Foot.



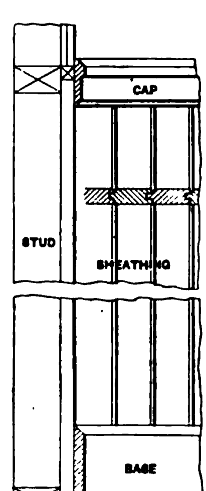
Ridge Board and Finial.—Scale ¾ Inch to the Foot.



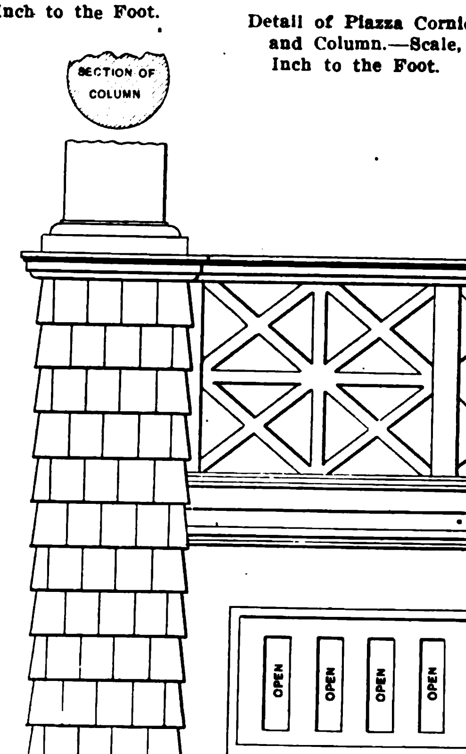

Details of Base—Scale, 1½ Inches to the Foot.



Horizontal Section Through Corner of Building.




Detail of Wainscoting in Kitchen and Bathroom.—Scale, ¾ Inch to the Foot




Details of Front Piazza.—Scale, ½ Inch to the Foot.

*Miscellaneous Constructive Details of Suburban Residence.*

are involved. A good all round competent pattern maker should have "an eye like a hawk and a head like a Philadelphia lawyer." This is a definition I once heard, but, while somewhat exaggerated and overdrawn, still it shows that there must be ability of a high order shown. He should have a thorough knowledge of drawings, be able to read them truly and quickly, be no mean draftsman, and the more his mathematical and mechanical knowledge the greater chance he will stand for a better position and the more valuable will he be to his employer. He must possess a true eye, which will be found a great advantage to him. On him will devolve largely the amount of labor put into patterns.

If the work to be done is permanent standard patterns, such, for instance, as steam pumps of graduated sizes, too much care in reason cannot be expended on the job. Parts should be well fitted together and the proper amount of draft given. If the patterns are in halves, he will provide the proper amount of metallic dowel pins. Avoid wooden dowels as much as possible, with sufficient number of rapping and lifting plates for drawing patterns. This latter item is too often forgotten, and only brought to the pattern maker's notice when he sees the results of the molder's draw spike. Always put them in the weakest part of the pattern, and where the grain of the wood is shortest. Do not skimp rapping plates, lifting plates and drawing straps in permanent patterns. They pay for the extra cost and time of putting in.

Core prints of sufficient length to sustain weight of cores without crushing molds should be used. The pattern maker who gets his intricate cores correct and to fit the mold exactly has solved one of the most difficult problems in pattern making, and will save himself and the molder who handles his job much sorrow and heartburnings. Indeed, no pattern maker can be considered successful unless he has acquired the faculty of having his cores well fitting and correct. More skill is frequently required in making core boxes than patterns. This is well known among foundrymen.

It frequently happens that a pattern is required for only one casting. I have known men who could not seem to appreciate this fact, but would spend just as much time on the job as if there were a hundred required. This is where the judgment of the good pattern maker is shown.

In work of this kind a strong, substantial pattern is not necessary; sufficiently strong to retain its shape and stand the molder's handling will do. Extra finish is not required. So long as the pattern is accurate in its essentials that is all that is necessary. These are the cases where the pattern maker shows his value to his employer in his ability to discriminate and be governed accordingly. These traits of the pattern maker's make-up are more readily observed in men who have been raised pattern makers from their youth up than in men who have acquired the trade in after life, having worked at other wood working trades. Of course there are exceptions to every rule.

A good pattern maker will always be on the alert to catch the draftsman's errors, and draftsmen are liable to err, as every pattern maker of experience knows.

#### Some Special Points.

Another feature of pattern making is that oftentimes the expense of a costly pattern can be avoided by sweeping up the work, and a good spindle and socket should be an adjunct to every foundry where machinery castings are made. A little getting together of the foundry foreman and boss pattern maker will often produce a considerable saving in pattern work by the use of the spindle and sweeps. How easy, for instance, a bed of sand can be leveled up for open sand castings; a good, level sweep board swung around on a spindle and you have it, doing away with straight edges and leveling strips, producing better and quicker work, as every molder knows. The foundry foreman and pattern maker should work hand in hand. The best results are obtained this way, two heads being better than one.

The pattern maker does not always see a job through the molder's eyes, and this method can oftentimes be improved by the advice of the molder, and the molder will work in a happier frame of mind if the pattern is to his liking.

In the making of patterns it is necessary to have glue in most cases to secure the component parts permanently together, but there are lots of patterns that could and ought to be made with a minimum amount of glue instead of a maximum, as is too often the case. Where glue is exposed to the damp sand trouble is invariably caused, and the less glue the better. There is such a thing as having patterns too securely made, as every pattern maker knows when he has to make some simple changes and finds hubs and prints glued fast and has to break them all to pieces, tearing the under wood with it when he has to remove them, when the unscrewing of a wood screw or the hub or print being loose ought to suffice without the dab of glue under it.

The proper construction of patterns, not only for strength in themselves but also to allow of the easiest and least expensive method of molding, is the desirable thing in pattern making, consistent of course with the end in view of all patterns—*i. e.*, the making of the best castings with the least expense to the employer of both pattern maker and molder—for in these days of sharp competition you cannot afford to be generous either in time or material. Patterns are often made by the pattern maker, especially if the patterns are made in a job shop, with a view to getting the job out of hand as quickly as possible, and the best methods are not used. The molder has to finish the job at an additional cost of time, which would have been better put on the pattern before it left the pattern shop. However, you cannot blame the job shops. They have a living to get, and, like every one else, are not working for glory.

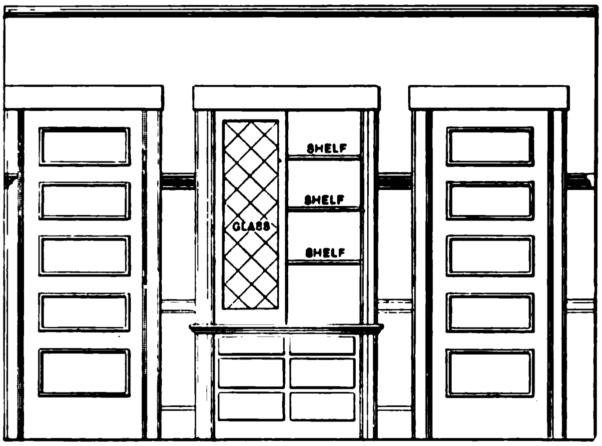
Shrinkage of castings is a very important item in pattern making. In some castings of very heavy type scarcely any allowance for shrinkage will be necessary, but in the heavier type of machinery castings 1-12 inch per foot; in the lighter grades of machinery castings 1-10 inch per foot, and in castings such as builders use ⅛ inch per foot. I have found it not wise to have one allowance for all castings, as the best results will not be obtained if this is followed. For brass and steel 3-16 inch per foot will be found about right.

A few words in conclusion as to the pattern shop. Have it amply lighted with daylight and fully lighted artificially when necessary; the walls, if brick, covered with whitewash, and if wood, white paint. If they are not so at first, try the experiment of a little whitewash and note effects. A comfortable heat should be maintained. If not, the effects of glued work will be largely minimized and poor results will obtain. Pattern makers should be crowded no more than necessary. All these things tend to produce successful pattern making.

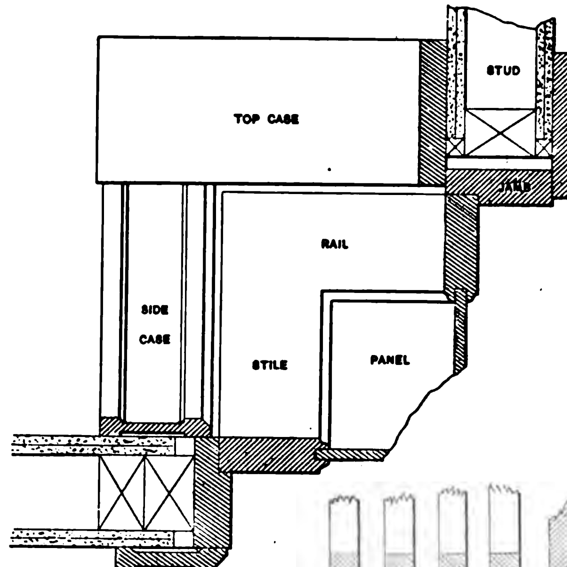
## Steam Radiation in a Greenhouse

A recent inquiry in the *Florists' Exchange* as to how much steam piping was necessary to heat a given greenhouse was answered by U. G. Scollay of Brooklyn, N. Y., and while the method of arriving at the result was not given, the conditions of the problem and the proportions of the apparatus advised will doubtless prove of interest. The correspondent of the journal mentioned wanted to know how many 1¼-inch steam pipes it would take to heat a greenhouse 30 x 65 feet, built of wood, lined thoroughly with paper roof and sides (shingle roof), with one 30-inch continuous ventilating sash running along each side and also on the roof, and he also wanted to know what size main it would take. The house is located 500 feet from the boiler. He desired to maintain a temperature of 40 degrees with the outside temperature 10 degrees below zero.

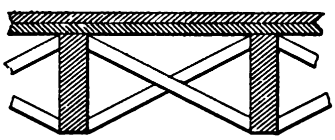
Mr. Scollay's reply was: "You will require 440 lineal feet of 1¼-inch pipe in your house to insure 40 degrees inside with 10 degrees below zero outside. This divided up will give you about seven rows. I would advise placing a valve at each end of each of the six rows in order that you may at all times have the heat under control. This is more necessary in steam than in hot water work, for the reason that hot water may be controlled by the fire in the boiler, while with steam pressure or vapor



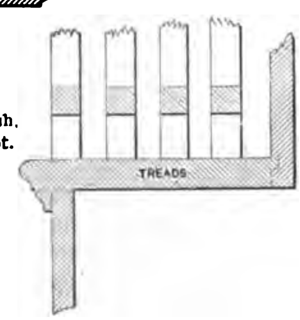

Elevation in Dining Room, Showing China Closet.—Scale, ¼ Inch to the Foot.



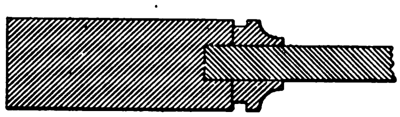

Details of Interior Door Finish. —Scale, 1½ Inches to the Foot.



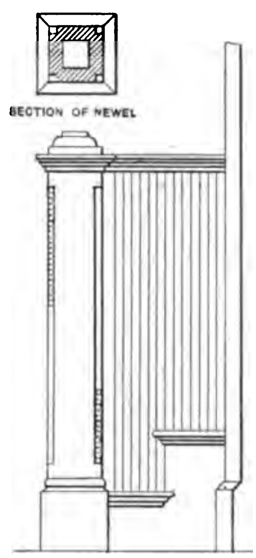
Section of Floor, Showing Bridging.—Scale, ⅜ Inch to the Foot.



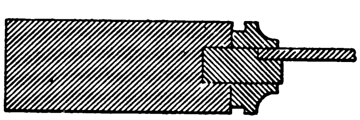

Section of Stair Tread, Risers and Balusters.—Scale, 1½ Inches to the Foot.



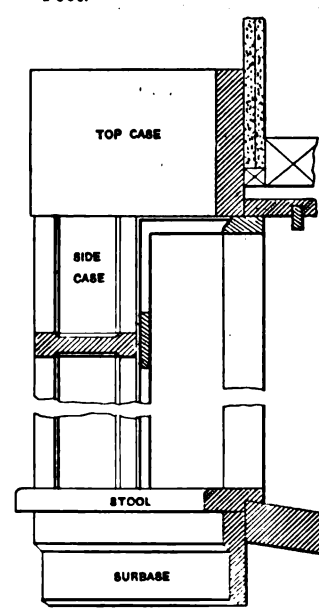
Secton Through Front Door on Line C D. —Scale, 3 Inches to the Foot.



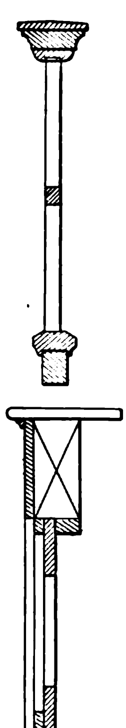

Newel Post and Stair Railing.— Scale, ½ Inch to the Foot.



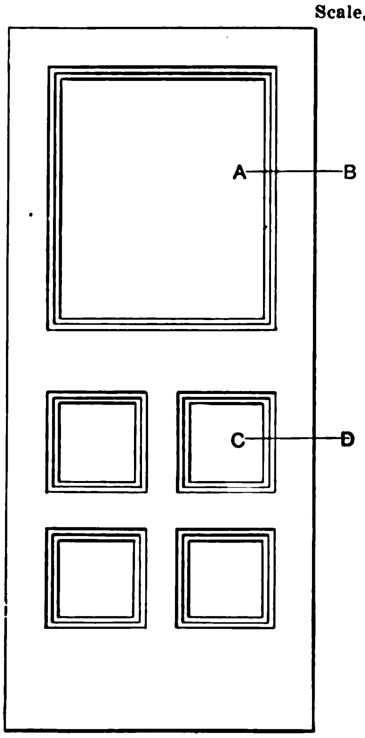
Section on Line A B.—Scale, 3 Inches to the Foot.



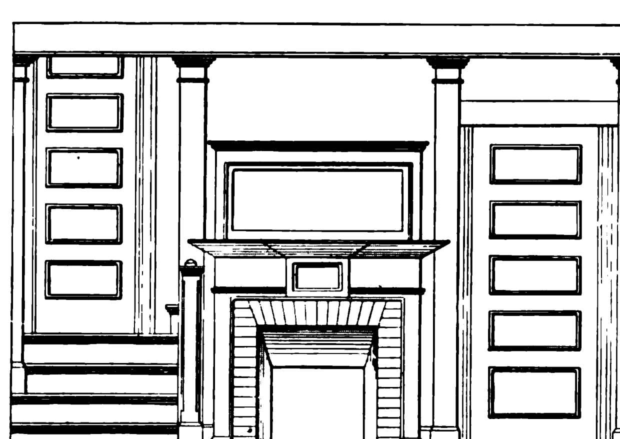

Detail of Interior Window Finish.—Scale, 1½ Inches to the Foot.



Sections Through Piazza Railing and Sill. — Scale, ¾ Inch to the Foot.




Elevation of Front Door.—Scale, ¾ Inch to the Foot.



Elevation in Living Room, Showing Fire Place and Stairway.— Scale, ¼ Inch to the Foot.

*Miscellaneous Constructive Details of Suburban Residence.*

must be kept up in any event, which makes it imperative to regulate by the amount of surface kept in active use. For the distance these coils are from the boiler I would advise not less than 2½-inch steam main with 2-inch return. I of course assume that it is your intention to thoroughly protect these main pipes. Five hundred feet away from the boiler is a pretty long reach. While I give you these sizes of mains I am unable to say how they will work in your case, for the reason that I do not know how you will be compelled to run them. There are numberless complications liable to arise, so very numerous, in fact, that it is scarcely of any use for me to speculate on what your conditions are. Candidly, unless the conditions are exceptionally favorable for getting steam to your house and returning the condensation to the boiler, I would advise the installation of a small steam boiler for your house, say of 400 square feet capacity. Possibly you have a large central plant and prefer to take steam from it. If so, be very careful to allow ample hight above the water line of your boilers for your coils, in order that dry steam may be obtained. Pardon me for suggesting it, but our experience inclines us to hot water for small jobs of this kind, in that regular temperature is more easily maintained. If you should discard the idea of steam and adopt water it would take five rows of standard cast iron greenhouse pipe or its equivalent in 2-inch pipe, say eight lines. A good boiler of 500 square feet would take care of the work nicely. Of course I mean that in case of either steam or water the small boiler would be placed in a pit close to the house."

## Efficiency of "Fire Proofed" Wood.

Some interesting conclusions are contained in the report on his tests of the fire resisting qualities of fire proof or noninflammable wood recently issued by Prof. Charles L. Norton, in charge of the Insurance Engineering Experiment Station of Boston.

By way of preface he says, among other things:

The attempts to render wood "fire proof," or, rather, fire retardent, are not of recent origin, but it has not been until the necessity arose of providing fire proof "trim" for buildings built otherwise of noninflammable material that fire proof wood came to be made and put upon the market in quantity. Wood being porous, it is possible to cause solutions to soak into it and on drying to leave a part of the dissolved salt in the cellular structure of the wood. The application of heat and pressure sometimes following exposure in a chamber at reduced pressure is the means often employed to cause the solutions to enter the wood. It is in the method of treating the wood rather than the nature of the solutions used that especial excellence is usually claimed for one or another brand of fire proof wood. So far as the writer can find out without exhaustive chemical analyses there is no great difference in the operation of the different salts with which the wood is treated.

### Exposure to Dampness.

One of the most serious objections to fire proof wood in the minds of many who have used it is the difficulty of preventing the salts used in the treatment from injuring the appearance of the varnish, especially in damp places. Of the several samples sent us from actual service only one was free from this trouble and that one had manifestly never been "fire proofed." Several pieces of fire proof wood placed in damp locations have shown a tendency to mold and effloresce, but it does not appear that their fire resistance has yet been materially diminished. In damp places the contact with fire proof wood increases the rate at which rusting of iron occurs, but for use in dry places there need be little apprehension on this point.

### Conclusions.

Judged by the average of all the specimens examined it is clear that many sources of ignition which, while lasting only a few seconds, would set fire to untreated hard wood, must last at least five minutes to set fire to fire proof wood. The flame and radiation given off by fire proof wood is only a small fraction of that given out by untreated wood, and the chance of spread of fire along it from the heat of its own burning is almost nothing. The deterioration of the wood when kept in a reasonably dry place is shown by the specimens of the Electric Company at least to be almost nothing for a period of three years, and it is my opinion that when painted or varnished, or even when, like the specimens which were kept for examination in 1902, they are in the shape of rough lumber, the protection of the electric process is apparently permanent. No information is at hand, unfortunately, concerning the other processes on this point.

As has been said, the material taken from the buildings was on the average poorer than that sent by the manufacturers, but there were a number of pieces which were quite as well treated as the best sent by the makers. The best and the poorest pieces of the old material came from the same building and were represented to us as being the product of the same company. This calls attention to the difficulty of determining the quality of the material except by destroying it and makes it seem that the surest guarantee of quality must finally be found rather in that the product is the work of some firm or number of firms whose name and brand carries with it absolute reliability rather than to attempt to test any large percentage of it. There has been an uncertainty, apparently based upon experience, among the building trades as to the quality of materials which they have purchased under the name of fire proof wood that has hindered the use of it greatly, and that there is some basis for their suspicions is shown by the specimens examined. It seems unlikely that much unsatisfactory wood has gotten by the Building Department, if we may judge from these pieces.

It was noted all through the tests that the fumes of the burning wood were intensely pungent, irritating to the eyes and throat, and caused in the case of a number of persons exposed to them for some days acute illness for a short time. In case of fire it is probable that the firemen would find this smoke a hindrance in entering and working in a building trimmed with fire proof wood. The relative effectiveness of the treatment in use by at least one of the companies in 1902 and 1905 shows that the art has progressed and that the later specimens are more fire retardent than the earlier ones were when new or are at this time.

## Metal Roofs Protect Farm Buildings.

The discussion regarding barn fires which has been running in the New York *Journal of Commerce* and was reviewed in these columns September 9 continues to bring out opinions and facts of interest regarding metal roofs for farm buildings and the like. Geo. C. Howe, vice-president of the Niagara Fire Insurance Company, says: "The lightning hazard is probably responsible for 50 per cent. or more of the fires on barns. Whether or not this hazard could be reduced with proper installation of lightning rods I am not prepared to say. I fully believe, however, that buildings having tin roofs are much better than those having shingle roofs, being not so susceptible to lightning, which was demonstrated at my country place, where a tree alongside of my barn was struck by lightning, which apparently extended along the tin gutter to a post, the latter as well as the siding being splintered."

F. M. Gund, secretary of the German Insurance Company, of Freeport, N. Y., whose views were reprinted in the issue mentioned, writes us in part as follows: "We believe that metal roofs on farm buildings would be impracticable, as they generate a great deal of heat, and if the barn were filled with new mown hay the additional heat generated by the metal roof would be almost certain to increase losses by spontaneous combustion."

In a number of cases that have come under our observation the barns that are roofed with metal have a cupola or some other form of ventilator to overcome the objection alluded to. A ventilator has a further advantage in that it facilitates the curing of the hay.

*Wood Craft*, with which is incorporated the *Patternmaker*, is the name of a new candidate for popular favor in the way of a monthly magazine devoted to the general field of wood working. It is issued by the Gardner Publishing Company, Cleveland, Ohio.

# METHODS OF CONCRETE BUILDING CONSTRUCTION.*

BY F. E. KIDDER, CONSULTING ARCHITECT.

THE strength of concrete is affected to a great extent by the thoroughness and uniformity with which it is mixed. Experiments have shown that within reasonable limits the more times the materials are turned the stronger will be the resulting concrete. For this reason a well designed mixer will produce stronger concrete than can be made by hand without undue expense. For small jobs, however, concrete can be satisfactorily mixed by hand.

The drying out of concrete before it has had time to complete the process of crystallization will prevent its attaining any considerable strength and often causes it to crumble. Crystallization cannot take place without the presence of moisture, and to attain its maximum strength concrete must be kept damp continuously for at least a year from the time of mixing.

Where concrete is in large masses, or deposited in trenches, and is mixed fairly wet, enough of the original water will be retained to complete the process of crystallization, but when exposed to the sun and dry winds thin bodies of concrete must be supplied with additional water by spraying and on no account be allowed to dry out within several days. The longer the concrete is kept damp or wet the harder and stronger it will become. Concrete cannot have too much water after it is once set.

### Impermeable Concrete.

Probably most persons consider that porosity and permeability, as applied to concretes, stones, &c., are practically the same. As a matter of fact concrete may be porous and still be impermeable. The absorption of water by concrete is due to the presence of voids into which the water penetrates. The permeability or impermeability of concrete depends chiefly upon the size of the voids. To be impermeable the void must be very small, and consequently the concrete must be very dense.

As all concretes contain some voids all are more or less porous. If the voids are small the rate of absorption will be slow, and in the case of walls a long continued rain will penetrate only part way through the concrete, and on the return of dry weather the concrete will dry out. If the voids are large, and amount to 25 or 30 per cent. of the volume of the concrete, absorption will take place rapidly and the water will soon penetrate through the wall, the time of penetration depending upon the thickness of the wall.

To secure impermeable concrete the aggregates must be graded so as to produce a dense mixture, and the proportions of cement to sand should be at least 1 to 2. To produce sufficient density there must be about equal proportions of fine and coarse grains of sand, and only small proportion of medium size grains and enough water must be used in mixing to produce a medium wet mixture.

With properly graded aggregates a 1 : 2 : 4 mixture should be practically impermeable. If sand and cement only are used the proportions of sand to cement should not be greater than 2 to 1.

Spencer B. Newberry recommends the addition of hydrated lime for producing water tightness in cement blocks, the proportions recommended by him being: Cement, 1½; hydrated line, ½; sand and gravel, 5.

There are also one or two water proof compounds now on the market which it is claimed will make concrete in which they are mixed water proof.

### Effect of Freezing on Concrete.

Although concrete work can be executed in freezing weather, special precautions are necessary, which considerably increase the expense, so that as a rule it may be said that if possible concrete work should be avoided in freezing weather, and especially if the surface of the concrete must be finished.

Freezing retards the setting and hardening of concrete, and keeps the strength down, until a normal temperature is attained, when it commences to increase until finally it attains a strength practically equal to what might be expected if the concrete had not frozen. Even when the temperature is slightly above the freezing point the setting and hardening of the concrete is greatly retarded, but may be accelerated by heating the sand and water and warming the cement. The mixing of salt in proper proportions with the water used for mixing the concrete lowers the freezing point.

In the New York Subway work, in 1903, 9 per cent. of salt to the weight of water was adopted. This is equivalent to 22½ pounds of salt to 30 gallons of water.

The effect of freezing upon the surface of concrete is to cause it to scale more or less to a depth of about 1-16 inch. Such scaling is not enough to effect the strength of the concrete, but in most cases injures the appearance. Finished blocks of concrete—*i. e.*, made to represent stone or terra cotta should not be permitted to freeze.

### Durability of Concrete.

Good Portland cement concrete exceeds all common building stones in durability, with the possible exception of granite. This is particularly true in cities where coal is burned. It is not affected by acids to any appreciable extent, by changes in temperature, or by ice or water; in fact, the latter improves the material. The writer has a walk formed of blocks of 1 to 5 gravel concrete, 2½ inches thick, without facing, which has been subjected to freezing and thawing for two winters without the least apparent effect on the blocks, and there are many examples of concrete sidewalk blocks which have been down for 20 years or more and are in practically as good condition now as when laid.

### Building Cellar Walls.

For the foundation and cellar walls of frame buildings concrete can be used to a great advantage *by the carpenter* because all of the lumber required for the forms can afterward be used in the construction of the superstructure, which means a considerable saving in the cost of the walls. By using concrete the carpenter can start his work from the ground and have full control over it. He can also build the chimneys of the same material, and in this way no other mechanics are required about the building until it is ready for painting and plastering. This chapter will therefore be devoted especially to the methods of building foundation or cellar walls for light buildings, such as dwellings, barns, &c.

**Proportions of Cement to Aggregates.**—Because of its important bearing on the cost the proportions of cement to aggregates is almost the first question to be considered in any proposed concrete work. For the foundation walls of buildings of moderate hight no great strength is required, and the most important considerations are generally those of compactness and impermeability.

For ordinary conditions a concrete composed of 1 part cement, by volume, to 8 or 9 parts gravel containing sand and pebbles up to 2½ inches in diameter should be sufficient. If there is a large proportion of sand in the gravel then more cement should be used or the material graded by screening through a screen having 6 x 6 meshes to the inch. For gravel containing no sand the proportions may be made 1 part cement to 3 of sand and 6 of gravel, but if these proportions are used the materials should be accurately measured.

If there is no gravel in the neighborhood, so that it is necessary to use crushed stone, then the proportions may be made 1 part cement to 8 parts stone and screenings, using the entire run of the crusher, passing through a 2½-inch mesh.

***Measuring.***—The careful measurement of every batch of concrete is a matter of great importance and should never be neglected. If properly managed it takes but little time and adds almost nothing to the cost of the work. The most economical measure is the wheelbarrow. The quantity of concrete mixed at one time, should be such as to use either a half barrel (two sacks) or a barrel (four sacks) of cement at a time. For this

* Continued from page 264, October number.

class of work each sack of cement may be considered as a cubic foot,* so that if the proportions are to be 1:3:6 then for each *two sacks* of cement there should be used 6 cubic feet of sand and 12 cubic feet of gravel or broken stone. The ordinary contractors' wheelbarrow will easily hold about 2 cubic feet, hence two sacks of cement, three wheelbarrows of sand and six wheelbarrows of stone or gravel will give a 1 to 9 mixture.

As the capacity of a wheelbarrow, however, depends upon the extent to which the material is heaped up, before starting the men to mixing 2 cubic feet of sand should be carefully measured out and put in a wheelbarrow, so that the men may see to just what extent the barrow should be filled. For this purpose a box 12 inches square and 12 inches deep may be used as a measure, being filled and scraped off level, and emptied twice into the barrow. For a 1:2:4 mixture use three sacks of cement to three wheelbarrows of sand and six of stone or gravel, and for a 1:2½:5 mixture 2½ sacks of cement to three barrows sand and six of aggregates, using the same amount of sand and aggregates, but varying the quantity of cement.

**Size of Batch.**—The volume of concrete made at one mixing is called a "batch." The size of the batch should be determined mainly by the rapidity with which the concrete can be deposited. Thus for large masses, where the concrete can be dumped into place direct from the wheelbarrows, it will be more economical to mix 15 to 18 wheelbarrows of sand and aggregates at a batch than a smaller quantity, while if the job is a small one, or if the concrete is for building thin walls, then not more than six to nine wheelbarrows of sand and aggregates should be mixed at a time. *The size of the batch should not be greater than can be deposited within one-half hour from the time it is mixed.*

A nine-barrow batch cannot be properly mixed by hand with less than five men. A six-barrow batch can be mixed by a crew of either three or five men.

### Mixing the Concrete.

Where concrete is to be mixed in large quantities, it will pay to use a mixing machine run by power, but on isolated jobs of less than 500 yards it will almost invariably be cheaper to mix by hand, and only hand mixing will be considered in these articles.

Concrete should always be mixed on a tight platform, which for the class of work we are now considering should be made of planks laid close together and spiked to a 2 x 4 or 4 x 4 sleeper near each end. The ground where the platform is to set should first be carefully leveled, and the two sleepers bedded flush with the top. The planks are then laid and spiked, and further secured by driving pegs against the outer edges. The cracks between the planks should then be filled by washing loam, clay or sand into them, and the platform swept clean. For a six-barrow batch the platform should be about 8 x 12 feet, and for a 9 or 12 wheelbarrow batch not less than 10 x 16 feet. A 1 x 3 or 2 x 3 inch strip nailed around the edges will prevent stones or pebbles from rolling off the platform.

There are several methods of mixing concrete, each of which has its advocates, but the only requisite as far as the quality of the concrete is concerned is that every particle of gravel or stone shall be covered with a coating of mortar, and that the resulting mass shall be homogeneous and of uniform consistency.

The following method is probably the one most used, as it is economical and thorough and gives good results. The quantities given are for a 1:3:6 mixture.

**First Step.**—Fill three wheelbarrows with sand, dump on the mixing platform and spread into a layer about 3 inches thick.

**Second.**—On top of the sand empty two sacks of cement, the sacks being moved as the cement comes out, so as to distribute fairly evenly over the sand.

**Third.**—Mix the sand and cement *dry* by turning with square pointed shovels, the process requiring two men. The men should stand facing each other at one end of the pile to be turned, one working left handed and the other right handed. The shovels should be pushed along the platform under the sand, brought up and turned completely over, depositing the shovelful, with a drawing motion, about 2 feet beyond the edge of the original pile. This operation should be continued until the entire pile has been turned. The men should then work backward in the same way, so that when the second turning is completed the pile will lie in its original position with the sand and cement well mixed.

**Fourth.**—While the sand and cement are being mixed three other men should be filling six wheelbarrows with gravel or crushed stone, and as soon as the second turning is completed the six wheelbarrows of gravel should be dumped and spread out on top of the cement and sand, and the mass partly wet down with water, either from buckets or a hose.

**Fifth.**—As soon as the pile has been wet sufficiently four men, two at each end of the pile, should commence turning the mass with shovels, in the same manner as described above, each pair of men working toward the center of the pile, and forming a new pile just back of them. When the pile has been turned once there will thus be two piles with a space of about 3 or 4 feet between. The men should then reverse the operation, working on the inner edge of the two piles and throwing the mixture to the center of the platform, so that when the second turning is completed the material will again be in one pile and in about its original position.

The material should be again turned, this time by two men working on one end of the batch, and as soon as they are well started the other two men should be wheeling the concrete to the trenches or forms and putting it in place. While the batch is being turned the first and second times a fifth man should hold a hose or watering pot and sprinkle on water as it is needed to give a uniform consistency.

The amount of water required will be found to vary with different batches, owing to the different degrees of dryness of the sand and aggregates, so that it is customary to regulate it by the appearance of the concrete as it is being turned. There should never be enough water added at a time to wash out the cement. When gravel containing sand is used without screening, the entire nine barrows of gravel should be spread on the platform, the cement on top, and then wet and turned at least four times and preferably five times.

Mixing concrete properly is hard work, and also requires some skill, but it is of the utmost importance that it be done thoroughly. Concrete turned less than three times after it has been wet cannot be considered as well mixed.

*Caution.*—The cement should not be spread on the sand until ready to mix the batch, as even apparently dry sand contains enough moisture to cause the cement to harden and set.

### Consistency of the Concrete.

The proper consistency of the concrete, *i. e.*, whether it is wet, dry or medium, will depend very largely upon the character of the work in which it is to be used.

Thus for footings and plain walls of concrete a medium mixture that can be well tamped is desirable, while for reinforced concrete work of all kinds a wet mixture should be used. A dry mixture should be avoided when possible.

**Depositing the Concrete.**—For small jobs, and where the concrete has a thickness of 12 inches or more, the most economical way of depositing the mixture is to wheel it to its intended place in wheelbarrows and dump directly into the trench or forms. Considerable care must be exercised in handling dry concrete to prevent the stones from separating from the mortar, but with a medium or wet mixture there will be little trouble in this respect. If the concrete is to be used in thin walls or partitions it should be placed by shovels or trowels, the concrete being taken from a barrow placed where it can be easily reached.

* The actual contents of a cement bag is more nearly 0.95 cubic foot, although if turned into a box 12 inches square and 12 inches deep it will more than fill it unless packed solid.

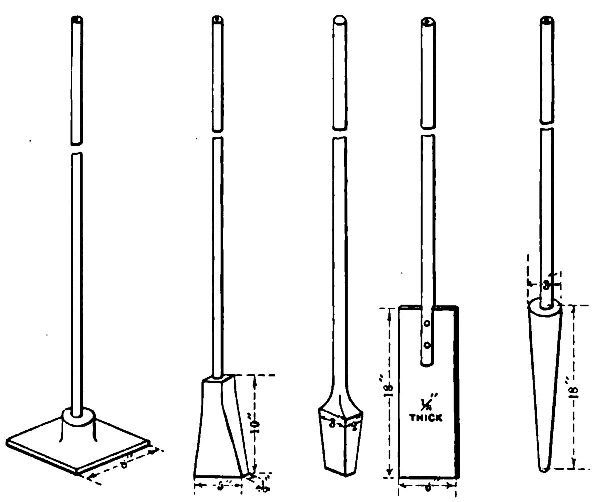
For filling deep trenches the concrete should be quite wet or quaking so that it will require no tamping; wet concrete also holds together better when falling a considerable distance.

**Tamping or Puddling.**

All concrete should be either tamped or puddled whenever practical. For dry and medium mixtures thorough tamping is a necessity to obtain a solid mass, and even with very wet mixtures pockets or voids may occur unless the mass is puddled. A mixture which does not quake in the wheelbarrow should be deposited in layers not over 6 inches thick, and thoroughly tamped or rammed with an iron rammer, such as shown by Fig. 1. Against the forms a rammer such as is shown by Fig. 2 is more satisfactory.

A quaking mixture may be deposited in layers 10 to 12 inches thick, and should be puddled with a square pointed spade or a rammer like that shown by Fig. 2. A rammer such as is shown by Fig. 3, made from a piece of 2 x 3 scantling, is very effective for many kinds of work, the rammer being shoved through the entire thickness of the mass.

For exposed walls built in forms the concrete next the form should be puddled by thrusting a square pointed spade or a thin tool like a sidewalk scraper down next to the mold, as the concrete is placed, working it up and down, and at the same time pushing back the larger stones or pebbles so that the thinner mortar may run in and form a smooth and fairly uniform surface. Care must be taken, however, not to pry on the concrete so as to spring the molds. Figs. 4 and 5 show the tools used for puddling the concrete in the factory buildings of the United Shoe Machinery Company at Beverly, Mass., the largest group of buildings yet built in this country of reinforced concrete.




Figs. 1 to 5, Inclusive.—Types of Rammers and Puddlers for Concrete.

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The concrete was mixed quite wet and deposited in layers about 12 inches thick, and the tools were made so that they could penetrate 16 inches without covering the head.

**Requisite Dimensions for Concrete Walls and Footings.**

The requisite thickness of concrete walls naturally depends in a great measure upon the quality of the concrete, whether or not it is reinforced, and the purpose for which the wall is to be used. Messrs. Taylor and Thompson state that "A single concrete wall 4 inches thick with its base spread to provide a footing is at least equivalent to an 8-inch brick wall, and a 6-inch concrete wall is at least equivalent to 12 inches of brick." *

They recommend, however, that all walls 6 inches thick and under be reinforced with small rods, about ¼ inch in diameter, placed from 18 inches to 2 feet apart, not only to increase their permanent strength but to guard against accidents during or immediately after construction.

The writer's experiences with cement walls lead him to believe that the foregoing statement regarding the comparative thickness of concrete and brick walls has not been overestimated, as far as the strength and stiffness is concerned, but it is often necessary to make walls thicker than absolutely required for strength. A 4-inch wall of ordinary concrete is likely to be penetrated by moisture in a severe rainstorm, and it has little stability to withstand a thrust unless reinforced by piers or buttresses.

For cellar and foundation walls, therefore, the writer would not recommend a less thickness than 8 inches except for very small buildings. Interior partitions supporting floors may be 6 inches thick, and partitions which support no weight may be made as thin as 3 inches.

In Fig. 6 is shown a section through the cellar wall of a two-story frame building which is well adapted to clay soils in Northern latitudes. In all soils which "heave" under the action of frost it is very desirable to "batter" the outer face of the wall, so that as the ground works up it comes away from the wall.

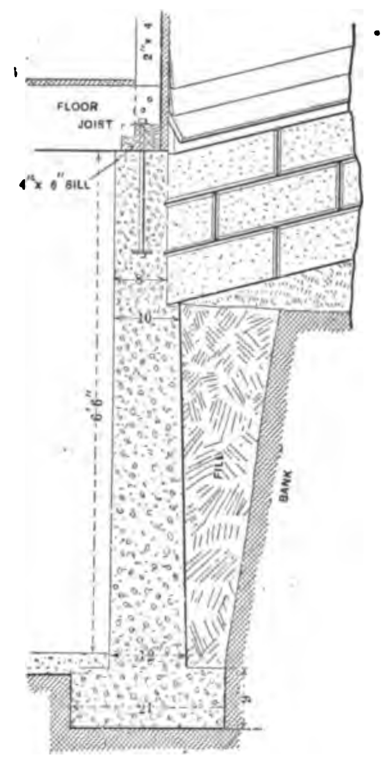



Fig. 6.—Concrete Cellar Wall for Two and Three Story Frame Buildings.

In dry soils and soils not affected by frost the wall may as well be plumb on the outside and of a uniform thickness of 8 inches.

(*To be continued.*)

## Natatorium for Seattle.

Plans have just been completed for the natatorium which will be constructed this winter by the Alki Point Transportation Company in the outskirts of Seattle. The building is designed exclusively on Oriental lines, with Japanese colorings and trimmings. The building will contain a swimming pool 240 feet long and 52 feet wide. The entire building will be surrounded by two decks of wide verandas, part of which will be inclosed in glass for the benefit of winter visitors. A roofed wharf, also of Japanese design, will extend from the building. This will be provided with a float and stairway leading to the water level at all tides. Aside from the large swimming pool there will be 12 private bathrooms, besides hot water baths and Turkish baths. A large garage conforming to the design of the main building will be constructed near the latter.

* "Concrete, Plain and Reinforced," page 463.

# PERSPECTIVE DRAWING FOR THE BUILDER.—III.

BY M. M. SLOAN.

BEFORE proceeding with the outline of the roof it would be well to consider the detail of the window openings. Fig. 11 shows a detail of the second-story double window on the front of the building. In looking at the corner of a building one will always notice that the rebates on the far side of the window are visible, while those on the near side are hidden, the only line there visible being the edge of the jamb. To determine the detail of the window the several points in the plan are projected to the picture plane, as shown by 1, 2, 3, 4, 5 and 6. The corner of the building is represented in the figure by the line C C, and if the several points on the picture plane are projected vertically into the perspective and the hights of the window sill, depth of the lintel and the hight of the window are laid off on C C, as represented respectively by *a b*, *c d* and *b c*, then the length of the lines 1 1, 3 3, 4 4 and 6 6 in the perspective are obtained.

This figure shows on a larger scale the method employed for obtaining the outlines of the roof, and particularly the projection of the eaves beyond the walls of the building. The outline of the wall edges marked Q O, O J and J M are obtained by dropping a line from point C of the plan and locating thereon the desired point O. From O the left hand edge of the wall is determined by drawing a line O Q to the left hand vanishing point already drawn in Fig. 10. The point J is found by drawing a line from F through the picture plane to the point of sight and projecting, H, thus located on the picture plane, vertically downward. The line S J is drawn from S at the true hight of the gable to the right hand vanishing point intersecting the line from H and locating the point J. The edge J M is readily found by determining the corresponding point to O at the right hand corner of the gable. Through the point J an indefinite line may now be drawn

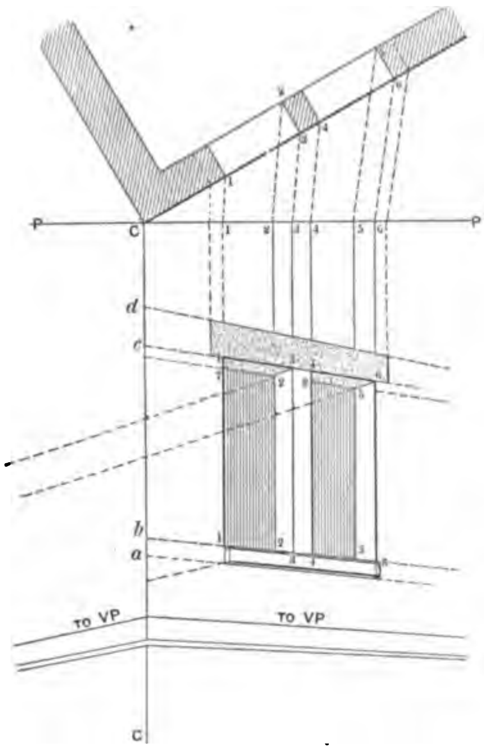



Fig. 11.—Perspective of Windows of Fig. 10 Shown in Detail.

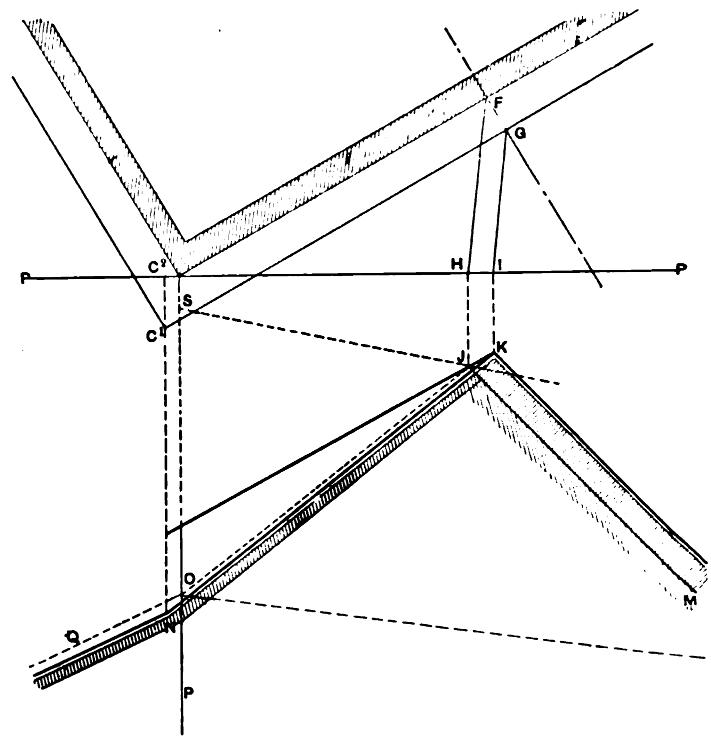



Fig. 12.—Method in Detail of Obtaining Roof Shown in Fig. 10.

*Perspective Drawing for the Builder.*

The vertical lines 2 2 and 5 5 have likewise been drawn, but their lengths are not fixed until lines are first drawn from 3 and 6 to the left hand vanishing point. Where these oblique lines intersect the vertical lines 2 2 and 5 5 another line may be drawn from the right hand vanishing point, as designated by 2 7 and 5 8. When these lines are heavily drawn the respective shapes of the window, soffit and jamb have been obtained. A line may then be drawn from *d* to the right hand vanishing point and the length of the lintel projected from points on the picture plane, as shown. The sill of the window, as it is considerably above the eye and projects about 1½ inches from the wall, shows a projecting end and under surface, which may be found as descried for the soffit and jamb. The detail of the band courses may also be described by the method explained. All of this work is of course to be transacted in connection with Fig. 10, the reason for using a separate figure being to make the explanation more satisfactory. When the door and window openings have been laid out in the perspective and the jambs and soffits properly represented the attention may be directed to drawing in the outline of the roof and eaves.

The several points in connection with this portion of the work will be made more clear by reference to Fig. 12. from the left hand vanishing point and K obtained thereon by dropping a line from the point I, which is found on the picture plane in the usual manner from G of the plan. The line K N, which represents the outside edge of the eave to the left of the center line and which is practically parallel with J O, may be drawn indefinitely and the point N located thereon in the following manner. From the plan it is noticed that the point $C^1$, which is the extreme corner of the overhanging roof, is not back of the picture plane, but in front of it. It is quite evident therefore that before the point can be projected to the perspective it must be obtained on the picture plane; therefore a line is drawn from the point of sight through the point $C^1$ and the point $C^2$ thus found on the picture plane. This point is then projected vertically to intersect the indefinite line K N previously drawn locating the point N. Next draw N R to the left hand vanishing point. By following out this method Fig. 10 may be completed in all its details and finished by rendering in pen and ink or water color.

In the method of perspective drawing illustrated in Fig. 10 the view of the building was taken with its sides at unequal angles with the picture plane, and the point of sight was in a perpendicular from *c'*, the point of contact with the picture plane. In the method now about to be described the point of sight is not taken on such a perpendicular, and as more of one side than of the other is desired, it is moved accordingly; the angle which the two sides of the plan shown in Fig. 13 make with the picture plane P P is 45 degrees. There is a great advantage in this method in that the vanishing points marked V[3] and V[4] are obtained by drawing lines from the point of sight S at 45 degrees, intersecting the picture plane at V[1] and V[2], from which they are dropped into the horizon line, as shown. It will also be shown as the explanation proceeds that by using this method a plan in perspective may readily be obtained by reason of which it is not necessary to use the plan above as before, and the operation is thereby much simplified. The plan above is in this instance, drawn to illustrate the position of the building and to show that the results obtained by both methods are the same. The elevations of the building to be drawn are shown at the left in the figure, being for convenience drawn to a scale equal to one-half that employed in the perspective. The arrangement of the porch and front entrance is peculiar and is clearly illustrated in the plan. In the beginning it is required to first locate the ground line marked G G. The point of sight is usually assumed to be 5 feet 6 inches above this line, at which distance the horizon line H H is drawn, as shown.

In the previous problem it was shown that all vertical hights could be measured on any line that was contained in the picture plane. The only measuring line, therefore, available in that instance was the corner of the building, which corner was in the perpendicular drawn from the point of sight. In this case, however, though the corner of the building is still contained in the picture plane, the point of sight S does not lie in a perpendicular from the corner of the building. It is evident, therefore, that $S_1$ S is not a measuring line, but

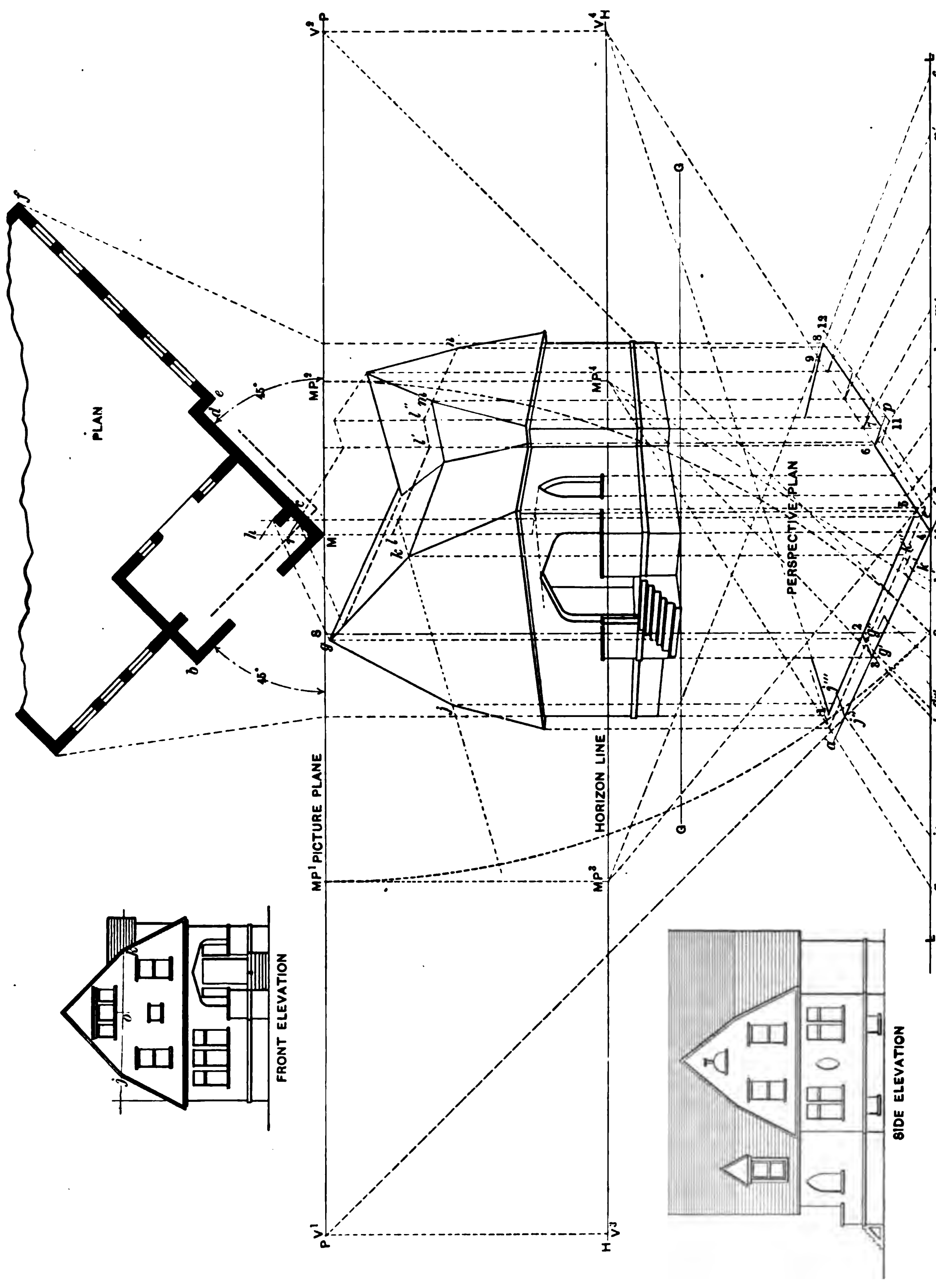



Fig. 13.—Perspective Drawing According to "Plan in Perspective" Method.

*Perspective Drawing for the Builder.*

that the true measuring line must be at M M, drawn through the corner of the building.

Before proceeding further it will be necessary to lay off the perspective plan as shown at the bottom of the figure by the heavy solid lines, which is constructed by means of the points M $P^3$ and M $P^4$ on the horizon line. These points, called measuring points, are found by revolving the line $V^1$ S about the point $V^1$, and the line $V^2$ S about the point $V^2$, till they intersect the picture plane P P at M $P^2$ and M $P^1$. These points are then projected perpendicularly to the horizon line, as shown at M $P^4$ and M $P^3$.

In laying out the perspective plan all measurements are made to scale, first upon a horizontal line, L L, drawn through S. The measurements for the different lengths and openings on the left side or front of the building are made from the point M on L L toward the left, while the measurements for the right side of the building are made to the right of M on L L, the point M representing the corner of the building in the perspective plan. It must be understood that the distances set off to the right and left of M represent horizontal measurements in the two vertical planes only which meet at M, the measurements being transferred to their respective positions on these planes by being carried toward the points M $P^3$ and M $P^4$. Measurements for portions of the building lying back or forward of these planes must first be found on these planes and then carried back or forward as the case may be, in perspective, to their proper positions in the plan. From M lines are drawn indefinitely toward $V^3$ and $V^4$, representing respectively the front of porch and side of the house. To obtain the position of the corner 3, in the perspective plan, lay off from the point M on the line L L the distance M *b*, equal to the length of the projecting porch or the distance M *b* of the plan above. From the point *b* then extend a line toward the point M $P^4$, cutting the line from M as shown at 3. The extreme left hand corner of the building is determined first by drawing indefinitely from 3, already found, a line, 3 2, toward the right hand vanishing point $V^4$. The intersection 2 is found by first laying off to the right on L L the distance M *c*, equal to the projection of the porch, or M *c* in the plan, and projecting a line from the point *c* toward M $P^3$, intersecting the line drawn from M toward $V^4$ at 5, and then drawing a line from 5 to the left hand vanishing point, intersecting the line from 3 and locating the corner 2. The full width of the front may now be set off on L L, as shown by M *a*, and a line drawn toward M $P^4$ to intersected with M 3 extended, as shown at *a'*. A line from *a'* drawn toward $V^4$ to intersect the line 5 2 extended will locate the corner 1 of the building. To locate the point 6 the distance M *d* is laid off on L L equal to the distance M *d* of the plan. A line drawn from *d* toward M $P^3$, intersecting the indefinite line previously drawn from M, will then give the point 6. The projection of the side of the building shown in the perspective plan by the line 6 7 is obtained by laying off the distance M *e* on L L equal to the projection *d e* of the plan. Then from the point *e* a line is drawn from M $P^4$ to intersect 3 M extended at *e'*, and when a line from *e'* is intersected by an indefinite line drawn from V $P^3$ through 6 the point 7 is obtained. The point 8, which is the extreme corner of the projecting portion of the side, is found in a similar way, by laying off from *d* the distance *d f* equal to *e f* in the plan, and by carrying a line to the measuring point M $P^3$, intersecting the line 4-6 extended, thus locating the intersection 9. The point 8 is then found by drawing through 9 a line from $V^3$ to intersect the line from 7 drawn toward $V^4$.

All the corners now obtained in the plan may be projected upward to the perspective, as shown by the dotted lines. In a manner similar to that just described, all of the details, such as the window openings, the arch over the door and the opening through the parapet wall to the steps, may be found by setting off their respective dimensions at the proper distance from the point M along the line L L and then carrying them toward their proper measuring points to intersect the front or side of the building, as the case may be. Care must be exercised to observe that the points on the line L L are not projected upward, but that the points to be projected are obtained at the intersections of the lines drawn to the measuring points with the lines of the perspective plan.

The application of the foregoing principles to the finding of the roof lines of the building will now be described.

The point *g* may readily be located by first laying off from the ground line G G on the line M M in the picture plane a measurement equal to the hight of the peak of the gable at the front of the building, as shown by the point *h*. From *h* a line is drawn, first toward $V^4$ to intersect a perpendicular from *e* of the plan, which represents the crossing of the plane of the front gable with that of the side M 6, then toward $V^3$ indefinitely. Upon this line the point *g* may be found by first finding the center of the plane, represented by M *a'*, at *g'* and carrying it back to the plane of the gable at *g''*. Preceding this, the distance M *g'''* is laid off on the line L L, equal to one-half the width of the front of the building, and from *g'''* a line is drawn toward the measuring point M $P^4$ and the point *g'* thus found. To locate the points *j* and *k* in the perspective the distances *j o* and *o k* of the front elevation are laid off each way from *g'''* on the line L L, as shown by *j'* and *k'*. These points are then carried first toward M $P^4$ to cut M *a'*, then toward $V^4$ to the line from *e* as shown at *j'''* and *k'''*, thence vertically into the perspective. The hight of the points *j* and *k* is set off by scale on the vertical measuring line M M, as shown at *l*, and a line is carried first toward $V^4$ to intersect the perpendicular from *e* of the plan, thence toward $V^3$ to intersect the perpendiculars previously drawn, as shown at *j* and *k* of the perspective. The corresponding points *m* and *n* of the side gable, which, as shown by the side elevation, are at the same hight, are also obtained from point *l* on the measuring line, by carrying from it a line, first toward $V^4$ to *l'* erected from point 6 of the plan, thence from $V^3$ to intersect at *l''* with a line erected at point *p* of the plan, which represents the intersection of the face 6 7 extended with the plane of the side gable. The positions of the points *m* and *n* in the plan are found in a manner similar to that employed in finding *j* and *k*. Their distances from point M of the plan are taken from the side elevation and set off, as shown at *m'* and *n'*. They are then carried toward M $P^3$ to line 6 9, thence from $V^3$ to line 11 12, all as shown. The hight of the side gable is set off at *r*, and the method of transferring it to its place, also the intersection of the side roof with the main roof, are so clearly indicated by dotted lines as to require no further explanation.

In drawing the perspective just described it must be observed that the plan above was not required, except, of course, to obtain any necessary measurement from which could have been taken a working drawing. All measurements from the elevations could also have been taken from the working drawings of the building, so that for the actual construction of the sketch neither the elevations nor the plans need to be included in the work.

(*To be continued.*)

## Tin Roofs for Country Homes.

Of all the outer walls of a house which make what has been called its shell the roof is the most important. To-day walls are built only strong enough to resist heat and cold and to support the roof. They do not need in these peaceful, civilized times to be built to withstand attack. But the roof still needs to be built to withstand the steady and persistent attacks of weather. Mere thickness and strength are not enough for a roof. In fact, they are unnecessary. The particular material with which the roof is covered and the invulnerability of that material to weather, which means heat, cold, dampness, dryness, wind and other manifestations of the elements, are the important and vital things. A great many materials are used for roofing and a great many motives enter into the selection of these materials. William Sherwood in *Country Life in America* believes that tin makes the best roofing material that can be obtained, provided the tin is the best of its kind, and his interesting article substantially in full is as follows:

The two objects the builder or house owner has which are against the use of tin are: First, false economy, and, second, the æsthetic consideration. It is true that tin is not so beautiful as many materials, as, for instance, time-stained shingles reduced to a soft, pearly gray by the action of the weather; red tiles, which add brilliant and beautiful coloring, or slate, which is so picturesque; but the first object of the house is to be lived in, and comfort and utility should never be sacrificed to effect, however good that effect may be. The first purpose of a roof is not to furnish an attractive picture, but to protect the house. A leaky roof, no matter how artistic, can never be anything but annoyance and a source of loss.

**The Old Process in Tin Plate Manufacture.**

When tin was first used for roofing purposes, its manufacture being commenced about 70 years ago in Cornwall, it was the custom to make a strong, durable sheet of black plate, as it was called, and dip that sheet into a mixture containing a large percentage of tin. The sheet was alternately dipped into a flux of palm oil and then into a kettle of tin until a thick coating was secured. The purpose of the palm oil flux was to cause the tin to adhere readily to the black plate and afterward to the successive coats of tin. This was a slow and expensive process, but in those days of honest workmanship it was the only process known, and therefore the only process used. The result was a tin plate so durable that buildings are still roofed with the same tin purchased 70 years ago, which tin has outlasted all the severity of our climate.

As the use of tin for a roofing material increased one tendency of manufacturers has been to cheapen it. By careful experimenting they have found out the smallest quantity of tin which can be used to give a tin color to black plate. They have found out how to cheapen the black plate itself. Instead of dipping the black plate into the tin mixture and allowing it to adhere it is dipped in and then squeezed off between rollers, so that only a very thin coating of tin remains. Instead of the more expensive palm oil flux an acid flux is used, which, while answering the purpose of a flux, injures the quality of the tin plate. Finally, a different proportion of tin in the tin mixture is used, which produces an inferior quality of tin coating upon the black plate. To-day, as in the past, the most durable roofing tin, in my opinion, is one made by the hand dipped process—slow, painstaking and careful, but producing a tin of real merit and one which makes tin the most desirable roofing material.

**Care Needed in Selecting the Roofing Tin.**

There are two things that work against a man securing as good a tin roof as he wants and ought to have. First, the architect in writing his specifications often allows a certain latitude in the quality of tin to be used. The architect as a rule is fully posted on the different qualities of tin. Every conscientious architect desires to have the best material possible to use in the house. Most architects specify the kind of tin which will produce a permanent and lasting roof, but they allow a leeway in their specifications for the substitutions of other tins, which, while they are claimed to be as good as the specified tin, are not. The builder takes the contract at a certain price. Possibly he has had to figure quite closely to get it. He realizes that the particular brand of tin specified by name is expensive, and he also realizes that the architect's specifications allow him a certain choice in the tin. He substitutes a tin which he often conscientiously believes is as good as the tin specified, which makes quite a little saving in the cost of the roof. Such saving is a very serious matter to the owner of the house. It may make all the difference between a livable and comfortable house and one which is a constant source of annoyance and expense. Whether a man is building a house to live in or whether he is building it to sell its value is affected by a defective roof.

# Comparative Cost of Wood and Steel Frame Factory Buildings

BY H. G. TYRRELL.

THE following estimates give the comparative costs of a factory building framed in slow burning wood construction and also in steel fire proof construction. The building is 60 x 100 feet, and six stories high, containing six floors and a roof. The floors are designed to carry an imposed load of 100 pounds per square foot. The building has windows on all four sides, and the walls in all cases carry the ends of the floor beams. The thickness of walls in the basement is 24 inches, in the first four stories it is 17 inches, and in the remaining two stories it is 13 inches thick. The estimates given below are for the structural parts of the building only, including walls, columns, floors, roof, excavation, doors and windows, and foundations, but do not include any partitions, stairs, plumbing, elevator, heating, wiring or lighting.

The framing of the slow burning design is as follows: Eight tiers of columns spaced 20 feet apart in both directions carry the floors and roof. From the roof down through four stories the columns are of yellow pine. In the lowest of these stories the size of column used is 14 x 14. Below this, where a greater size would be required than can be secured economically, round cast iron columns have been used, 11 x 1¼ in the first story and 12 x 1¼ in the basement. All the columns have cast iron bases, 3 feet square and 16 inches high. Lengthwise through the building in the floors run two lines of 12 x 20 yellow pine, which rest on the brackets of the cast iron column caps. The cross floor beams are 8 x 16 yellow pine, spaced 5 feet apart. At the columns they rest on column caps, and at intermediate points they hang from the 12 x 20 header beams, by means of wrought iron stirrups. In the walls the cross floor beams rest on cast iron wall plates, 9 x 20 x ¾. The floor is made of ⅞-inch maple, laid on 1¾ yellow pine. The roof is similar in construction, and has a tar and gravel covering.

The quantities of material in the building, as outlined above, are as follows:

| | |
|---|---|
| Excavation, yards | 1,800 |
| Cellar cement floor, square feet | 6,000 |
| Foundation concrete, cubic yards | 150 |
| Brick, cubic feet | 39,000 |
| Windows, 4 x 7 | 238 |
| Roofing, square feet | 6,000 |
| Yellow pine lumber, feet, B. M. | 116,000 |
| Yellow pine flooring, feet, B. M. | 73,000 |
| ⅞ matched flooring, feet, B. M. | 46,000 |
| Iron work, tons | 46 |

The estimated cost of this design is $35,000, which is equivalent to 6.1 cents per cubic foot of the building, or 83 cents per square foot of the entire area of all the floors. The interior framing of floors and columns, including wall plates, columns, caps and bases, and stirrup irons, is 27 cents per square foot of floor area.

In the fire proof design the arrangement of beams and columns is similar to that for the slow burning design. Riveted steel columns are used from cellar to roof, and the floors are framed with steel beams. The flooring between the beams is reinforced concrete. In this case the quantities are as follows:

| | |
|---|---|
| Excavation, yards | 1,800 |
| Cellar floor, square feet | 6,000 |
| Foundation concrete, cubic yards | 150 |
| Brick, cubic feet | 39,000 |
| Windows, 4 x 7 | 238 |
| Roofing, square feet | 6,000 |
| Steel columns, tons | 105 |
| Steel beams and wall plates, tons | 252 |
| Concrete floors and roof, square feet | 42,000 |

The cost of the building in this case is $57,000, which corresponds to 10.2 cents per cubic foot of the building, or $1.36 per square foot of the entire floor area. Floors and columns cost 75 cents per square foot of floor area. Hence comparative estimates are as follows:

| | Cost per cubic foot of building. Cents. | Cost per square foot of floor area. Cents. | Cost per square foot floors and columns. Cents. | Total cost. |
|---|---|---|---|---|
| Slow burning construction | 6.2 | 83 | 27 | $35,000 |
| Fire proof steel construction | 10.2 | 136 | 75 | 57,000 |

# CORRESPONDENCE.

### Construction of Gambrel Roof Farm Barns.

*From* Frank M. Hamlin, *Lake Villa, Ill.*—Since my first acquaintance with *Carpentry and Building* I have been much interested in the matter contained within its covers, and especially in the Correspondence columns. During the comparatively short time I have been a subscriber I have noticed very little has been presented in regard to the construction of farm barns such as are used by the ordinary farmer. In this section of the country we have erected a large number of farm barns, and with the editor's permission I will endeavor to show by means of sketches our system of construction, some of which it may be stated is not altogether new, but is an improvement on the old way. The leading feature of this system is the construction of the roof. At present I will make no attempt to show the arrangement of the floors, but will deal only with the question of construction. In Fig. 1 is represented an elevation of one of the end bents, showing the location and arrangement of the different members of the framing. The frame is mortised and tenoned together, using 1-inch oak pins, with draw-bore to fasten the parts together. The outline of the roof is obtained in the following manner, the results giving a very satisfactory appearance to the roof. Draw a line from plate to plate even with the top and divide this line into 24 equal parts. Erect a center line, upon which and at a distance equal to one of the parts above the base line mark a point. With this point as a center and a radius equal to half the width of the building, less one part, describe a semi-circle as shown by the dotted lines in Fig. 1. Divide this semi-circle into 4 equal parts and mark the points which will define the angles of the roof—that is, the 3 upper angles, as naturally the plates are the lower points.

In Fig. 2 is shown the method of tying and bracing the side walls, using the wood brace and iron rod shown in detail in Fig. 5. Dotted lines show the manner of bracing the walls in the bents each side of the barn floor, as the beam shown would not be as objectionable here as it would be in the central bents, but, on the contrary, will act as a retainer for the hay in the mow.

An elevation of the side of the barn showing the spacing of the bents, the manner of the bracing, etc., is presented in Fig. 3. Reference to the details in Figs. 4 to 9, inclusive, will more fully explain the several members. In Fig. 3 the upper half of the rafters is not shown in order to economize space.

I trust that what I have had to say will prove of interest to some of the craft, and I also hope that others who have had experience in this line of work will tell about it in the columns of the paper, as by so doing they may afford valuable suggestions to others. I will be glad to answer any questions through the columns of the paper which may be put to me regarding barn construction, and will furnish a floor plan of a typical barn if such would seem to be required.

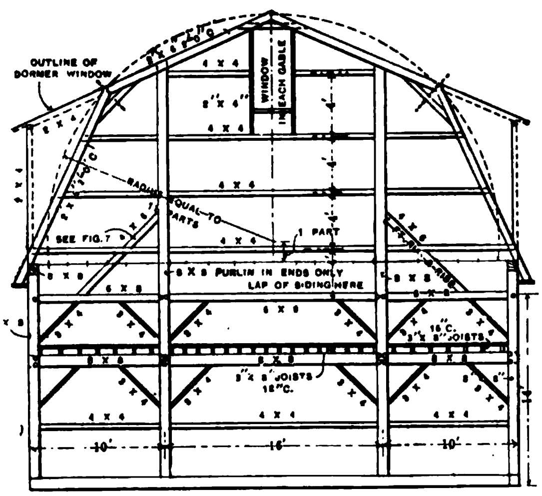



Fig. 1.—Elevation of End Bent.

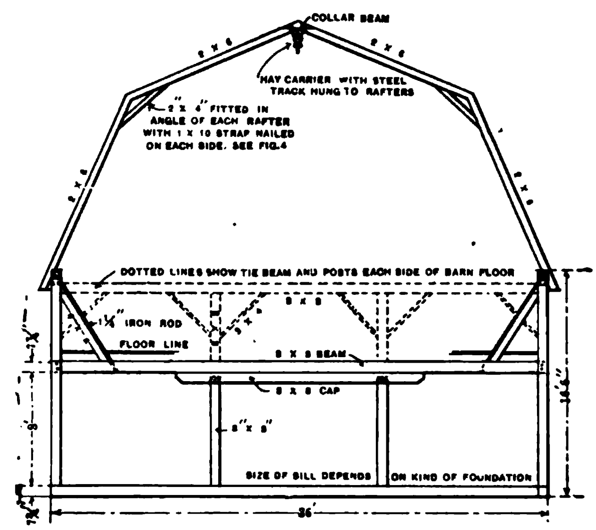



Fig. 2.—Bent Showing Method of Tying and Bracing the Side Walls.

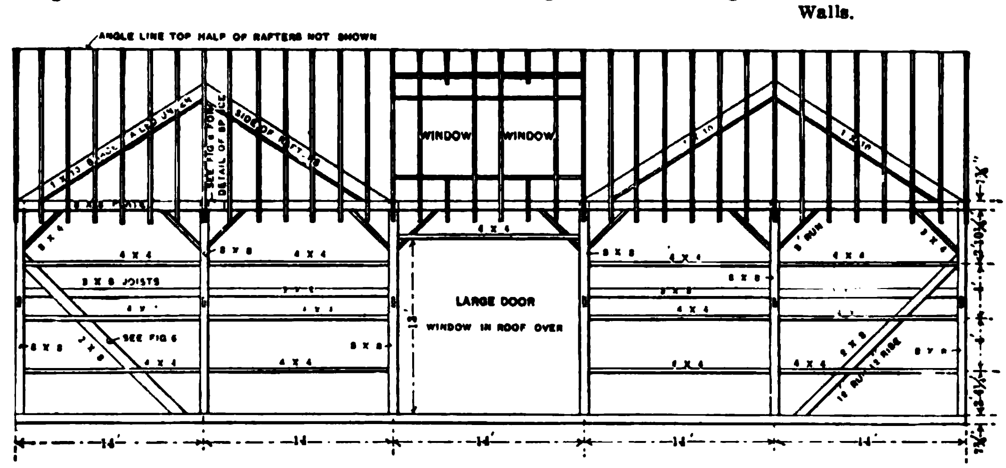



Fig. 3.—Side Elevation, Showing Position of Bents.

*Construction of Gambrel Roof Farm Barns.*

### Renewing the Life of Files.

*From* C. T. S., *Lafayette, Ind.*—Some years ago I saw in a scientific publication reference to a process for renewing the life of files by submitting them to an acid bath. I have forgotten the acid used and have also lost the article mentioned; therefore come to the Letter Box for the desired information.

*Answer.*—To resharpen files by the acid process wash the files thoroughly with a scratch brush in a strong solution of sal soda (washing soda) in hot water to clear them of grease, dirt or metal that may stick between the teeth. Then wash in clean hot water to remove the soda and dip in a bath of one part nitric acid to four parts water contained in an earthen vessel. The glazed baking pans of a size to hold several files are very good for this purpose. Turn the files over constantly to allow the acid to act on all sides and the gas-bubbles to escape. The time of immersion must depend much on experience and the fineness of the cut; say from one minute for a fine cut to five or six minutes for the coarser cuts. If the very coarse cut files are found on examination not sufficiently sharp, redipping from two to three minutes will often improve their sharpness. With a little experience files of different grades may be sharpened at the same operation by giving attention to the time of immersion for each grade. Acid baths of less strength with longer immersion of the files may be used with a little experience. Thorough washing in hot water and drying is the final operation, but if the files are to be laid aside for future use they should be greased with vaseline while warm from the wash bath after drying. Some prefer to dry the files when required for immediate use by a dip in a strong hot soda or lime water bath. In conclusion, it may be stated that in mixing the acid with the water

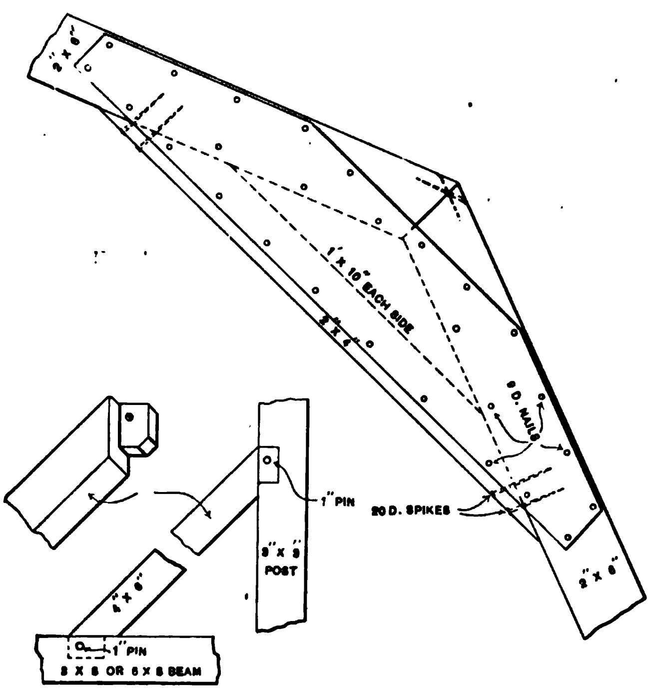



Fig. 7.

care should be taken to pour the acid very slowly into the water, as the heat action is very great.

### Converting a Warehouse Into an Opera House.

*From* AN APPRECIATIVE READER, *DuQuoin, Ill.*—For the past three years I have been an earnest reader and admirer of your paper. It has been a great source of instruction to me, and I only wish every young man in the craft like myself would avail himself of the advantages offered to learn many valuable pointers such as pertain to our trade. I have especially been pleased with the Correspondence columns when there was not too much of that "20 and 30 doors and 10 to 20 thousand shingles per day" business. I wish to ask of Mr. Kidder, through the Correspondence columns, the design and size of materials for a truss to be used on a building of 65 feet span. The building is at present a warehouse 65 feet square and has 13-inch brick walls well laid in mortar which contained a good percentage of cement. The building is to be converted into an opera house. We wish to remove the posts that at present support the roof and second floor and make a self-supporting truss roof from which will be suspended the ceiling. The latter is to be arched under the trusses as high as the structure of the truss will permit. We have thought of making the roof one-third pitch and covering it with tin or galvanized iron. The ceiling will be of stamped steel. The snow in this section of the country is very light, seldom having a fall of more than four or five inches. Now, what would be the proper design of truss to use, and could it be of build-up timbers? Would the pitch be too flat for safety on such a span? Would it be necessary to place pilasters in the walls under the truss seats? In short, if Mr. Kidder has time and inclination and there be space available in the columns of the Correspondence Department, I should like very much to see it built on paper.

### Measuring Plastering.

*From* C. H. L., *Warren, Minn.*—What is the proper way to figure lathing and plastering? In this section

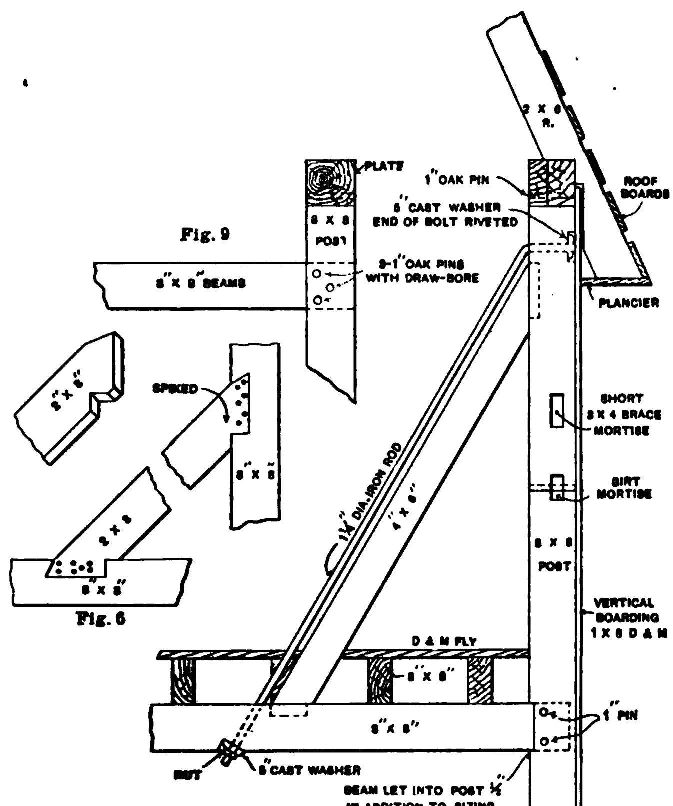



Fig. 9

Fig. 6

Fig. 5.

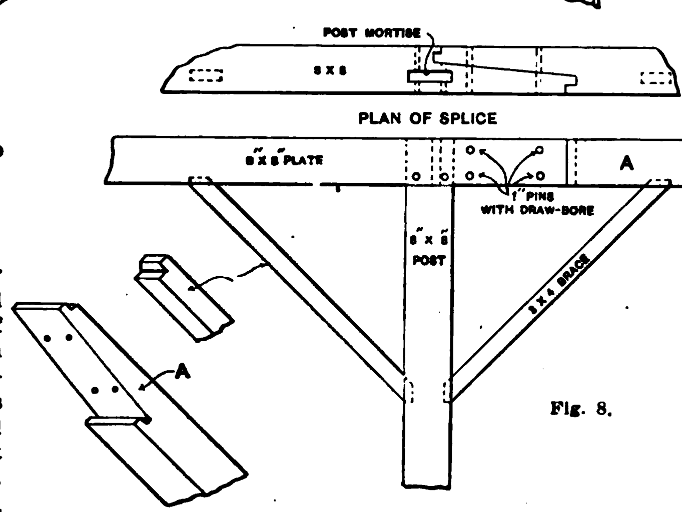



Fig. 8.

*Details of Construction of Gambrel Roof Farm Barns.*

lathers and plasterers like very much to figure the outside dimensions of a house, and I wish to know if this is allowable according to law, or is it the proper way to measure the inside of the room. It sometimes happens that a wall is nearly all covered with doors and windows, and very little lathing and plastering is done. Is it right to charge for the full wall?

*Note.*—With no desire to anticipate the many interesting letters which we feel our practical readers will contribute describing the practice which prevails in their section regarding the measuring of work of this character, we would state that it is usual to figure plastering by the square yard, more especially plain surfaces such as walls and ceilings. Regarding deductions for openings, custom varies in different parts of the country, some plasterers allowing one-half the area of openings for all doors and windows, while others make no allowance for openings less than 7 square yards. For work difficult to reach, such as closets, soffits of stairs, etc., the rate is usually higher than for plain walls and ceilings.

### Criticism Wanted of Trussed Beam Construction.

*From* HEE H. SEE, *Brockville, Can.*—I would very much like to have Mr. Kidder pass judgment upon the trussed beam shown in the accompanying sketches, and say if it will do what is required of it. The beam is to be used to support the roof of a locomotive engine house, or, I should say, a number of them will be used for this purpose—22 in all. There will be 11 rows of 2 trusses each, with the inner ends of the trusses supported on a 12 x 12-inch post, as shown in Fig. 3. Owing to the radiating tracks on the floor of the building it will not be possible to space the posts equal distances from the side walls, neither will it be possible for the same reason to space the trusses equal distances on centers. The greatest distance between centers of any two trusses will be 15 feet 6 inches, and the shortest distance 13 feet 9 inches. The greatest span of any truss will be 42 feet, and the shortest 38 feet.

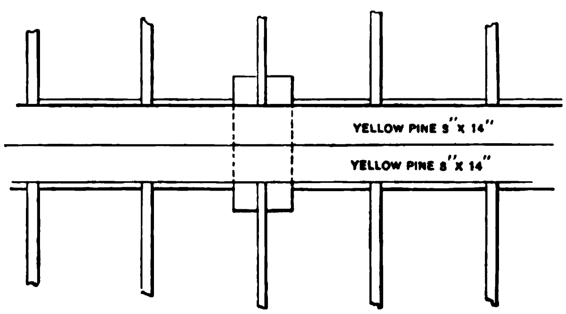


Fig. 1.—Plan.

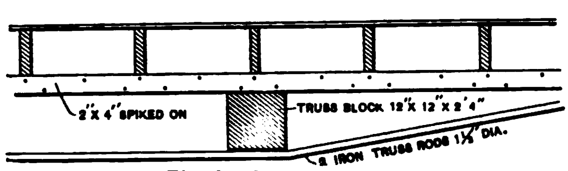


Fig. 2.—Side Elevation.

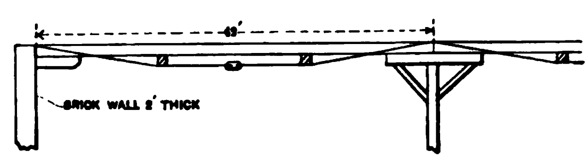


Fig. 3.—Side Elevation, Showing One Complete Truss.

*Criticism Wanted of Trussed Beam Construction.*

The truss will be composed of two pieces of Georgia pine, 8 x 14 inches, placed side by side and extending the full length of the span; these will be trussed with two iron rods 1⅜ inches in diameter. The rafters will be 2 x 10 inch white pine, spaced 2 feet on centers, and in order to stiffen the trusses as much as possible it is proposed to cut the rafters in between them with their lower edges resting on a 2 x 4 inch, which will be spiked to the trusses. In order to shorten the span as much as possible there will be a tie-beam or corbel, 10 feet long, on top of each post, and a 5-foot one at the wall, as shown in Fig. 3.

The roof will be ⅞-inch matched boards, covered with "Perfected Granite Roofing." The roof rises about ⅝ inch to the foot and there will be no ceiling. In Figs. 1 and 2 are shown plan and elevation of a portion of a truss near one of the truss blocks. Fig. 3 shows one truss complete, and its connection at the wall as well as at the post.

I am aware that there are better forms of trusses than the one shown, and that the same quantity of material could be used to better advantage in a different form, but there are special reasons for using this form if it is possible to do so.

*Answer.*—The sketches and letter of our correspondent were submitted to Mr. Kidder, who after giving the matter consideration makes reply as follows:

The construction shown is good, if the truss rods are dropped a sufficient distance below the girders. The trusses as shown would probably support the roof in the Summer when there is no snow load, but to make the roof perfectly safe for possible snow loads the truss rods should be dropped at least 20 inches below the bottom of the 8 x 14-inch beams—*i. e.*, the truss blocks should be 12 x 19½-inch, with a cast-iron plate, with grooves for the rods on the bottom. Without this plate the rods would crush into the blocks. If there is sufficient height it would be better to make the truss blocks 12 x 24-inch.

The method of computing the stresses, and the figuring of the strength of the belly-rod trusses is fully described in Chapter VII. of the Architects' and Builders' Pocket Book. The method of computing the stress in the rods was also explained in my reply to the communication of "S. C. P.," published on page 160 of the June number of *Carpentry and Building*.

### Suggestions for Heating a Lodgeroom.

*From* C. J., *Corbin, Ky.*—There is a building in this town in process of erection which it is desired to heat, the structure being 73 x 31 feet in plan, and has a lodgeroom across one end, taking up the greater portion of the building. This room is 50 feet long, and extends across the entire width of the building—31 feet. Next to this is an anteroom, 17 x 24 feet, and the rest of the building at that part is taken up by a hallway 7 x 17 feet. A stairway extends across the middle of one end, which is 8 feet wide, one corner of the building being used as an approach, and the other corner as a small room, 8 x 8 feet. There is no cellar under the building, and the heating apparatus must be placed on a level with the lodgeroom floor. While this may in some measure interfere with designing a warm air heating system, still a decided preference is had for this method of heating, and, if possible, I would like to have information on the subject.

*Answer.*—While furnace systems of this character are not frequently met with in actual practice, still there are systems of heating by hot air with a furnace placed on the same level as the rooms to be heated. In a certain case of this kind, which might be mentioned, a furnace having two pipes was used to heat a store 30 x 45 feet in plan, with a ceiling 14 feet high. The store was one large room, with an office partitioned off on one side, which necessitated the using of a pipe to heat the office. This pipe discharged about 8 feet above the floor, and a positive return system was used, being effected by means of a register placed in the further end of the office, returning the cool air under the floor. To heat the rest of the store a 12-inch pipe was carried upward to a height of about 10 feet, and there discharged horizontally immediately underneath an inverted tin trough, which had a cross section of a half circle. The trough was supported in the direction of the air delivery and prevented the further rise of the air, but allowed it as it cooled to drop gradually to the floor. This system worked satisfactorily. A similar one was a more comprehensive installation and heated a large store, 26 x 50 x 10 feet, and a small store, 13 x 26 x 10, with a 12 x 13 addition. Some parts of the larger store were 45 feet from the furnace, but this plant worked satisfactorily, it is stated, notwithstanding that in addition to the two stores heated 12 rooms in the upper part of the house were sufficiently warm in zero weather. It would therefore, seem perfectly feasible to install such a system in the present case. A heater placed in the anteroom, close to the lodgeroom, would in all probability force a sufficient amount of warm air to the farther end of this room to heat it under all ordinary conditions, especially as the building is in the moderately temperate region of Kentucky. Other pipes can be taken to the other rooms, but probably none will be needed for the anteroom. A point on which special stress should be laid is the necessity of providing return flues of sufficient size so as to return to the heater the cooled air. Undoubtedly, many of our readers who have done similar work can furnish valuable information to assist in solving this problem, and we should be pleased to have them contribute from their own experience.

### Finding Bevels of Hoppers.

*From* R. E. B., *Clarksville, Tenn.*—I have been very much interested in the series of articles by George W. Kittredge on "Bevels Used In Carpentry." I have made all the drawings and carefully followed the instructions, gaining therefrom much valuable assistance. However, in going over the instructions I encountered some knots which I have been unable to untangle. I recently had occasion to construct a hopper, which I did successfully under instructions gained from these articles, but I would like to ask the author to be a little clearer on obtaining the bevel on the edge of the plank for hopper when the edge is square with the face and not horizontal, as shown in the stand illustration in the March issue.

I enclose diagram, Fig. 1, and demonstration by Robert Riddell for getting these bevels, but I cannot understand that part which refers to the bevel across the edge. He gives no reasons "why." This is discouraging to one who desires to be something more than a mere machine. His demonstration is as follows:

"Draw two parallel lines any distance apart, as A-B and C-D. Assume 2-A as the given flare and from A square down, cutting C-D in C. Taking 2 as center and 2-A as radius strike an arc, cutting a perpendicular from 2 in F. Join C-F. This gives the bevel P for the direction of the cut across the face. To find the bevel for the miter on the edge take 2 as center and strike an arc, touching A-B and cutting C-D at D. Join D-F. This gives the bevel R for the miter on the edge of the plank, which should be square with the side."

*Answer*.—The letter of our correspondent was referred to Mr. Kittredge, the author of the articles in question, and he comments as follows:

I wish to say in reply to "R. E. B." that in the series of articles mentioned I tried to tell the story as concisely as possible and still make everything clear, but it appears I have been a little too brief. That portion of the description which refers to the construction of a hopper in which the edges are square with the sides is contained in the latter part of the third paragraph in the first column of the article in the March issue, beginning, "Should it be desirable," etc., and explains the development of the cross-piece Y. This piece has its upper and lower surfaces square with the sides of the stand, as shown at G in the sectional view, and its development is shown at the extreme top of Fig. 10. The lines in the elevation of Y are derived by horizontal projections from *t*, *r*, *s* and the fourth point, not designated by a letter, in the profile G'. The two lower lines of the elevation (those just below the letter Y) represent the surface corresponding to the edge of the plank in a hopper. Projections from the points *s* and the one next toward *r* are carried into the oblique plan above as shown by the dotted lines, giving the required bevel.

I would call the attention of "R. E. B." to the fact that the bevels there given apply only when one side is fitted against the other without being mitered, while the diagram given by Riddell is for a mitered joint. In the case of a mitered joint the bevel for the edge is most simply obtained as shown in Fig. 2, in which B-A-C represents a sectional view of one side of a hopper placed at the required slant, while the plan of one corner is shown directly above and duly projected therefrom. The development or normal view of the edge A-B is obtained by projections from the plan as shown at the left, in which *a*-*b* is first made equal to A-B. The slant of A-C has been made equal to that of A-2 of Fig. 1 for the sake of comparison, which shows that the angle at *e* is the same as that at R.

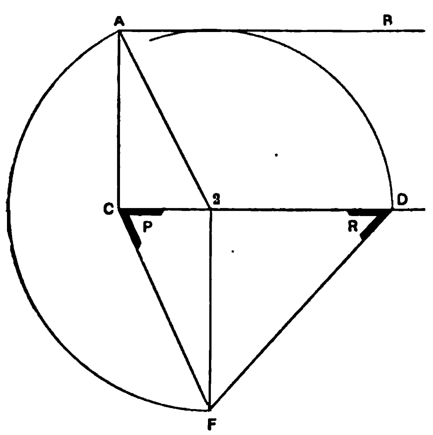


Fig. 1.—Diagram Given in Robert Riddell's Work for Finding the Bevels for a Hopper.

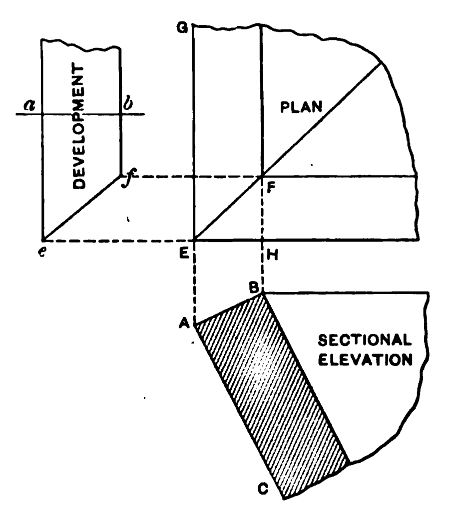


Fig. 2.—Method of Finding the Bevels for the Edge of Plank by Projection.

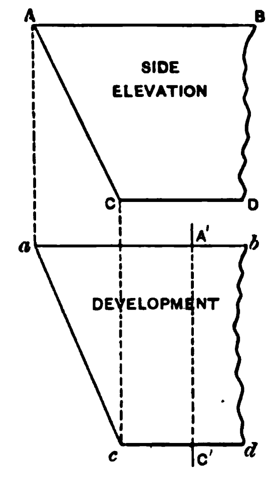


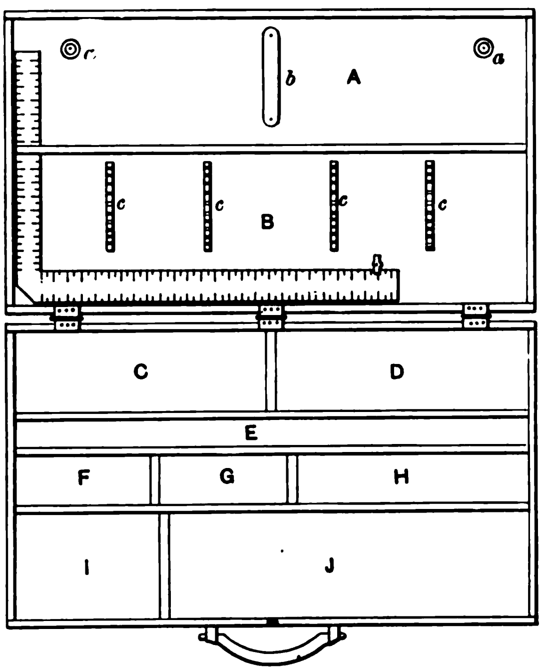
Fig. 3.—Side Bevels Obtained by Projection.

*Finding Bevels of Hoppers.*

The results obtained by Riddell's method are correct, but it is only by a somewhat circuitous course of reasoning that their accuracy can be made apparent. This is probably why the "whys" are not given. Briefly expressed, the reason why is as follows: First, the angle at *e* of Fig. 2 is one angle of a right-angled triangle, one leg of which is equal to A-B, the real thickness of the plank, while the other leg is equal to F-H, its apparent thickness in the plan. Had the line *a*-*b* been drawn in continuation of F-*f* this triangle would then have been indicated by *a*-*f*-*e*, the hypothenuse *e*-*f* remaining in that case the same as now shown. Second, this is exactly what has been done in Fig. 1, since 2-F of the right-angled triangle 2-D-F is equal to the real width (2-A), while 2-D, being equal to B-D, is the apparent width, thus giving a hypothenuse at the required angle. Inasmuch as this diagram was constructed primarily to obtain the bevel CF of the side, the reason just cited does not seem satisfactory until it is further stated that, since the edge of the plank is at right angles to the side, the relationship of parts will be exactly the same and the results therefore the same. This would, however, require another diagram to make the demonstration complete.

The great advantage of the methods of descriptive geometry or projection over other geometrical methods is that each part of the drawing, according to the methods of projection, represents some particular view which is either stated or is understood from its relation to the other views, as explained in the earlier chapters of the articles on bevels. While completed views may require the drawing of more lines on the paper than mere diagrams, certainty is thereby obtained and confusion avoided. The direction of the view at each part of a drawing being indicated, the pictorial effect thus produced greatly assists the imagination to grasp the situation. These operations result in the development of an entire surface in which all sides and angles are correctly given, not simply in an angle which must be turned this way or that, with a chance of error, before being applied to the work. According to the methods usually published for obtaining bevels for rafters, hoppers, wreath pieces for winding stair rails, etc., many of the lines drawn are common to two and sometimes more triangles or views, thus increasing the chance of error. For instance, in Fig. 1 B-A-2-D is really an elevation of a portion of one side of a hopper. If a line were drawn horizontal from F toward the right this line, with F-C and C-D, would constitute a development of the surface shown by B-A-2-D. The line 2-D is therefore the bottom line of the elevation and at the same time a part of the top line of the development or pattern of the side; while the line from F, previously supposed, is lacking, but would if drawn complete the shape of the side piece. The result sought in Riddell's diagram, with reference to the side bevels, would be accomplished by the well-known methods of mechanical drawing, as shown in Fig. 3, which deals with the side bevels in exactly the same manner that Fig. 2 deals with those of the top or edge of the plank.

Although somewhat late in the day it may not be out of place to direct attention to a few slight typographical errors which crept into my articles on "Bevels Used In Carpentry." On page 335 of the December issue, second column, lines 22 and 23 should be transposed; on page 337, first column, eighteenth line from the bottom, *a-o-n-a-f* should read *a* on *a-f* and in the sixth and seventh lines from the bottom K and K′ should read *k* and *k′*.




*Carpenter's Tool Box Like a Suit Case.—Fig. 1.—View of Box with Lid Thrown Back.—Scale, 1 Inch to the Foot.*

**Carpenter's Tool Box Like a Suit Case.**

*From* R. W. McD., *Uniontown, Pa.*—In the September number of the paper "W. H.," Cincinnati, Ohio, asks for details showing construction of a tool box on the order of a suit case, and in reply I enclose a couple of rough sketches which may be of assistance to him. Fig. 1 represents the box with the lid thrown back, the inside dimensions being, length 32 inches, width 18 inches, depth of box 5½ inches, and depth of lid 1½ inches. The space marked "A" in the lid is for saws. The knobs *a, a* pass through the handles, and the blades are kept in place by the rack *b*. The bit brace may also be put in this space if desired. The tongue of the steel square passes through the middle partition and is further supported by a triangular piece in the corner as well as by the catch at the lower end of the blade. The letters *c, c, c, c* represent loops of heavy duck or leather and are for auger bits and chisels. In the body of the box the spaces I and J are for planes, H for hammers and hatchets, G for oil stone, etc., F for bevels and try-square, E for level and C and D for miscellaneous tools as required by various jobs. An additional lid may be placed over the body of the box fitting over the divisions in such a manner as to prevent any shifting about of the tools.

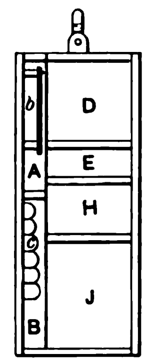



*Fig. 2.—Cross Section of the Box.—Scale, 1 Inch to the Foot.*

In Fig. 2 is represented a cross section of the box showing the construction of the saw rack and the loops for the chisels and bits. The drawings are to a scale of 1 inch to the foot. The box should be constructed of ½-inch stuff and the partitions may be lighter if desired. Of course "W. H." will have to use his own judgment as to the arrangement of the box, being governed, of course, by the tools he expects to carry about, but the above will be found a convenient general plan. If the box is liable to be subjected to hard usage small trunk irons may be fastened on the corners and additional catches set on top of the box near the ends.

**Knot for Tying Sash Cords.**

*From* C. D. K., *Lapps, Pa.*—In answer to "Old Reader," Evanston, Wyo., I enclose a sketch showing my method of tying a knot in sash cord. The knot is shown tied loosely in order to clearly indicate the manner in which it is made, but in actual practice the knot is of course tied down against the weight, thereby causing the latter to hang plumb and true.

*Knot for Tying Sash Cord.*

*From* T. K. W., *Lake Providence, La.*—In the September number of *Carpentry and Building* which has just arrived, the delay being due to the spell of yellow fever we have had for the last two months, necessitating a strict quarantine, "Hee H. See" of Brockville, Ont., gives his method for tying a sash cord, which certainly is new to me. If he could get hold of one of those "salty old barnacles" who have been sailors on Lake Ontario he could perhaps learn to tie a bowline knot, and after that I think he would never hang a sash weight on a granny's knot.

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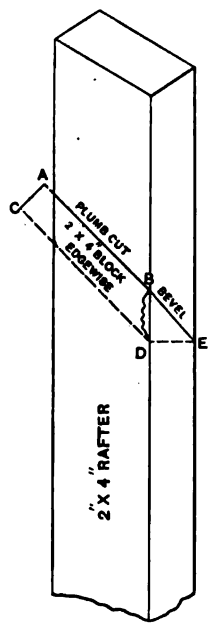
**Short Cut for Obtaining Bevels on Jack Rafters.**

*From* FRANK G. ODELL, *Lincoln, Neb.*—I am persuaded that much good gray matter is wasted among the craft in puzzling over lengthy academic discussions and geo-




*Short Cut for Obtaining Bevels on Jack Rafters.*

metrical problems designed to teach the proper method for obtaining pitches, cuts, bevels, &c., in roof framing. The trend of this scholarly discussion is apparent in the numerous patent squares, framing tools, &c., now on the market. Some time since I was telephoned to rush to a job in progress where "the gang" were having trouble with a simple four-gable and valley roof. Trouble was apparent on my arrival. Six men were on the scaffolding, four of whom were looking on, while the other two were separately and helplessly striving to get the length and bevel cut of a simple set of jacks set 16 inches on centers. The two master minds had been wrestling for over an hour with this problem, calling to their aid their favorite patent squares, each with a different table of figures and a different solution for this vexing question. Incidentally the other four were looking on, and the "boss" was paying the bill. It was an opportune time to arrive and an opportune time for an object lesson.

"Bill, put a 2 x 4—20 on those saw-horses. What's the pitch of your roof—9 and 12? All right. Here's the plumb cut." (Line A B in the sketch). "Give me a scrap of 2 x 4. Now lay it edgewise on your rafter and one edge flush with your plumb cut. Make a pencil mark down the other side parallel with the plumb cut. (Line C D). Now square across the edge of your rafter. (Line D E). Intersect the short edge of your plumb cut with the lower point on the bottom of the rafter. (Line B E). That's your bevel. Now get busy and frame those jacks."

The whole operation was performed in less time than it takes to tell it, and the rafters fit. Now, what's the use of figuring on a simple proposition like that?

This profound halo of mystery which surrounds the art of roof framing is not so much of a mystery after all when simple and easily comprehended methods are employed.

"How did you get the length of those jack rafters?" Oh, well, that is another story, which will bear telling at some other time.

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**Strength of Girder.**

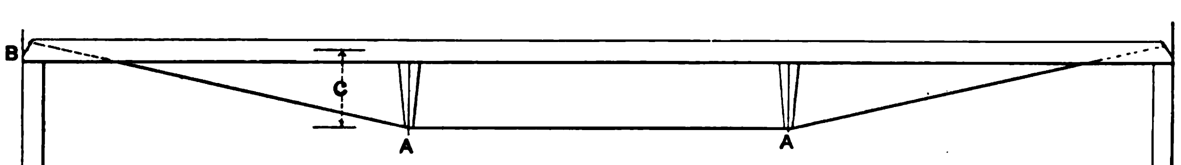
*From* H. N. S., *Upper Woods Harbor. Nova Scotia.*—It is my intention to erect a wooden structure 40 feet wide by 60 feet long, with 30-foot posts, and covered by a hip roof. The first floor will be used for a public hall, the second for an Odd Fellows' Hall, and the attic for Lodge Room purposes. The attic floor will be sustained by rods from the roof. I want to support the second floor by two belly-rod trusses placed lengthwise the building and spaced equally. I would like an expert opinion as to whether a girder built up of three 3 x 12 inch pieces of spruce will be sufficient to carry the load, which will total 100 pounds per square foot. With a drop of 4 feet will 1½-inch iron be large enough for the belly rods?

*Answer.*—The inquiry above was referred to Frank E. Kidder, the well-known consulting architect, who furnishes the following opinion:

The correspondent says that the two belly-rod trusses are to be spaced *lengthways* of the building, which will make the clear span about 59 feet. As there are two trusses in the width of the building, the load to be carried by each truss will equal $13 \times 59 \times 100$ lbs. = 76,700 lbs. Assuming that the struts are spaced so as to divide the truss into three equal spans, then the load at points A, A of the diagram will be 1-3 of the above, or 25,560 lbs.

The pull on the rods in the end panels is equal to the quotient obtained by dividing the distance A B by the drop C, multiplied by the load at A. The length A B will be about 20 feet. Calling the drop C 4 feet, then the pull in the rods will equal $\frac{20}{4} \times 25{,}560 = 127{,}800$ lbs., which at 15,000 lbs. per square inch will require 8.52 square inches of steel, equivalent to nearly five 1½-inch rods, or two 2⅜-inch rods, upset.

The timber beams will require to sustain a compressive stress of about 125,000 lbs. plus a transverse load of 25,560 lbs., which would require nine 3 × 14's bolted together. As a matter of fact, 59 feet is too great a span for a belly-rod truss. The trusses should extend across the building and be spaced 12 feet on centers. This would make the load on one truss $39 \times 12 \times 100 = 46{,}800$ lbs., and at A it would be 15,600 lbs. The length A B will then be only about 13 feet 7 inches, or 3.4 times the drop, and the pull in the rods will be $3.4 \times 15{,}600 = 53{,}040$ lbs., requiring two 1½-inch rods with upset screw ends.




*Strength of Girder.—Sketch Accompanying Comments of Mr. Kidder.*

For the timber beam three 6 x 14-inch timbers should be used. These dimensions may seem large, but nothing less could be considered safe. The method of computing the dimensions for belly-rod trusses was explained by the writer on page 161 of *Carpentry and Building* for June of the present year.

# CABINET WORK FOR THE CARPENTER.

## THE PARLOR.

By PAUL D. OTTER.

UNLESS one has a "den" or retiring room the parlor or reception hall is a fitting place for a writing desk where every one, including the guest, may have access to the writing materials. In our life of to-day, made up of so much detail, the old-fashioned "lap" portfolio or the writing box, is quite out of the question, and generally, from its portability, is not, when in a hurry, just where it is wanted. In Fig. 6 of the sketches reproduced herewith we show one so outlined that it will be in harmony with the severely plain or with the mixed class of furniture which goes to make up the furnishing of a parlor.

With the present day carpenters' familiarity of fitting drawers and compartments the same general practice applies in providing all the necessary pigeon and cubby holes which experience has reminded us are so useful in disposing of answered and unanswered letters, stamp and pen compartments and other little details which will either please you, your wife or your wife to be; for I take it that a great many of the lonely young fellows who see the home ahead of them will be ambitious to have the home furnished largely with their own handiwork, work which they can back up with a guarantee. The horse lover gets no greater pleasure in going over the good lines of his horse than does the man in fondly passing his hands over a well made article of wood work which he has made when the home was plain or when shaping itself into an actual reality of home with the partnership of a wife and all the pleasure which comes from acquiring one's possessions piece by piece through the years.

The solid top constituting the rear portion of the writing surface back of the hinged fall is dressed 12 x 26¼ x 15-16. The open frame under the drawer is 11 x 26¼ x 15-16. The front of the drawer covers its front edge as an apron. The drawer has a space of 4½ inches to the bottom. The lower board, 10½ inches wide, is cut away in a graceful sweep to a width of 5 inches at the center. Under this a stiff three-cornered batten should be glued as a support and also to prevent splitting of end pieces. The latter should be 1⅛ inch dressed, while the other parts, excepting the top, may be 15-16 inch thick. A ¼-inch rotary cut white wood veneer answers better than most any material as a filler for the back and is recommended for covering such surfaces inexpensively. Finish on both sides and it will avoid bulging. A chain or, what would be better, a knuckle jointed brass rod or strip to hold the writing top to a level position should be fitted to the inside of each end.

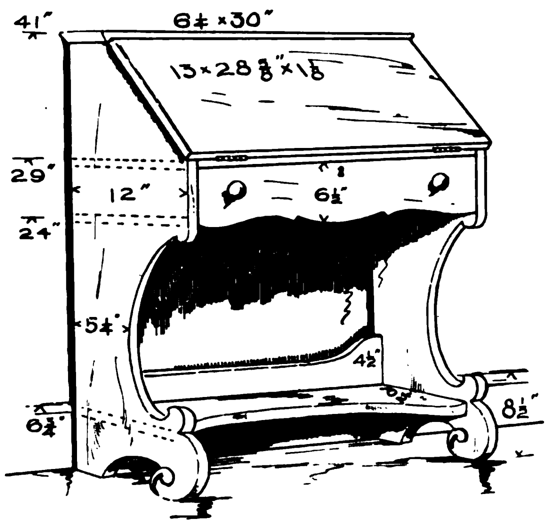



Fig. 6.—General View of Writing Desk.

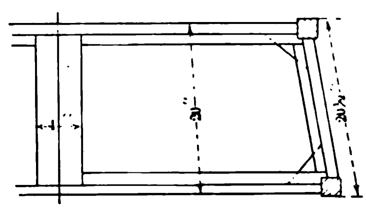


Fig. 9.—One-Half of Plan of Settee.

Fig. 7.—Desk Chair.

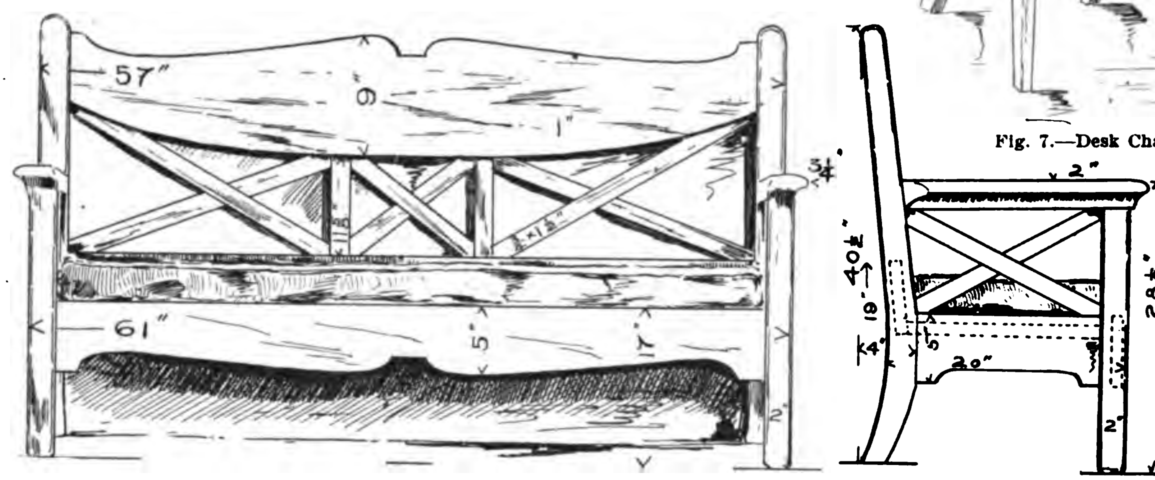



Fig. 8.—Front and End Views of Settee.

*Cabinet Work for the Carpenter.—The Parlor.*

**The Desk Chair.**—This answers not only for a light chair at the desk, but does duty as the more formal reception chair, a seat for the visitor to drop in to say "howdy" and off again. You know there are some people who like to think they have done their duty and been sociable. The chair, Fig. 7, should be built of the same material as the writing desk and be treated in the finish the same. The total hight is 41½ inches. The posts are cut to the shape shown within a 5-inch board dressed 1 inch thick. The seat is shaped within a square of 17 inches and treated to a saddle surface as described in previous articles. The hight of the desk chair varies from 19 to 20 inches with the usual after cutting of the back posts ⅝ inch off level. Taper the legs from 1⅝ inch to ⅞ inch square at the floor. Seat rails ⅞ x 2 inches are then mortised to the legs and to the back posts as well as between the back posts at the rear. The distance outside of the front legs at the seat is 15 inches, and they

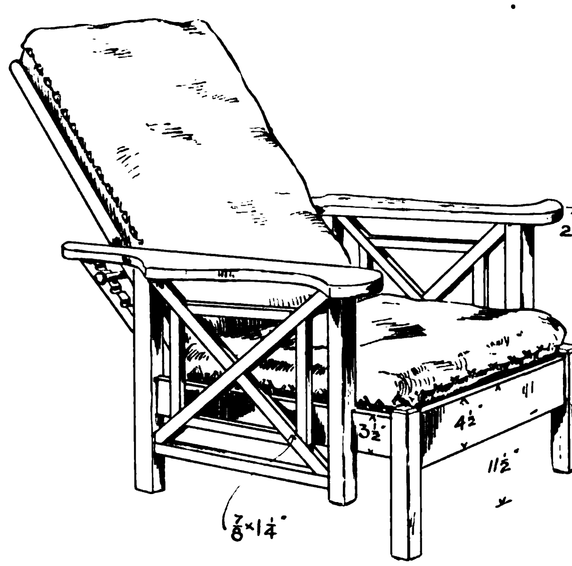



Fig. 10.—The Morris Chair.

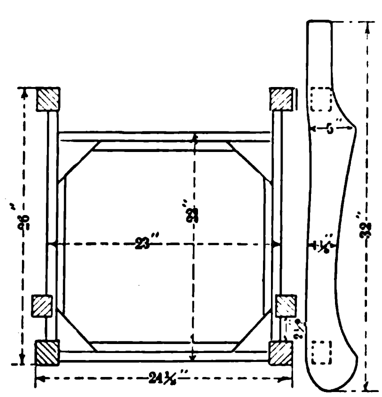



Fig. 11.—Plans of Seat and Arm of Morris Chair.

shown in the interior view of the parlor and also in the prevailing style of frames. It is true that many other pieces about the room of the conventional order generally in the home are of fanciful outline and surface treatment. This severe criss cross effect in the back may put it "off key," and a more pleasing effect may be secured by filling the same space with ¾-inch square spindles spaced ¾ inch apart. This is mentioned simply to excite a little originality of treatment suited to individual requirements, because the subject of fitness applied to all things is worth consideration.

The general proportions of this settee call for a thick, soft cushion top in the nature of a one or two piece bag in leather, corduroy or tapestry, or the upholstering may be fixed in the usual way. A long, loose seat, such as made by carriage makers, would look well, in which case this would rest on a panel seat bottom.

**The Morris Chair.**—There is always one or more in the family who derives comfort from the Morris chair or some other form of adjustable back chair, while with others, like the tea or coffee drinkers, there is nothing so restful as the excitable rocker. When extreme comfort is sought for one may have to make a personal test before being thoroughly satisfied. In the case of the Morris chair the luxurious softness of the cushions allows almost any form to mold itself into a comfortable position, and therefore the contents of the cushions should be of the best grade of curled hair, with a mixture of moss, tow


Fig. 12.—View of Pedestal 36 Inches High.

*Cabinet Work for the Carpenter.—The Parlor.*

are spread at the floor 16½ outside to counteract the taper which would make them look "pigeon toed." These little points must of course be looked after by the maker and in the actual construction. Should they with this difference still look "pigeon toed," draw them out more at the bottom; herein lies the value of careful workmanship to so set the work up K. D. (knocked down) that the general effect may be seen and corrections or additions made to various parts when taken apart for gluing up.

**The Settee.**—Time was not very long ago when the settee and davenport were thought of like the "white elephants," but now some people living in flats think the space none too small to accommodate a full size davenport. Come around at night, however, and the stately piece of furniture will be found working overtime, twice its width, doing duty as a first-class bed. Do not go into too many double barreled affairs if you can possibly live in a house or out in the country.

So with this idea our subject, Figs. 8 and 9, deals with something you can't double up or take apart, if properly made and glued. This too is offered as a model from which to prepare, if preferred, a working drawing, having a different back filling and arm treatment, the pattern shown being in harmony with types of furniture

or cotton. The bag form of cushion, previously mentioned, is shown in the illustration, although the style of the cushion with square edges like carriage cushions is most generally used.

While dealing with the cushions it may be said here that the seat cushion is supported either by a three-ply veneer panel tacked to the inner strip, shown on the seat frame, Fig. 9, or the same open space is bridged over by heavy upholstery burlap interwoven and tacked to strips and corner blocks. In tacking always start with and turn down a double thickness of the ends of bands to avoid stripping through the tacks.

The back cushion is supported by an open frame rack made of ⅞ x 1⅛ inch material, the frame 18 x 30½ inches outside, with four ⅝ x ⅞ inch cross slats evenly spaced. The bottom rail is hinged to the back rail of the Morris chair seat frame, and the inclination of the rack is made by resting it against a ⅝-inch steel or brass rod, placed in any notch on the bracket support shown on the rear of the chair.

The lower end of the back cushion rests on the rear end of the seat cushion.

As to the chair frame there is a field for change of style from Fig. 10. Using the same seat plan create a different treatment under the arms either by square spindles or three or four splats or flat balusters under the arms.

Following the illustration, the front and back posts and arm pillars are made of stock dressed 1¾ inches square, the back posts being finally cut from the bottom 1½ inches to give the chair proper angle. The side rails may be dressed 13-16 inch thick, and with the upholstery cleat on the inside of the same thickness they will when glued be very substantial. This is a matter of some consideration if more than one chair is to be made, as stock costs much more if required over 1 inch in thickness. After the chair has been tried by setting up, knock off all the sharp edges before the final gluing.

**The Pedestal.**—As many people are debarred from occupying exalted places, due to many reasons, we often are obliged to go outside of the family to secure some effigy or bust of the great—a hero made famous after death—or perchance some one may bring into the warmth of his home a beautiful nude maiden chilled to marble seeking shelter behind a flowing gauzy streamer. Whatever the subject, it is either the expensive original or a copy of some reputable work and in consequence should have a befitting support. One suggestion of many forms which the carpenter may readily construct is shown in Fig. 12. Many patterns have little of the constructive element about them, consisting simply of feet, base, shaft and cap, all work of the lathe. What should be avoided is making the entire piece so small that it be ridiculously inadequate to apparently serve its purpose as a support. The elements of classic architecture suggest with little effort suitable pedestals and, indeed, no model could be better than a pure Ionic or Doric column.

We are now very much in the time of veneer work, and if desired Fig. 12 offers the proper surfaces for veneering and of a simple character. The readers are doubtless familiar with the construction of the modern porch column, base and cap, so that little need be written. Should the decision be to make the pedestal a display of veneer, the construction should be in white pine or basswood. The shaft, top and bottom cove mold may be faced with a "crotch" adjustment of the veneer, or as it naturally is, selecting in the case of oak pieces of decided flake in the quarter. The fillets and edge of top and base look well with "cross band veneer"—a strip selected with good marking and cut from across the face of the veneer.

It would be well after the cove molding has been produced to saw these full length for the construction of cap and base, and before mitering face them with the veneer. To do this a rounded block conforming to the shape of the cove must be made as a "caul" or pressing block the full length of the moulding or of the part to be veneered. When all parts are in readiness the veneering should be carried to completion if possible, or if interrupted the work continued with all parts under like conditions such as the temperature of the room, consistency of the glue and even warmth of the pieces receiving the glue. This is all important, and a little experience will cause many to appreciate that it is mildly stated. Care and quick action should enter into the work, and, other things being equal, the results will be satisfactory and lasting.

When much veneer work is to be done several large square pieces of felt ¼ inch thick are very desirable and quite essential when gluing to changing surfaces. A newspaper or thin sheet of zinc to prevent sticking can be placed over the surface when veneering the cove. The felt is then laid over this, after which the warm "caul" block and finally the flat supporting pieces on top and bottom before the jaws of the clamps or press are brought to bear. When the pressure increases the yielding character of the felt will press the veneer into any slight change of surface. If great care is maintained in the process of mitering and fitting the shaft the veneer may be applied to the stock first. The top and the frames which constitute the fillets top and bottom are of course faced with veneer after the frames are made. The half oval opening may be "floored" and used as a place for card receiver.

In conclusion permit me to say that our needs are numerous, and other examples for the parlor might be shown, but the essentials have been touched upon. The man who has recently acquired a phonograph will have to try his hand unguided in designing a cabinet for his records, for this piece of furniture is the last acquisition that is becoming just as needful as was the music case when the piano was purchased some years back. It is hoped that an impetus and starting point has been set in this treatise which will create a desire to have about the home those articles which are either conventionally necessary or are absolutely useful.

## Sheet Metal Work in the West.

Years ago Kansas was poor, and the little sheet metal work that was done was of necessity crude, answering the requirements of the time being only. During late years we have been more fortunate, says a writer from that State, our crops have been larger, and this year promises to be a banner year throughout the State. Formerly spouting was about the only work done outside the shop, tin roofs being considered too expensive for any of the people in this vicinity. This, no doubt, was true, because their houses were of a character they did not propose to live in long after they could afford to build better ones. The wisdom of their course has been proved by results in the last ten years. A large number of farmers have built homes of their own, large and commodious. Some of these houses are roofed with shingles, others with slate and a goodly number with tin plates. Tin plates are more in favor now than they have been for some time past, because we are impressing on the farmer the necessity of thorough painting.

As yet for barn roofing nothing has been used but shingles. As the quality of this form of roof is growing poorer every year, I think it will be only a question of time when some sort of a metal roof will be necessary. I believe the corrugated iron roof, either galvanized or painted, will be satisfactory for this kind of work, but have had no experience with putting it on or its durability. I expect, however, to buy some and try it myself, and I believe that I can make quite a market hereabout for this grade of roofing.

In the early days the spouting was done because of the scarcity of water and the necessity of conducting the rain water to some cistern and storing it. In this way we were brought into the business of supplying water for domestic purposes. At first we simply did the spouting work and connected a pump to the cistern. Latterly, however, wind mills began to come into favor and we added them to our line, setting up the wind mill complete and running all the pipe necessary. This led us to do such work as putting in kitchen sinks and house tanks. With the improved condition of affairs and the money that will be returned to the farmers throughout this country this fall I think I can persuade several to have a range boiler put in and possibly a bathroom. I have prepared for this by reading such articles as have been printed from time to time regarding plumbing generally, and have already set in my own house a complete bathroom with a range boiler connection. There is no doubt that many farmers throughout this part of the country will be only too glad to have these conveniences when they are pointed out to them and the low price at which the goods are sold is made known. I am going to try it, anyway, and if any other Kansas tinker wants to try the same thing I will go hand in hand with him.

## Builders' Exchanges in Small Cities.

The formation of builders' exchanges in the smaller cities is a good movement, and one that may well be extended to still smaller towns, comments a writer in a recent issue of the *Improvement Bulletin*, for it is an unfortunate fact that there frequently exists ill feeling, often ill founded, between contractors, as well as in other lines of business. If the members of the same line of business can be induced to get together and meet each other upon a common ground it will mean much less friction and much less difficulty in getting along in harmony, even though the strife for business continues as vigorous as ever.

# WHAT BUILDERS ARE DOING.

ALTHOUGH the status of the building business in Baltimore appears comparatively quiet at this season the value of contracts awarded since September 1 is quite up to the average, aggregating about $1,800,000. There are many scenes of activity in the burnt district, where the superstructures of numerous large buildings are being pushed rapidly toward completion, notably the Chesapeake & Potomac Telephone Building, the Keyser Building and the Baltimore & Ohio Central Office Building, the steel structural work of which has reached the thirteenth story and the granite work is well under way. A major part of the recent contracts referred to above are not in the burnt district, which indicates a healthy progress for the city at large. Real estate men report business good and prices satisfactory. One of them says regarding the situation: "For the past two years there has been a great deal of building in the residential sections of the city. The activity has been especially marked in the erection of two-story houses. While there has been more than the usual development in the suburbs, I believe the great possibilities which the country around Baltimore offers in this line are just beginning to be realized, and I look for even more activity in suburban development next year. There are several sections of the outlying districts which are ripe now for development. To wait longer would be a detriment to these properties, as neighborhoods will be created, whereas the owners now have it within their power to make the neighborhoods."

The Builders' Exchange has had to record the sudden death on September 29 of one of its most prominent and active members, Edward L. Bartlett, who presided at the organization of the Builders' League in 1888. He was president the first year, and his interest continued unabated until the time of his death. He was chairman of the Entertainment Committee when the National Association of Builders met in Baltimore in 1895, and was also a director in that body. Mr. Bartlett was widely known in the commercial and manufacturing world through the firm of Bartlett, Hayward & Co., iron founders, makers of elevators, gas holders, &c., and his wisdom and engineering skill contributed much toward the success and growth of the business.

At a special meeting of the Builders' Exchange, held at noon on September 30, eulogistic resolutions were adopted, and a committee named to attend the funeral, which occurred on Sunday, October 1.

### Brooklyn, N. Y.

The report issued by Superintendent Peter J. Collins of the Bureau of Building for the third quarter of the year shows that all records are being broken this year. Since July 1 there have been completed 198 new buildings against 501 for the same period last year, and permits were issued for 5166 new buildings and alterations as against 4387 for the same quarter in 1904. The estimated cost of the improvements is $20,420,421 as compared with $12,717,483, an increase of $7,702,538, which breaks all records for the building trade in this county. The Twenty-sixth Ward leads in the number of new buildings completed and commenced, these being respectively 168 and 481. The statement is made in the report that there is not a single ward in the borough where at the present time more or less building is not in progress. Over 600 flats and tenements are in course of erection, this style of building leading, while there are over 450 dwelling houses of all kinds for which permits have recently been filed.

### Buffalo, N. Y.

From all information that can be gathered the cost of building materials has not apparently lessened the volume of business in progress to any noticeable extent, nor has the attitude of labor tended to restrict building operations. The figures issued from the office of Deputy Building Commissioner Henry Rumrill, Jr., show that during the month of September of the current year the bureau issued 176 permits for new and remodeled buildings at an aggregate estimated cost of $885,440, while in September of last year there were 174 permits issued calling for an estimated outlay of $366,536, thus showing the present season to be decidedly more active than a year ago. The totals for the first nine months of the current year involve 2254 permits issued for building improvements estimated to cost $5,599,424, as against 2022 permits for improvements valued at $4,831,355 in the corresponding nine months of last year.

### Chicago, Ill.

Building operations during the first nine months this year show a total cost of $47,737,115 for 6355 buildings, which is an increase of 901 buildings and a total increased cost as compared with the first nine months of last year of $16,654,875. The permits taken out during the month of September also show an increase as compared with the same month last year, the total covering the construction of 1003 buildings, involving a total cost of $7,349,150, as compared with 802 buildings and $4,919,850 for the same month a year ago. To some extent this increase may be due to the fact that the ordinance requiring the use of iron pipe for sewerage and buildings went into effect on the first of the month, and builders who wished to avail themselves of tile sewerage rushed in for permits during the closing days. Even if this had not been so, it is safe to say that there would have been a marked increase in building operations. The number of permits issued during September is only exceeded by similar months in 1892 and 1891, the number in the former year being 1291 and in 1891 being 1102. The cost of construction exceeds that of any September in the city's history, although this month in 1892, on account of World's Fair operations, showed a cost of $7,739,400.

The indications already point to 1905 as the banner year for building operations, not only for large structures but flat buildings and dwellings as well. The September permits almost entirely covered small structures. The only notable operations now being contemplated include an addition to the uditorium Annex and the erection of the City Hall, the latter at a cost of $5,000,000. The old city building is now being razed and plans for the new structure are under way. The year's total has of course been greatly enhanced by the large number of big buildings undertaken earlier in the year and include an addition to the Marshall Field Building, Great Northern Trust Building, Commercial National Bank, addition to the Chicago Athletic Club, Mandell Brothers' addition, Boston Store Building, Stumer, Rosenthal & Eckstein store and office building.

It is not only to supply the natural demand, together with that resulting from the increase in population by immigration, but the changes in conditions brought about by enterprise in the establishment of new industries is also responsible for activity in building in new localities, says *Construction News*. For example, it is stated that 900 new houses are required at Chicago Heights to accommodate the increasing population due to growing industrial developments. The Chicago Heights Land Association has let contracts for about 40, and is about to award contracts for the construction of 50 more. These with other houses in construction aggregate in all probably 200 new buildings under way at that place, to say nothing of the demand for more. It is pointed out that the construction of houses in the southwestern part of the city, while extremely active, is in no way equal to the demand that will soon be felt in that section. Sears, Roebuck & Co. are expending $4,500,000 in new buildings to which they will take a force of 5000 employees not later than November 1. The Winslow Brothers Company is also completing a new plant nearby, which will afford employment to 800 hands. The Western Electric Company will within a year or two give employment to probably 6000 hands at its new works at Hawthorne. In each instance there will be a large number of employees who will desire to live within a short distance of their place of employment, while no adequate means has been taken to accommodate them. There is much building under way, but not enough to meet the demand.

### Cincinnati, Ohio.

Within a radius of two miles of the post office building operations are in progress embracing new structures, alterations and reconstruction work, which will involve an expenditure of not less than $5,000,000. Throughout the entire city and suburbs the amount that is being spent in building construction is in excess of all previous records, and it is an interesting fact that the amount invested in houses, flats, schools, etc., in the residential districts is almost equal to that being expended for business blocks and hotels in the center of the city. Probably the largest single improvement is the new hotel for the Pike site, which will cost in the neighborhood of $1,000,000. The second largest operation within a radius of 10 squares of the post office is the Textile Building, in the construction of which all city building records have been broken. The building is a massive 12-story affair of steel, concrete and brick, and when completed will have cost something like $350,000. The excavations were commenced on March 1 and the erection of the steel superstructure on July 1, the last piece being riveted on September 15. The concrete roof will be finished by the time this issue of the paper goes to press, and an interesting point to mention is that by that time every foot of space will have been leased by textile industries and their allied trades. The steel framework of the Fourth National Bank Building is rapidly nearing completion; the last rivets have just been driven home in the new Havlin Hotel, and the Stix Building, at Seventh and Walnut streets, to cost about $200,000, is completely inclosed. Inasmuch as it is practically one solid piece of concrete and looms up as a landmark, it will be, when finished, one of the notable wholesale structures in Cincinnati. Many other improvements are under way in the business section of the city, bringing the aggregate valuation for the nine months of the current year in excess of that for the entire year of 1904.

According to the report of the Inspector of Buildings there were 379 permits issued in September, calling for an outlay of $378,740, as against 384 permits for improvements valued at $430,125 in the same month a year ago. It is, however, in comparing the figures for what is regarded as the active season that the tremendous strides which have been made in building operations are apparent. For the nine months of the current year 3790 permits were taken out, calling for an outlay of $7,003,760, while in the corresponding period of 1904 there were 3499 permits issued, involving an estimated outlay of $4,955,435. The common verdict is that the building boom in Cincinnati is entirely without precedent.

### Cleveland, Ohio.

At a recent meeting of the Executive Board of the Building Trades Employers' Association, held in the rooms of the Builders' Exchange, the labor situation in the building trades was thoroughly canvassed and reports presented showing that fall operations were proceeding without interruption. The only difficulty experienced has been a slight scarcity of certain kinds of material and that was not serious.

The Master Painters' Association held its fall "smoker" in the rooms of the Builders' Exchange on Wednesday evening, September 20, when refreshments were served and a pleasing entertainment provided.

Preparations are being made for the fall and winter series of social and business luncheons to be held by the Builders' Exchange. These gatherings have proven very popular with the members in the past, affording as they do opportunities for considering matters relating to the building industry as well as various movements inaugurated by the exchange for the consideration of well planned and properly equipped public and private buildings. The first of the luncheons was held early in October during the convention of the American Civic Association, the speakers being officers of that association, who discussed the relationship of properly designed buildings to the Department of Municipal Art.

### Grand Rapids, Mich.

Building permits for the month of September show a slight falling off as compared with the same month of last year, but as the valuation represented is much greater it naturally follows that the class of buildings must be better. The building inspector's report shows that for September there were 133 permits issued representing a valuation of $212,445, as against 134 permits issued a year ago representing a valuation of $180,309. The increase in the valuation of buildings can be attributed largely to the fact that never in the history of the city has the number of flat buildings been so great as during the last year. These buildings as a rule are of strictly modern type, and are built of first class material and rent at from $25 to $35 a month.

Last year fully 800 cheap houses were built on the contract plan, costing from $1000 to $1500 each. These in a great many cases soon became the property of the parties who originally advanced the money for their construction. Thus the market was pretty well supplied with this class of buildings, and investors who a year ago might have looked upon the cheap house proposition with favor have this year seeked to place their money in more substantial structures, from which they can obtain good rentals.

Attention is turning to the need of modern office buildings in the city. Already work of remodeling some of the more desirable buildings is under way, and this will be the principal activity of the winter months. Another season will probably see still greater activity along this line in the central but antiquated business blocks on the main street of the city.

### Kansas City, Mo.

Building activity continues upon a scale which speaks well for the volume of business for the year, fully one-half of the valuation of the improvements in progress representing flat houses and private dwellings. During the month of September there were issued by S. E. Edwards, Superintendent of Buildings, 390 permits, calling for an outlay of $1,399,645, as compared with 444 permits involving an outlay of $859,045 in the corresponding month of last year. For the nine months of this year 3420 permits were issued for improvements having a valuation of $8,661,022, as against 3389 permits for improvements valued at $6,743,577 in the first nine months of last year. The increase, it will be noted, is decidedly marked.

### Los Angeles, Cal.

The month of September shows a slight falling off in the building activity of Los Angeles as compared with the preceding five months, as well as with September, 1904. The record for the month just closed shows 830 permits for work estimated at $1,148,431, as compared with 850 permits for work estimated at $1,414,821 for August, 1905, and 654 permits for work estimated at $1,261,482 for September, 1904.

During the last two weeks of September new business seemed to drop off considerably, though builders were actively engaged with work already begun. Architects state that there is no reason to believe that a reaction is impending, as much work is now being planned for the near future. So far this year the building work undertaken exceeds by nearly $2,500,000 the work undertaken during the same months last year. These seems to be a steady movement toward the construction of fine residences, especially of two-story frame dwellings averaging in cost about $3500 each.

### Louisville, Ky.

While the value of building operations projected during September is largely in excess of the same month a year ago, it is unquestionably true that the high price of building materials has restricted operations in the city for some time past. It is probably safe to say that there has been at least 33 1-3 per cent. less building than would have been the case had conditions been more normal. The new work runs largely to manufactories, flat buildings and business blocks rather than to private dwellings. According to Robert J. Tilford, Inspector of Building, there were 191 permits issued for building improvements in September carrying a valuation of $302,590, while in the same month last year a similar number of permits were issued, but the amount involved was only $174,270.

Taking the figures for the first nine months of the current year it is found that there were 1745 permits issued for improvements valued at $3,535,499, as against 1484 permits for improvements to cost $1,909,966 in the first nine months of last year. The estimated cost of the building improvements as given above represents only 60 per cent. of the real cost, as in issuing permits the department accepts the owner's estimate as to figures.

The annual outing of the Building Contractors' Exchange on Labor Day was held at River View Park, a summer garden in the suburbs, and was a big success. The members had the pleasure of having a number of contractors from Cincinnati as guests, and the day passed off very pleasantly. One of the chief features of the occasion was an old fashioned country dinner with yellow legged fried chicken and the like, all of which was hugely enjoyed by those present.

### Milwaukee, Wis.

Members of the various branches of the building trades have been unusually busy this season, operations having been conducted upon a scale far in excess of last year. A noticeable feature of the situation is the number of frame cottages being erected, which is greater than in any other similar period since the Department of Buildings was established, 17 years ago, and the real estate people are putting forth the claim that their cottages are sold before the paint is thoroughly dry. Early in the year there was a feeling that the high cost of building materials might influence building operations, but this seems not to have been the case. Another factor is the present labor situation, which is perfectly harmonious. The Wisconsin Telephone Company is just completing a modern eight-story fire proof office building costing $300,000, and work is in pregress upon a mercantile building which will cost about $350,000. The structure is located at the northwest corner of Second and Sycamore streets; it covers an area about 150 x 120 feet, and will be six stories high. The structural members are of sufficient strength to sustain four more stories, which the owner may eventually add to the building.

The records of the office of Inspector of Buildings show that during September of the present year 400 permits were issued for building improvements, estimated to cost $1,436,-884, which compare with 332 permits for improvements, costing $677,297, in September of last year. Taking the nine months of the two years the showing is also highly gratifying. For the current year there were 3348 permits issued for building improvements, calling for an estimated outlay of $7,635,990, while in the first nine months of 1904 there were 2773 permits issued for improvements, costing $6,187,098.

### Minneapolis, Minn.

The high cost of materials and labor does not appear to have exerted any adverse influence in connection with building operations, and the season has witnessed a large amount of work both in the way of dwelling houses and structures intended for business purposes. The showing for the month of September is not quite up to a year ago, but for the nine months the record is far ahead of the same period in 1904. According to the figures prepared by James G. Houghton, Inspector of Buildings, there were 394 permits issued in September for building improvements costing $797,225, while in the same month last year there were 453 permits issued involving an estimated outlay of $897,180. From January 1 to September 30 of the current year 3922 permits were issued from the office of the Inspector of Buildings, calling for an outlay of $7,151,515. These figures compare with 3588 permits issued in the first nine months of 1904 and involving an outlay of $5,445,605.

### New Orleans, La.

Considering the fact that the city has been burdened with an epidemic of yellow fever the amount of building carried forward during the month of September makes a gratifying comparison with the corresponding month of last year. According to the report compiled by the Mechanics, Dealers and Lumbermen's Exchange, there were 130 permits issued, representing an estimated expenditure of $227,295 as compared with 192 permits issued in September, 1904, representing an outlay of $202,909. A comparative report of the building materials received from the basins, river and railroads during September makes a creditable showing, although the improvement is not so pronounced as in connection with building operations. The permits for the latter include 89 for frame dwellings and two for brick dwellings, as against 48 for frame and one for brick in September last year.

### Philadelphia, Pa.

There is little abatement in the phenomenal building activity in this city. Statistically the present year bids fair to be the best ever experienced and it is believed will exceed considerably the figures for the year 1902, in which the building improvements were estimated to have cost $32.509.-575, including the permit for the Wanamaker Building, which alone was estimated at $5,000,000. During the nine months of the present year the cost of building operations aggregated $29,063,830, and from the present indications the volume of work which will be taken during the next three months will, it is expected, be fully up to that which has been done in previous years and may even exceed those figures. There has been a very large increase in operation work, particularly in two and three story dwellings, while the demand for buildings of all kinds indicates that builders will remain busy for some time to come.

With the exception of some difficulties with the house painters, who have been on strike since early last month, the labor situation in this city is considered fairly satisfactory. There is a good demand for skilled mechanics and in some branches of the trade it is difficult to get men enough to complete work promptly. The demand for all kinds of building material is very heavy and it is hard to get prompt deliveries in some lines.

Appended are the statistics for 1902, the best building year experienced up to the present time, together with those for the year 1904 and the comparative figures for nine months of the years 1904 and 1905:

| | Number of permits. | Number of operations. | Total cost. |
|---|---|---|---|
| 1902 ................ | 7,469 | 12,103 | $32,509,575.00 |
| 1904 ................ | 8,398 | 14,152 | 28,967,776.00 |
| Nine months, 1904.... | 7,336 | 11,258 | 23,897,720.00 |
| Nine months, 1905.... | 6,979 | 13,974 | 29,063,830.00 |

At the luncheon which preceded the quarterly meeting of the Master Builders' Exchange on September 26 Col. Sheldon Potter, Director of Public Safety, was one of the guests who addressed the builders and who outlined his ideas touching reorganization of the Bureau of Building Inspection. In speaking of the necessity for reorganization he stated that owing to the change in the character of building and building methods many of the laws were obselete and in his opinion all such should be repealed. He also declared that time had rendered a change necessary in the qualifications of inspectors and that a larger proportion of them should be engineers. He urged that the Exchange appoint a committee to confer with him on the entire subject of reorganizing the bureau, and in due course Chairman Armstrong appointed such committee.

Director Potter assured the members of the Exchange that all builders would stand an equal chance in bidding for work in his department, that the day for playing favorites in the award of contracts was past and that contracts would be awarded to the lowest responsible bidder. He also announced that the practice of requiring certified checks to be deposited with bids would be discontinued and a bond accepted instead.

### Pittsburgh, Pa.

Building operations in and about the city continue active and architects and contractors report a favorable outlook for the fall and winter months. A noticeable feature is the number of buildings under way in the residential portion of the city and in the surrounding towns. Several large office buildings are nearing completion, among which may be mentioned the Frick Annex, which will without doubt be one of the handsomest structures in the city. The new Fort Pitt Hotel, costing over $1,000,000, will be opened about October 15. The railroad companies are expected to take an active part in building operations and are said to have plans nearly ready for several large buildings. The Pennsylvania Railroad recently awarded a contract for two warehouses in the lower part of the city, to cost about $500,-000. The Fulton Building, at Duquesne way and Sixth street, is nearing completion, and with the structure also erected by Henry Phipps across the street will form an imposing gateway to the city from Allegheny and add greatly to the picturesqueness of the skyline along the Allegheny River front. The new building is named in honor of Robert Fulton, builder of the first steamboat.

The figures issued by S. A. Dies, Superintendent of Building Inspection, showed that for September permits were issued covering 376 building operations and involving an estimated outlay of $1,332,751, as compared with 311 operations, costing $5,077,579, in September of last year. The great discrepancy between the valuation of the improvements in the two periods named is due to the fact that in September last year a single permit was issued for a building estimated to cost $3,500,000. Eliminating this, the difference between the two periods is comparatively small, although September of this year is still somewhat under that of a year ago. The operations for the nine months of the current year were 3336, calling for an outlay of $13,105,-779; while for the first nine months of last year permits were issued covering 3030 operations estimated to cost $13,-317,939.

One of the largest meetings ever held by the Builders' Exchange League took place Wednesday evening, October 4, at the headquarters on Penn avenue. It was called a corporation meeting, inasmuch as it included individual members from all master trades. Considerable business of an executive nature was taken up, including present labor troubles, and more or less discussion ensued as to the way of successfully meeting them. Congressman James F. Burke gave an interesting talk on organization, following which were addresses from the presidents of the subsidiary organizations of the league. This was one of the four corporation meetings which are held each year and aroused much enthusiasm. Samuel Francis and John A. Strauss were elected delegates at large and C. W. Bente and Joseph Stackhausen were selected as alternates.

### Portland, Oregon.

A large amount of expensive building is now under way in Portland and a still larger amount is planned for the near future. At the present time seven buildings, running from three to twelve stories in hight and aggregating $710,-000 in cost are under way, and eleven other buildings, running from two to eight stories in hight, are planned at an estimated cost of about $1,500,000. Probably at no previous time has there been so much work actually under way as at present. Architects report that they are still rushed with work and that plans are being completed which will keep Portland builders busy throughout the winter and spring. The tendency seems to be either toward the construction of the largest class of office buildings or the erection of new dwellings. Some little reaction in certain classes of construction is expected to result from the closing of the Lewis and Clark Exposition, but builders do not anticipate any perceptible drop in the building activity as a whole.

The unusual demand for heavy building has practically exhausted the labor supply in certain lines, though as yet contractors have not been inconvenienced seriously by a shortage of help. As there is certain to be a falling off in smaller construction during the winter months builders are of the opinion that the labor supply will be ample for the time being.

### Sacramento, Cal.

The interior of the State Capitol at Sacramento, Cal., is to be remodeled, $325,000 having been appropriated for that purpose, and $350,000 will probably be expended in all. The building will be made fireproof throughout. The forest of timbers now supporting the roof will be removed, and the attic space divided up into rooms for the use of commitees, etc. The basement, which is now dark and useless, will be altered so that all the space can be utilized. Light areas will be provided. The legislative chambers will be remodeled and the acoustic properties improved. The stairways and elevator facilities, which are now awkwardly arranged, will be rearranged. New stairways and elevators will be put in at the main corridor near the dome. The plumbing will be entirely renewed. An electric lighting plant and steam heating apparatus will be installed.

Sutton & Weeks, of San Francisco, have received the first prize for plans for these improvements in an architectural competition.

### San Francisco, Cal.

Building kept up well in San Francisco and the Bay shore districts during September, the amount of money invested in buildings being greater than in some of the preceding months. The present tendency is to have a more elaborate interior finish and to use a great deal of marble. When the fall rains begin building is expected to slack up a little, but the architects' offices are still full of plans. Many new residences are projected, several large fire proof structures are planned for the heavy business districts, and more flat and apartment houses are being built than ever before.

Building materials are in great demand and there is a scarcity of Oregon pine owing to the fact that heavy shipments of lumber from the Northern mills to the Eastern States and the foreign markets leave little surplus to go to California. Stocks of lumber in the local yards are badly broken and a good supply of all grades can hardly be expected before spring, when the foreign demand has fallen off. An advance in retail lumber prices is expected. There is also a scarcity of structural steel in this market owing to the Eastern mills being so rushed with work that coast orders are not filled promptly. The cement situation has improved a little, but there is still much difficulty in securing domestic cement as the mills are busy on large contracts for Government work on irrigation projects. Much foreign cement is on the way by water but prices are still high. The Santa Cruz Portland Cement Company is erecting a plant capable of making 5000 barrels of cement daily and another large plant is projected. The supply of brick is ample for all purposes, and prices are still being cut, owing to the large number of manufacturers in the territory. Terra cotta and fire proofing are in good supply, with large manufacturing facilities.

The construction of the new custom house, costing $1,194,000, will be commenced by Thomas Butler, the contractor, as soon as the ground is cleared of the old buildings. About 100,000 cubic feet of Raymond granite will enter into the construction of the building and the Italian marble specified for the interior finish will cost about $175,000.

The most notable achievement of the present year has been the completion of the new post office, a massive three-story building of white granite. The interior work excels in the beauty and richness of its marbles, mosaics and bronzes.

### Santa Rosa, Cal.

The season here thus far has been one of unusual activity in the building line, but it has not been altogether free from friction between employers and employees. Growing out of frequent misunderstandings the builders and dealers in building materials decided to form a Builders' Exchange for the mutual benefits which arise from such an organization, as well as to take up any differences which might arise with the labor unions and endeavor to bring about an amicable settlement. As a consequence a call for a meeting was issued the latter part of September, and a temporary organization was effected by choosing C. N. Grant chairman and Frank A. Sullivan secretary. A committee to frame a constitution and by-laws was also appointed, consisting of J. F. Wallace, chairman, E. M. Williamson, Henry A. Hoyt, Clarence Haven and C. H. Underwood.

At a subsequent meeting a permanent organization was effected, and the following officers selected for the ensuing year: President, H. A. Hoyt; vice-president, T. W. Jones; recording secretary, Frank A. Sullivan, 210 Chestnut street; financial secretary, U. G. Davis; treasurer; J. F. Wallace.

The Executive Committee consists of F. Berka, E. M. Williamson, J. O. Kuykendall, J. H. Minard, F. L. Hoyt, W. L. Nagel and C. D. Roberts.

A number of fine buildings have been erected in the city during the present season, some are still under way and others are contemplated. The St. Rose Hotel and the new annex to the Occidental Hotel are examples of handsome buildings recently completed, costing in the neighborhood of $40,000. These, with the new Masonic Temple now under construction costing about $50,000, and the new White House, a fine business block nearly completed, make a splendid addition to the architecture of the city.

It may perhaps be interesting to add a word about the city of Santa Rosa and its surroundings. It is a beautiful place, situated in the heart of a most productive and fertile valley, containing about 1800 square miles. It is the county seat of Sonoma County, has a population of 12,000, is 50 miles north of San Francisco, and has three railroads—two steam and one electric—traversing the broad valley and connecting this and other cities with the metropolis. The climate is ideal, being mild in winter and cool in summer. In the past few years many thousands of Eastern people have settled here to their great joy and delight, as they now escape all the inconveniences of the rigorous Eastern climate, while finding ample means of obtaining a livelihood, as all business enterprises are thriving and the soil grows almost everything imaginable without irrigation.

### Seattle, Wash.

September has been an active month in building and a large amount of new work has been undertaken, notwithstanding the lateness of the season. So far the weather has been fine and the buildings under way have made rapid progress. Contractors realize that they have more work on hand for early completion than ever before and they are anxious to get their contracts well under way before the winter rains begin. During the past month work has been started on the new Schwabacher Building, the American Savings Bank Building, the Burke Building and others, and notwithstanding the season some other large buildings will be begun during October. The John A. Roebling's Sons Company has begun work on the foundations of its new building, and a number of fine residences are to be started at once. The large Y. M. C. A. Building and some other buildings have been held up indefinitely by the inability of the city authorities to guarantee permanent grades.

### St. Louis, Mo.

The major portion of the new work in progress in the city at the present time is made up of flats and buildings intended for business purposes. According to the figures of the office of James A. Smith, Commissioner of Public Buildings, there were issued in September of the current year 826 permits for building improvements estimated to cost $1,689,765, as compared with 609 permits for improvements valued at $1,575,039 in the same month of last year. For the first nine months of the current year 6344 permits were issued calling for an estimated outlay of $18,240,785. The grand total for the corresponding period of last year was 5278 permits covering improvements valued at $10,617,031.

### St. Paul, Minn.

The building figures for the nine months ending September 30 amount to $4,701,445, or nearly twice the figures for the corresponding period of 1904. Furthermore, the cost of buildings for which permits have been issued since the first of the current year is within a few thousand dollars of equaling the cost of the buildings authorized during the entire twelve months of 1904. Construction work in St. Paul during the fall and winter will center largely around the erection of the Auditorium Building, for which $225,000 has already been raised by popular subscription, and the proposed $1,000,000 Catholic cathedral on Summit avenue from plans by Architect Emanuel Masqueray of New York. The original plan of erecting an auditorium to cost upward of $350,000 will undoubtedly be carried out by an immediate issue of bonds to the amount of $150,000, and the chances are good that work will be begun on the building before the end of the month. A site has been selected at Franklin and Fifth streets.

With the best building year in the history of St. Paul drawing to its close, the outlook for next year is such as to justify the belief that the present year will be easily left behind as regards building figures. The proposed construction work at Fort Snelling will alone foot up to more than $1,000,000. At the State fair grounds buildings to cost upward of $200,000 are under contemplation, and if the plans of the State fair management do not go awry work on these buildings will be begun this fall, so that they may be completed by next summer. Within a short distance of the fair grounds at Hamline an amusement company has recently purchased a tract of 25 acres and will at once begin the erection of buildings and the other accessories of an amusement park. There will be about 20 buildings of all sizes and varieties, and the aggregate cost of them will be about $250,000.

The coming year is likely to see the erection of several structures for which there has been a public demand for several years. One of the number—viz., the Y. M. C. A. Building—is almost certain to be gotten under way before another year rolls by. A new union depot, located on the site of the present structure and capacious enough to provide accommodations for every railroad that runs into St. Paul, has practically been promised by the Great Northern management as a sop for the enormous improvements that the company is about to make in Minneapolis, "the other twin."

### Tacoma, Wash.

Building was more active during September than during the month preceding and was about equal to the record for September, 1904. The rush of work during the latter part of the month was largely due to the anxiety of builders to get their work as far along as possible before the rainy season opened. Builders generally anticipate a drop off in building during October unless the fine weather which has prevailed so far this fall will continue. Satisfactory progress has been made on the large structures, including the new High School Building, the Stone, Fisher and Blane buildings and the Johnston Temple of Music.

The material and labor markets are in good shape, although there has naturally been some little shortage of help during the rush of the past few weeks. This, however, will rectify itself during the rainy season. Architects report a large amount of planning, including a good deal of work which will not be given to the contractors before next spring.

### Toronto, Can.

The members of the Builders' Exchange in this city have undertaken to establish a bank and to provide a building for joint use of the exchange and the financial institution which it will foster. At first it was suggested that an exchange building be erected as a permanent home for the builders of the Canadian city, but some of the enterprising members of the exchange and other business men conceived the idea of organizing a bank and having the banking company erect the building as a home for the two institutions. Committees are now at work on plans for carrying out the enterprise, and it has every prospect of being a complete success. It is true that the builders of all the cities do a great amount of banking, and there is a bond in common which should make it easy to work out a scheme such as that adopted in Toronto.

# HEATING A DWELLING BY HOT AIR FURNACE.

BY D. A. CLARK.

REALIZING that the subject is one of never-ending interest, and believing that some reference to his own experience in heating two or more rooms from one riser, and taking two or more risers from one basement pipe, may not be out of place at this time, the writer is prompted to contribute the following results, based upon careful tests:

During the past four years I have experimented a great deal along these lines and have found that, while it is difficult to supply more than one riser from a large basement pipe, it is a very easy matter to supply two and three registers from one riser when properly arranged. I have used the Jones side wall registers, which are made by the United States Register Company, Battle Creek, Mich., and have had the best success. I find the system far in advance of any yet introduced, both as to ease in distributing heat and in economy of fuel consumption.

These registers are made so that a large air supply at the bottom of the register is secured, and as they are made in different sizes I have no difficulty in selecting the proper size for the rooms to be warmed. For instance, when heating a room on the first floor that requires 78 square inches of pipe area and one on the second floor that requires a 3¼ x 12, or No. 8, wall pipe, I use a register which has a bottom opening of the capacity of a 12-inch pipe and a top collar that fits a No. 8 wall pipe. Or if I am to heat two rooms on the first floor and one on the second I select a No. 34 register, with a bottom opening of the capacity of a 16-inch pipe. After passing the two openings for the first-floor rooms the riser is reduced, the wall pipe fitting into the collar on the top of the register box provided for this purpose.

In order that this system, or plan, of heating may be better understood and not be confounded with a system where one or two basement pipes are used for supplying several risers I present herewith the floor plans, Figs. 1 and 2, of a residence heated with this system, where I have installed a Stanton heater in connection with 12 Jones registers. This residence is situated in Van Wert, Ohio, and is owned by Dr. S. S. Tuttle. The entire building has been successfully heated during the past winter, when the outside temperature registered at times 14 degrees below zero. The temperature inside registered 70 degrees as early as 8 o'clock in the morning, and but 12 tons of Pocahontas (soft) coal was used for successfully heating this large residence the entire season of 1904-1905.

It will be noted by referring to the plans that this residence contains 10 large rooms, besides a hall and bathroom, and is what is ordinarily known as a 12-room house. It has an exposed wall surface of 3600 square feet, with a glass exposure of 576 square feet, and has 30,000 cubic feet of space to warm. Referring to the basement plan, Fig. 3, it will be seen that there are but six warm air pipes—four 12 inches, one 14 inches and one 10 inches in diameter. These are used to convey the warm air from the furnace to six registers on the first floor, which are arranged with top collars, where six wall pipes are attached to convey warm air to the rooms on the second floor.

For the benefit of those who argue that it is not practical to heat two or more rooms from one riser I have made a diagram, Fig. 4, of a complete riser, showing wherein this system differs from what is sometimes misunderstood by furnacemen when this system is spoken of. By referring to Fig. 4 it will be seen that a 12-inch pipe with 113 square inches is used to convey the warm air from the furnace to the bottom of the No. 15 Jones regis-

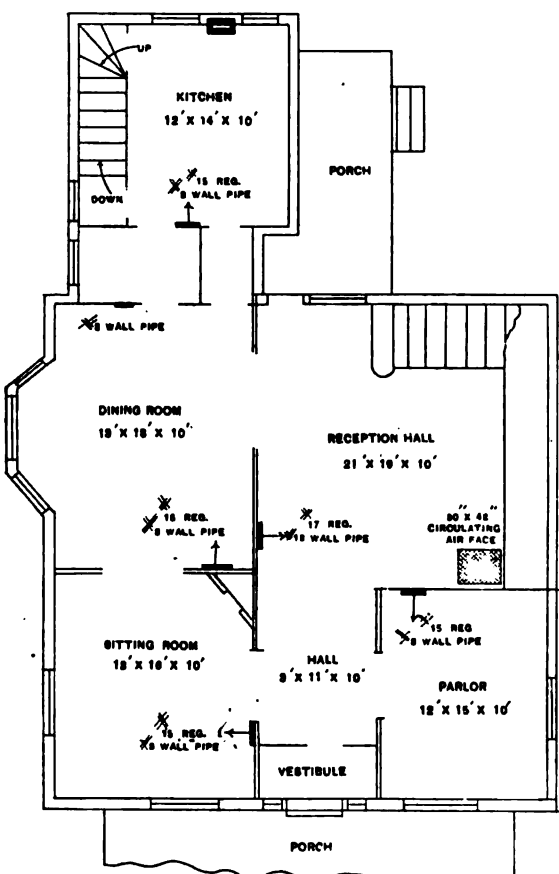



Fig. 1.—First-Floor Plan.

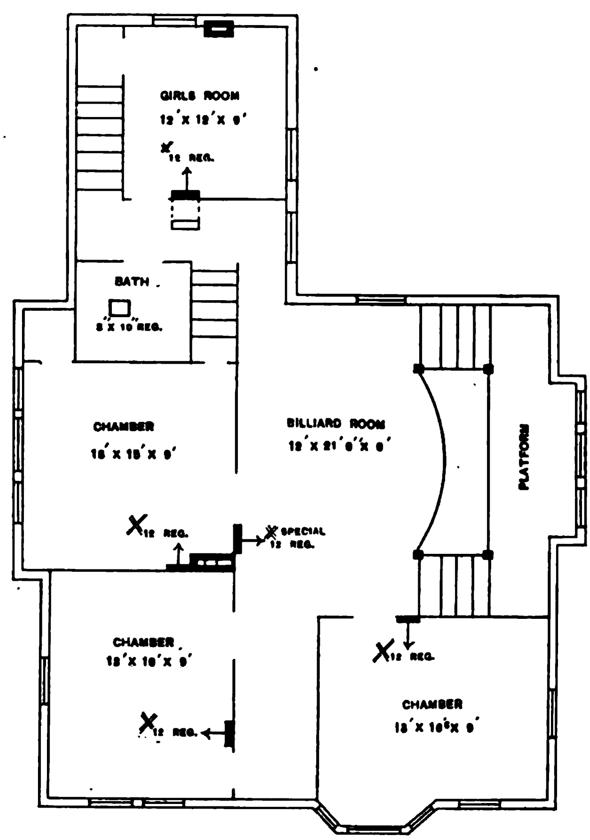



Fig. 2.—Second-Floor Plan.

*Heating a Dwelling by Hot Air Furnace.*

ter, which is used for heating the parlor. When the outlet for suppying this room is passed the riser is reduced until its capacity is just sufficient for the second-floor room, and all of the warm air from the 12-inch conductor could not possibly pass to the second-floor room, even though an adjustable diaphragm, or deflector, was not provided for regulating the necessary supply for each room.

For heating the reception hall and the billiard room over the hall I have used a No. 17 register, which has a bottom opening of the capacity of a 14-inch pipe, and I have used a larger riser in this case than for the other rooms, or one 3½ x 14 inches in size, with a special No. 12 register in the billiard room, which is made with a bottom collar to fit this large wall pipe. For the other rooms I have used No. 15 registers on the first floor and regular No. 12 registers on the second floor, the regulars receiving 3¼ x 12 inch wall pipes.

The air supply, Fig. 5, is taken either from outside or from the large reception hall inside, and the air duct is arranged so that when the supply is being taken from outsides, the movable damper closes the duct from inside, and *vice versa*. The advantage of this arrangement is that inside air can be used during the night, which is more desirable than outside air on account of the fire in any furnace getting low between night and morning, and because taking the air supply from the inside insures a warmer house early in the morning or prevents the house becoming cool in the early morning, as is sometimes the case where outside air is taken during the night.

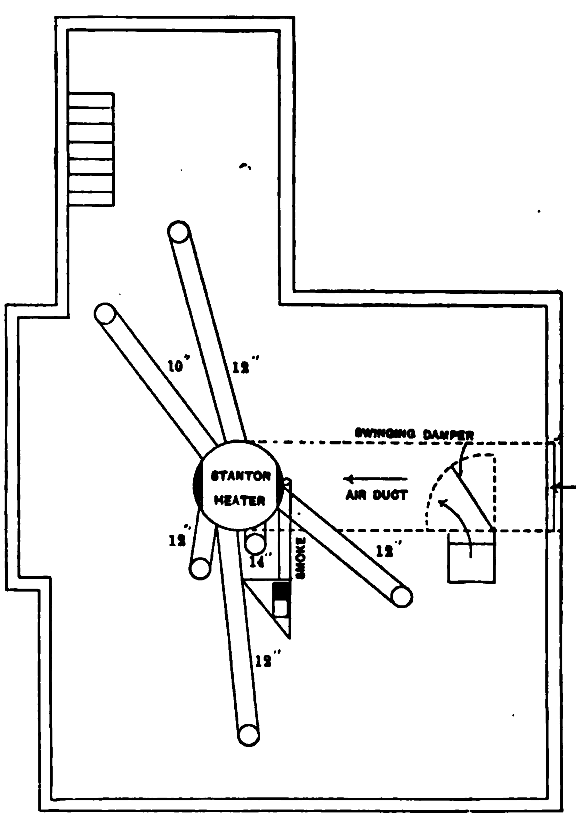



Fig. 3.—Basement Plan.

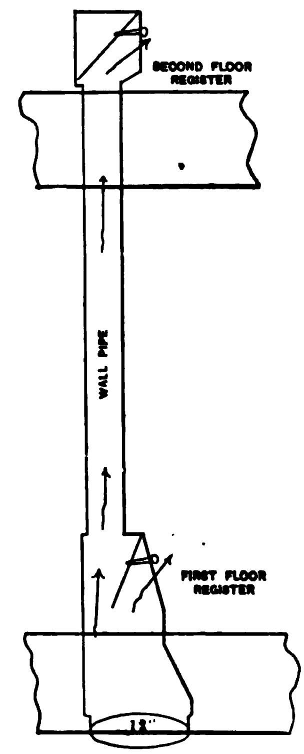



Fig. 4.—Diagram of Style of Riser Used.

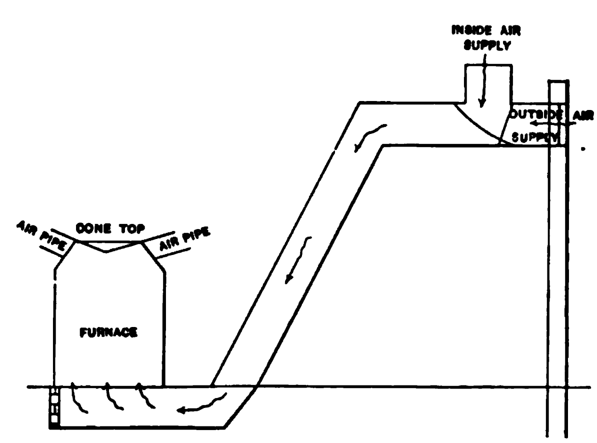



Fig. 5.—Diagram Showing Scheme for Recirculating Air.

*Heating a Dwelling by Hot Air Furnace.*

Aside from the fact that a residence can be heated much more successfully and with less fuel with this system of piping, the cost of installing is considerably less, as fewer elbows, angles, collars, dampers, &c., are necessary, less basement pipe is used, and each wall pipe is 2 feet shorter than in the ordinary system, and a tinner can install a furnace in much less time. It is not necessary to carry half as much stock in the way of register boxes, boots, fittings, &c. Any furnace dealer who has ever given this system a trial will use no other, and it is in the interests of the heating profession that I have carefully enumerated the many advantages to be gained by the use of this system of heating with warm air.

## Repainting an Old House.

In describing his method of painting an old house from which the paint has almost gone a veteran of the trade suggests the following: Very much depends on the condition of the paint that is left on the surface. If it was originally painted with pure white lead, then the surface is powdered and all that will be needed will be to brush it off. But if the old paint is still clinging here and there in scales, while in other places it has peeled to the bare wood, then we have an altogether different proposition. The first thing that must be done is to get the old paint off, and the best thing to do is to scrape it or to use wire brushes. But that may not get it all off. Then, in either case, as the wood is probably very absorbent, I would give the whole surface a coat of oil. The proportions are as follows: To 4 gallons of oil I would add 1 gallon of turpentine and about a pint of good quality drier. After the surface has been oiled and the old paint has softened up the scaling paint can be scraped off, if there should be any remaining. But if the old paint was powdered, then the oil will unite with it. After the oil has dried I would give it two coats of paint in the regular way. That ought to make a good job that will last.

# Comparative Cost of Different Methods of Building Construction.

IN building a house or erecting any sort of a structure the question of cost is one of the leading factors, and some comments on the comparative cost of different materials and methods of construction, suggested by questions which clients most frequently ask, cannot fail to be of interest to a large class of our readers. What we present below are extracts from an interesting article in "The House Beautiful," by Robert C. Spencer, Jr., on the question of cost in connection with the planning of a house.

First.—"Plaster" houses: How much more do they cost than ordinary frame buildings? Compared with an exterior covering of good, well painted siding or shiplap or stained shingles, a three-coat Portland cement plaster covering on metal lath is worth from 3 to 6 cents more per square foot, making no allowance for openings. Plasterers' estimates vary widely on this class of work, it being comparatively new. The frame exterior is, of course, quite variable in cost, depending upon locality, kind and grade of material used, and whether it will be stained or painted. One good brush coat of creosote stain costs about half as much as two coats of paint over priming. The metal lathing and cement finish can be roughly estimated at 10 cents per square foot, shingles at 4 to 7 cents, and stain at 1 cent for each coat, as a basis of comparison. Any carpenter can quote the current local price for shingling with a given kind and grade of shingle.

BRICK VENEER.

Brick veneer construction with a good "sand mold" or paving brick ought to be had for 5 or 6 per cent. more than metal lath or plaster. Solid brick exterior wall construction will vary from 10 to 20 per cent. above plaster, the price of brick being exceedingly variable, according to locality and quality of brick. Good "sand molds" or "pavers" can be had at country yards at from $6 to $9 per thousand, while the finest fancy face bricks cost as high as $50 in city markets.

Impervious face bricks of all shades, beautiful in color and texture, are sold in the local market at $26.

With the steadily rising price of good shingles, the comparative cost of tile and slate roofs is becoming a question of interest to builders of good houses. At present a roof of the best shingles costs nearly half as much as tile, and will require renewing or extensive repairing in from 10 to 15 years. Shingles will cost from 5 to 7 cents a square foot in the roof; tile, 14 to 16 cents. Copper for flashing, &c., instead of tin, zinc or galvanized iron, must accompany the tile, and is, of course, an added item of expense; but for a permanent home, of otherwise substantial and durable construction, a tile roof is a wise investment. Slates are seldom as agreeable, either in color or texture, although somewhat less expensive.

For porch floors wood is being supplanted by more durable materials. Exclusive of earth and gravel filling —or steel framing—a good cement floor can be laid for about 17 cents a foot, including wood centering on steel frame, or with a reinforcement of expanded metal or steel rods on earth filling or spans from wall to wall.

Brick paving, exclusive of supporting construction, is worth from 7 to 18 cents a square foot. Good pavers can be bought in central Illinois, for example, at $6 or $7 a thousand. The same grade of bricks in Chicago, owing to trade combinations, transportation charges and middlemen's profits, cost from $14 to $18, or more than double, illustrating the importance of locality in determining the cost of building.

In a country town an intelligent laborer at $2 or $3 for a nine or ten hour day can lay a good brick pavement for porch, terrace or walk. In Chicago the same work must be done by a union mason at the rate of 65 cents an hour for an eight-hour day, unless no other work remains to be done on the premises—in which case union restrictions can be ignored.

The cost of house building, except perhaps in times of panic and rapidly falling prices, is commonly underestimated. There are three prime factors in underestimating: Clients expect too much as a rule for their appropriations, being misled by a vast amount of garbled misinformation as to the cost of building. Warned by friends against the traditional extravagance of architects, they purposely and with malice aforethought usually understate their appropriations from 10 to 50 per cent. Knowing from experience that clients usually so understate their price limits, architects are inclined to be too optimistic, and too ready to attempt to plan a $10,000 house to fit a limit of $6000, a condition of affairs unbusinesslike, though common, and full of trouble and disappointment for both parties.

A written agreement or contract entered into before a line has been drawn would prevent those misunderstandings which often occur between the fairest and most reasonable men, having the best of intentions, but quite opposite points of view.

Such a contract, being for professional and therefore flexible and not strictly definable or limited services, cannot be absolutely hard and fast, like an ordinary business agreement, but it should stipulate as to fees and terms of payment and the amount of appropriation, and might, with fairness to both parties, provide that in case the cost is exceeded by over 15 per cent. the preparation of new or revised plans should be at the architect's expense, if a reduced scheme be acceptable to the owner. An absolute guarantee of cost cannot reasonably be asked of an architect unless he be paid an extraordinary fee for the gambling risk involved, as too many of the conditions affecting cost are not strictly under his control. No accurate estimate of cost can be made except upon very complete working plans and specifications, and then only by experts in that particular line, which few architects ever pretend to be. An architect is employed chiefly in planning and supervising the erection of the buildings, not in making detailed estimates of cost, which can only be prepared closely by experts in close touch with the markets and thoroughly familiar with every detail pertaining to the cost of labor and materials. Even with their supposed knowledge of prices—a knowledge upon which business success or failure must largely depend—the bids of contractors vary widely for the same work. For example, the writer has had bids varying 100 per cent. on a very modest home, while variations of 25 per cent. between highest and lowest bids are common.

PRICE OF A BUILDING.

The price one must pay for a building is not always the actual cost of labor and materials plus a fair profit, but what the lowest available bidder in a particular locality is willing to accept. Sometimes the lowest available bidder asks an undue percentage of profit—sometimes he is very anxious for the work or makes a mistake in his figures and does the work at about cost or at a loss. It seems fair, however, that a limit should be fixed by mutual agreement as above requested in order to protect both parties, the one from extravagance, the other from unreasonable demands. While this question of the architect's responsibility as to cost has given rise to no little litigation, there is no established American precedent, but the English courts have decided that architects are entitled to a margin of 15 per cent.

In the foregoing statements concerning cost of building the item of architect's fees has not been included. It should be understood in the preliminary agreement whether or not the amount of the architect's fee is included in the preliminary estimate. As to the cost of architect's services to be added, they vary from 3 to 10 per cent. The common idea that 5 per cent. is a standard fee for residence work is a mistaken one. Good modern work of this class, with its multiplicity of small details and the amount of personal attention required in proportion to the cost of the building, cannot be done with even a modest living profit at less than 7 per cent., and for small work, carefully done, 10 per cent. is not too high. There are in Chicago 15 or 20 architects who charge 7 or 8 per cent. for residence work, and at least two who charge 10, no matter how great the cost. The "5 per cent." fixed in the public mind is simply a minimum recommended by the American Institute of Architects as a general minimum. A skilled artist, whether a painter or an architect, cannot be expected to create a fine piece of work for the hire of the ordinary craftsman. In all other professions the fees vary according to personal skill and reputation.

It is for each home builder to determine for himself whether it is worth his while to pay what appears to be a high price for the personal service of a skilled designer, to pay the usual fee for mediocre service, or to save on cost of plans by using ready made "plan factory blue prints" while running the risk of large extras and other similar troubles. The majority will continue undoubtedly to take the middle course.

This article would scarcely be complete without a few words on the subject of extras. There is nothing connected with the operation of building a home which is more dreaded than a large bill of so-called "extras," a dread which is founded upon the many unfortunate experiences of those who have gone into building without sufficient care and thought as to their real needs and requirements, or whose architects have been too much hurried in the preparation of plans and specifications.

It is almost inevitable that there will be a few extras involved in the erection of any building, no matter how thoroughly and conscientiously the plans and specifications have been drawn; but the percentage of extras due to oversights in planning and specifying or to afterthoughts of owner and architect should always be small. Abundant time should be given to planning a home, and an architect should not be hurried on this class of work if haste can possibly be avoided.

The owner, on his part, should take sufficient personal interest in the work to carefully go over the plans and specifications in detail with his architect and satisfy himself in so far as a layman may where technical matters are involved that the documents from which the building is to be erected completely embody his requirements in every way before contracts are let. As far as possible everything pertaining to the building should be contracted for or the cost otherwise closely estimated before the work of construction has begun. Changes or additional work should not be ordered without an agreement beforehand, preferably in writing, as to their cost if the amount is at all considerable.

Contractors as a rule charge all they dare for extra work where no price is stipulated beforehand. Occasionally it is true that extra work is found necessary, the amount of which cannot be closely determined until it is done, in which case, with a fair and honest contractor, it may be better to order the work done and pay for it according to the expense involved: but the above advice as to definite agreement on price should be followed.

In the erection of a large residence the owner should employ a clerk of the works who can keep track of labor and material involved in such extras as it may seem best to order without agreement as to price, and thereby guard against extortion on the part of the contractor. In short, eternal vigilance is the price of a good house built to suit the owner's needs and the owner's purse.

## Rapid Construction Work.

An interesting instance of rapid construction work is found in connection with the new building in process of erection immediately adjoining the present Marlborough Hotel on the Boardwalk at Atlantic City, N. J. On June 17 the site on which the building is being erected was absolutely vacant and on November 1 the completed hotel, with 250 rooms and rising to a hight of six stories, will be turned over to its owners, ready for decoration and furnishing. The building is for the Annex Company and is being put up by the National Fire Proofing Company. Stretching 425 feet back of the Boardwalk, the new building varies from 50 to 125 feet in width at different points. One of its fetaures will be a great sun parlor extending around the front part of the building on the second floor. This sun parlor will have an outlook up and down the Boardwalk. It will be 25 feet wide and will contain six fire places of unique design, thus making the parlor particularly attractive in winter. There will also be a sun parlor stretching entirely along one side of the building. In fact, the entire second floor will be inclosed only with glass on one side.

The structural part of the building is composed largely of hollow tile reinforced by a special steel bar. There are no large steel girders or beams in the structure. The outer walls are to be of hollow tile with pebble dashed exterior finish. The use of hollow tile building blocks and fire proofing in this wholesale manner marks a distinct departure in building methods.

Another noteworthy feature of this hotel will be the fact that every room will have a bath and bay window. The hotel structure rests on 1300 piles, which are driven into the sand to a depth of 20 feet, considerably below the water line, by jettying—that is to say, holes were bored for the piles by powerful streams of water. No excavating had to be done at all. Engineers say, however, that the bath of salt water which the wood piles obtained in this jettying process will make them virtually everlasting when strongly surrounded by the abutting sand below the level of low water.

## Classes in Plan Reading and Estimating.

A series of classes which cannot fail to prove of more than ordinary interest to men desirous of making progress in the building trades has just been organized at the West Side Young Men's Christian Association, 318 West Fifty-seventh street, New York City. An idea of the scope of the course of instruction may be gained from the statement that it is the intention to teach general building construction, estimating and drafting to superintendents, foremen, clerks, mechanics, real estate men, &c. The course also includes a series of illustrated lectures on construction for the purpose of enabling the men to thoroughly understand every part of a building. These talks will not be highly technical, but sufficient for general work, and the illustrations for the most part will be from actual buildings. Groups of not over 20 men each will be in charge of practical estimators, who will take up the work of the various building trades. Plans and specifications, together with working drawings of actual buildings, will be used. The entire course is to be under the direction of L. E. Jallade, architect, who has engaged the following assistants:

Charles E. Hume, General Building, of Alfred Beinhauer, builder.
Joseph W. Cody, Excavating and Shoring, ex-Emergency Chief of the New York Building Department.
Charles E. Stanton, Sheet Metal Work, with A. J. Ellis Company.
Louis Kreis, Cut Stone, with John R. Smith's Son.
Edward Raque, C. E., Steel, with Post & McCord.
Jacob M. Kraft, Plasterer, with McNulty Bros.
Alfred W. Morris, Carpentry, with Robert Kellough & Co.
J. F. Burrowes, Ornamental Iron, with J. B. & J. M. Cornell.
Charles R. Ten Eyck, Terra Cotta, with New York Architectural Terra Cotta Company.
John Dalglish, Hardware, with Yale & Towne.
Henry M. Ritter, M.E., Heating, with Francis Bros. & Jellett, Inc.
J. R. Shields, Electric, with Francis Bros. & Jellett, Inc.

A drafting class, intended to meet the needs of men who desire instruction in drafting, will be in charge of Architect L. P. Hutton. The classes opened on the evening of October 2 and will continue for four months.

Classes were opened for the first time in New York in September of last year at the Fifty-seventh street branch of the Y. M. C. A. with an enrollment of 80 pupils and proved very successful. This year it is expected that the classes, based upon the experience of a year ago, will be of still greater value. Prominent architects, engineers and builders have promised to give the classes short talks on various topics connected with the building business, so that the entire course should interest architects as well as builders and mechanics.

## Gutters in Wood Work.

Two different types of boxed-in gutters, designed not only to carry away rainfall but also to prevent any damage by snow slides, are the subject of the accompanying illustrations. On flat roofs having a slope of less than 2 inches to the foot there is, of course, no need for protection against snow slides—at any rate, in the case of porch roofs where the snow will melt and run off before it slides.

The gutter shown in Fig. 1 is finished with 20 x 28-inch terne plates made up in rolls 28 inches wide. The strip of tin extends upward underneath the shingles about 12 inches, where it is fastened, while the lower edge projects straight downward over the cornice, forming a drip edge, so that water collecting toward the edge of the gutter can fall clear of the cornice. This makes a gutter wide and deep enough for an ordinary roof. If a more ornate finish is desired, it may be secured by soldering a ½-inch roll on the drip edge described, this arrangement not interfering with the free fall of the water.

The gutter shown in Fig. 2 is applicable to flat roofs. The particular style is shown as a part of a porch roof, made wide to accommodate the architectural conformation of the bracket and cornice. This is a form of construction such as may be used to extend an old roof line to improve appearances. The tin of the roof is formed into the shape of a gutter on the new wood work and carried over the edge of the cornice, as in the case of the gutter shown in Fig. 1. The gutter of this description provides a wide waterway and can be easily placed on an old building to take the place of a hanging gutter.

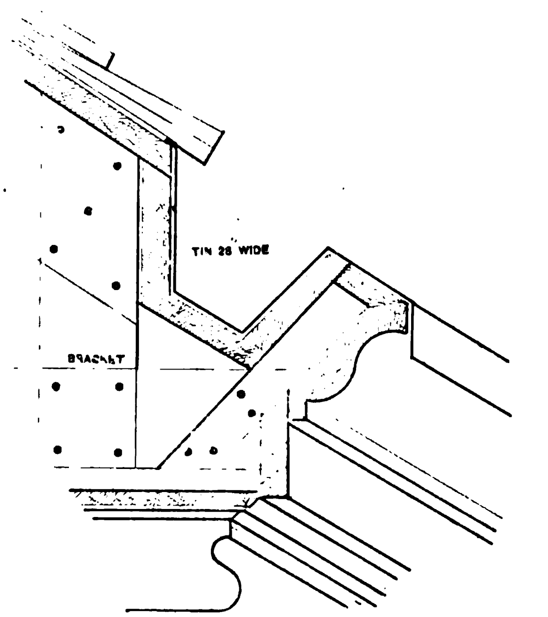



Fig. 1.—A Cornice Gutter.

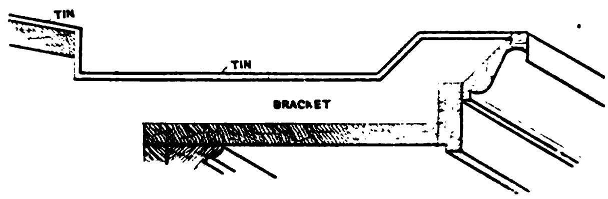



Fig. 2.—Gutter on Porch Roof.

*Gutters in Wood Work.*

## A Notable London Building.

The most remarkable building upon London Bridge after the chapel was the famous "Nonsuch House," which, from the arms over the archway, appears to have been of the Elizabethan age, and from other circumstances to have been erected in that city a short time prior to the year 1585. This singular and very curious building was constructed in Holland entirely of wood, and being brought over was put together with wooden pegs only, not a single nail being used in the whole fabric. It stood to the north of the drawbridge, over the seventh arch from the Southwark end of the bridge, overhanging the river on each side. At each of its corners was a square tower, crowned with a Kremlin spire and in the center a rich, elaborately carved gable. It was four stories in hight, the whole was richly ornamented with carved panels and gilded and jasper colored columns. In the front was a profusion of transom casement windows, with carved wooden galleries before them. Over the archway, which was the width of the drawbridge, were placed the arms of St. George, the city of London and those of Elizabeth, viz., France and England, quarterly, supported by the lion and dragon.

## New Publications.

**Wood Turning.**—Edited by John Black; 92 pages. Size, 5 x 7¼ inches. Numerous illustrations. Bound in paper covers. Published by the Industrial Publication Company. Price, 25 cents.

**Glazing.**—Edited by John Black; 94 pages. Size, 5 x 7¼ inches. Bound in heavy paper covers. Published by the Industrial Publication Company. Price, 25 cents.

These two little works constitute Nos. 14 and 15 of a series of technical manuals of the trades addressed. In the case of the work on "Wood Turning" the matter is contained in eight chapters, one of which, entitled "Turning Classic Columns," is made up of illustrated articles which appeared some time ago in *Carpentry and Building*. Attention is given to the wood turners' lathe and details, the tools which are required in executing work as well as to the decorative side of wood turning, in connection with which special lathes are described and examples and methods of making simple turned articles in the lathe are presented.

The work on "Glazing" consists of nine chapters, of which the early ones relate to the invention and manufacture of glass, tools used for cutting glass and the art of doing the work. There is a chapter on design for stained glass, another relates to firing patterns, &c., while others are devoted to etching and embossing on glass, stained and painted glass, planning and placing windows, and finally wooden moldings or astragals. Both books are written from an English standpoint, but embrace articles taken from some American trade papers.

## Test of Fire Proof Construction.

A rather singular and at the same time severe test of fire proof construction was recently made in New York City in a new 16-story skyscraper housing a factory that uses paper, printing inks and other inflammable materials, with hundreds of employees. The test was conducted by Prof. Ira H. Woolson of Columbia University, who authorized a testing chamber of brick to be built on one of the floors of the structure. This was a square hut, 6 x 8 feet, with the ceiling for its roof, designed to bring intense heat to bear upon the cinder concrete protecting steel girders. The New York Fire Department sent a squad of firemen, instruments for measuring great degrees of heat were installed, and when all was ready a fire of dry pine was started in the test chamber. In a few moments a conflagration of utmost fierceness was raging against the ceiling and the instruments began to register extraordinary degrees of heat. One thousand degrees F., then 1500 and 1700, until finally, at the end of 2 hours and 15 minutes, 2112 degrees was recorded, which is higher than the fusing points of zinc, silver, copper and gold. Then the word was given and the firemen threw a 60-pound stream of water into the chamber, reducing the heat in a few moments fully 1500 degrees. The cinder concrete held under this test, while the girder which it protected was deflected less than ¼ inch. Virtually no fracture or impairment was found.

This particular building is cited as a high example of American fire resisting construction. Some weeks later it was inspected by three municipal fire and building experts from Hamburg, Germany, who stated that German engineers had been inclined to accept American fire proofing claims with a grain of salt until the Baltimore fire. That furnished so phenomenal a test that a commission was sent from Hamburg to examine the ruins. Typical fire resisting buildings in various cities were also visited. The Germans found much to praise as well as some things that were new to them.

The cost of the building on which the fire test was made is said to have been in the neighborhood of 26 cents per cubic foot. This is regarded as economical in a fire proof manufacturing building of great hight. Cost of fire proofing is sometimes placed at 10 per cent. in addition to cost of slow burning construction, but in reality it varies widely in different types of buildings. Construction cost increases in direct ratio to hight. Fire proof buildings of ten stories can be erected for as low as 14 cents per cubic foot, while 20 cents is a liberal allowance. Large office buildings of 16 stories cost from 30 to 35 cents. The cubic foot cost of New York City's new Hall of Records was $1.

## Terms of Settlement of Sheet Metal Workers' Strike.

As noted in our last issue, the strike of the Amalgamated Sheet Metal Workers of New York was suddenly terminated September 13, the men to return to work pending arbitration of the trouble. Before, however, this could be done the Executive committees of the workers' and employers' organizations found after protracted joint sessions designed to clear away minor differences that they were able to adjust all the matters at issue. The men were given $4.50 a day, as against $4 heretofore. An exception was made in the case of the metal ceiling workers, who will be advanced by stages, reaching $4.50 in one year. The workers not only waived their demand for further restriction of the number of apprentices, but agreed to an increase in the scope of work that may be done by apprentices, according to a contention the employers have made for years.

The new agreement cannot be changed before January 1, 1908, and not then unless notice is given by either party prior to June 1, 1907. If no such notice is given it will continue from year to year unless notice is given before June 1 in any twelvemonth. Four associations of employers were included in the settlement, representing, respectively, the master steam and hot water fitters, the metal ceiling manufacturers, the employers of roofers and sheet metal workers and the manufacturers of metal covered doors and windows.

WE have received from Secretary Glenn Brown a copy of the proceedings of the thirty-eighth annual convention of the American Institute of Architects, held in Washington, January 11, 12 and 13 of the present year. It makes a volume of 273 pages, for in addition to the proceedings of the convention are lists giving the names of the founders of the institute, the professional members, fellows and associates, the officers, committees and members for 1905, a list of the chapters of the organization, together with the addresses made on the occasion of the annual dinner, January 11, at which many notables, including the President of the United States, were gathered.

WHAT is said to be the only building in Columbus, Ohio, constructed on a system of cantilevers is the new structure which is in process of erection for the Capital Savings & Trust Company. A base for the cantilevers was not found until the contractors had excavated 30 feet below the level of the street. A quicksand was encountered, rendering the work extremely difficult, and after 130 tons of steel had been placed in the ground only a few iron girders were visible to give an idea of the extent of the work which is required to prepare substantial supports for the proposed 16-story building.

## Prizes for Papers on Manufacture of Concrete Blocks.

The prizes offered by *Engineering News* and the *Cement Age* of New York City for the best papers on "The Manufacture of Concrete Blocks and Their Use in Building Construction," have just been awarded by the jury, which was composed of Messrs. Robert W. Lesley, past-president of the American Cement Manufacturers' Association; Richard L. Humphrey, president of the Cement Users' Association; and Prof. Edgar Marburg, secretary of the American Society for Testing Materials.

The first prize of $250 was awarded a paper by H. H. Rice, secretary of the American Hydraulic Stone Company, Denver, Col. The second prize of $100 is given to a paper by Wm. M. Torrance, C. E., of New York City, assistant engineer in charge of concrete-steel design for the Hudson Tunnel Company.

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SUPPLEMENT CARPENTRY AND BUILDING, NOVEMBER, 1905.

# CARPENTRY AND BUILDING

WITH WHICH IS INCORPORATED
THE BUILDERS' EXCHANGE.


DAVID WILLIAMS COMPANY, - - PUBLISHER AND PROPRIETOR
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DECEMBER, 1906.

### Moisture in Heating Systems.

This is the season when the doors and windows of our dwellings will be closed and strict attention given to the warming of the various rooms. While many heating systems will provide for their owners a comfortable temperature and a sufficient degree of ventilation, the trend of all heating apparatus in the last few years has been away from the provision of apparatus designed especially to supply moisture to the air. People do not realize to what extent their troubles arise from an atmosphere that is too dry. Different authorities do not agree fully as to the normal humidity, but somewhere between 50 and 70 per cent. is less disagreeable than a drier atmosphere, and the German laws require heating contractors to provide means of maintaining a humidity of 50 per cent. The difficulty of telling exactly what the humidity of the atmosphere is with the best instruments for the purpose has resulted in few people possessing any devices for getting even an approximate idea of the humidity. In fact, the effect of humidity is not sufficiently explained nor is the attention of the people called with sufficient frequency to the subject. Our daily papers all through the year give the maximum and minimum temperature and call special attention to great changes in temperature. They seldom or never call attention to any great change in the humidity, except, perhaps, in summer, and the majority of them do not give the humidity in connection with the temperature. In the summer season the humidity is more to blame for the excessive oppressiveness of some days than the temperature. Not infrequently there is no change in temperature yet a considerable relief from the oppressiveness is felt, due entirely to a drying wind which reduces the relative humidity.

### Relative Humidity in the Air.

There are, however, hygrometers which tell by a direct reading with sufficient correctness the relative humidity in the air either in summer or in buildings in winter. The early manufacturers of hot air furnaces included a vapor pan or water pan in their construction. Of late years many have failed to furnish this important part of the furnace equipment from the fact that furnacemen and their customers do not demand it. This was a small saving in the wrong direction. Rather the literature should have explained the necessity of using the water pan, keeping it clean and well filled, so that the moisture resulting from evaporation would have made the atmosphere in the building more agreeable and prevented and dryness of the eyes and other exposed and tender membranes which often produces an inflammation when there is too great dryness. Early heating contractors with steam and hot water provided wide shallow pans to be used in connection with radiators to insure the evaporation of water. Within the past two or three years more attention has been paid to the moisture in the atmosphere by physicians and heating engineers than heretofore. The result has been that a number of devices have been put on the market for use in connection with furnaces and steam and hot water heating apparatus. Careless people are not likely to purchase such apparatus unless it is specially brought to their attention when profit can be derived. Then careless people, even though they purchase and possess apparatus for supplying the needed moisture, are apt to neglect its use and not derive the benefit which it should provide. This, however, is not a sufficient reason to discourage the heating engineer from explaining the necessity of artificial moisture in a building.

### A Mammoth Apartment House.

What will take rank as the tallest and largest structure of its kind in this country, if not in the world—a designation of no mean significance—is the 20-story elevator apartment house which will soon rise on the entire block bounded by Broadway, West End avenue, Seventy-eighth and Seventy-ninth streets, New York City, and will cost in the neighborhood of $3,000,000. It will be a combination of both apartment house and hotel, and will be thoroughly up to date in all its appointments and equipment. At present the excavation work is in progress for the foundations, and some idea of the area involved may be gathered from the statement that the plot measures 200 x 250 feet. The plans, which have been prepared by Clinton & Russell, architects, show that the smallest regular apartment in the building will consist of four rooms and the largest of 18 rooms, all having every modern convenience and many which are not to be found even in what are regarded as thoroughly up to date hotels. On the subway level in Broadway there will be a restaurant, café, palm rooms, lounging rooms, &c., while a mezzanine floor will be so arranged as to provide for a banquet floor and ballrooms, the rest of the building being devoted to apartments. The main entrances will be on Broadway and West End avenue. This mammoth apartment house is being built by William Waldorf Astor and will constitute an important addition to the many magnificent structures now dotting the city due to investments by the Astor family.

### A Classic Bank Building.

The most notable of the buildings to be erected in San Francisco in the next few months is that of the Bank of California, which will cover the site of the present bank, but will occupy a larger area. According to the plans prepared by Bliss & Faville, the exterior effect is that of a one-story building of classical design, although there will be two floors. There will be a frontage of 87½ feet on California street, 124 feet on Sansome street and 87½ feet on Halleck street, with a hight of 70 feet. The architectural scheme is that of a colonnade of Corinthian columns, between which are screens of bronze grilles and glass to admit light. The classical design and many details of the structure are taken from ruins in the Roman Forum. The columns are 50 feet in hight, precisely the same as those of the Temple of Jupiter Stator. California granite is the material chosen for the work. The interior will be of grand proportions, one large banking room covering the entire building lot and reaching to a hight of 50 feet. Pilasters on the sides of this room will support an ornamental ceiling and the general effect will be the same as for the exterior. The interior finish will be of marble and mahogany throughout the building. Above the banking room, but concealed by the balustrade, will be two rows of offices for the officials of the various departments connected with the bank. These will be reached both by an electric elevator and by a staircase. Modern furniture of the best designs will be installed, harmonizing with the rich yet sober decorations. Work will be commenced on the concrete foundations of the new building in January.

## Death of F ank Eugene Kidder.

Thousands of readers of this journal will share with us a feeling of profound regret at the death of Frank Eugene Kidder, which occurred on the morning of October 27 at his home in Denver, Colo., and which was due to the results of an operation performed two weeks previously for the relief of a chronic stomach trouble. Although in poor health for a long period before he seemed after the operation to be making good progress for a time, but his physical strength was not equal to the task imposed upon it.

Mr. Kidder was born in Bangor, Maine, on November 8, 1859, and graduated from the Maine State College in 1879, receiving the degrees of C. E. and Ph. D. Later he became a student in architecture at Cornell University and the Massachusetts Institute of Technology. He was connected with prominent architectural offices in Boston and New York City, and for a time practiced the profession in the former place. He then moved to Denver, Col., where he has resided for the past sixteen years.

Mr. Kidder was considered an authority on all classes of building construction and had an extensive practice as consulting architect. He was long known to the readers of *Carpentry and Building* through his many valuable articles dealing with the strength of beams and floors, designing and proportioning of roof trusses, methods of figuring stresses, &c., and for his comments upon letters relating to these subjects which have appeared in the Correspondence Department.

He was author of the "Architects' and Builders' Pocket Book," a volume at present widely in use and regarded as an authority in its line; of "Churches and Chapels," "The Strength of Beams, Floors and Roofs," made up of the author's articles which had appeared at intervals in the columns of *Carpentry and Building*, and several volumes used as text books on "Building Construction and Superintendence."

At a recnt meeting of the Colorado Chapter of the American Institute of Architects suitable action was taken touching the death of Mr. Kidder, who was one of its most prominent members. He served as its president during the years 1903 and 1904, and his name was enrolled in the membership of the American Institute of Architects as Honorable Fellow. After briefly reviewing his life and making mention of the works which have issued from his pen the chapter voted to inscribe upon its records the following tribute to his memory:

"He was a kindly, Christian gentleman and his good offices will be sadly missed in the community in which he lived and labored. In sincere friendship and love we inscribe upon the records of our chapter these inadequate notes to his memory and extend to his bereaved family our heartfelt sympathies."

## German Workmen's Homes.

That a great deal is being done in Germany for the benefit of the working people is prominently shown in the efforts which are constantly being put forth to provide the laboring classes with suitable dwellings. The large manufacturing establishments, such as Krupp and others, municipal bodies, charitable organizations and private speculators, each and all have done much toward bettering the hygienic conditions and general welfare of the skilled workman and his family in every part of the Empire. Since 1842 the Prussian Government has expended in the mining district of Saarbrücken about £400,000 in favor of the coal miners resident in that region. It was intended at first that the money thus invested in dwelling houses should draw 4 per cent. interest, but later on a better method which enabled the miner to repay the loan by monthly installments, unencumbered by interest, was introduced. Similar methods were adopted with success by the Royal Munition Factory at Spandau. The building societies of Gladbach, Barmen, Dresden and other cities of the Empire have also proved to be a success in this regard.

Without question, the Krupp establishment at Essen takes the lead in providing comfortable houses and cottages for the laboring classes. In 1901 the value of the dwellings used exclusively by workmen was £750,000. There were 1660 houses of two rooms each, 1869 houses of three rooms each, 448 houses of four rooms each, 150 houses of five rooms each, 63 houses of six rooms each and 84 houses of seven rooms each, making a total of 4274 houses.

It is claimed by those in a position to know that the cottage system is superior to flats from nearly every point of view; but in Germany it is not always an easy matter to build cottages owing to the high price of lots, and the lack of rapid transit facilities is often against constructing such dwellings in the suburbs of the city, while the factory may by chance by situated in the center of the same. Another point against the cottage system which presupposes a yard or lawn in connection with it is the fact that there is a greater expense attendant upon keeping up a colony composed of such dwellings than is the case with compartment houses or flats. During the past ten years a great improvement has also taken place in the conditions surrounding the dwellings of those laborers who must depend upon themselves for securing suitable places to live in. The increased attention on the part of municipal authorities to sanitary arrangements and the police laws against too many people occupying one room have had a salutary influence.

## Convention of Brick Manufacturers' Association.

After carefully considering the attractions of the various cities extending invitations and the availability of each for the purpose, Theodore A. Randall, secretary, makes the announcement that it has been determined to hold the twentieth annual convention of the National Brick Manufacturers' Association in Philadelphia, Pa., on February 5 to 17, 1906. As in former years the American Ceramic Society will hold its meeting the first of the week stated and the session of the brick manufacturers will follow. It is the intention to have but one session a day, thus affording visitors ample opportunity for sight seeing. The hotel headquarters will be at the Continental, where a Convention Hall and Exhibition Room will be provided. An interesting programme is being prepared, full particulars concerning which the secretary will announce later.

## Convention of Sand-Lime Brick Manufacturers.

The annual convention of the National Association of Manufacturers of Sand-Lime Products will be held at Hotel Cadillac, Detroit, Mich., December 5, when a number of interesting papers dealing with sand-lime brick will be read and discussed. Prominent among these papers may be mentioned "The Characteristics of a Good Sand and Its Proper Preparation," "Lime and Its Relations to Sand-Lime Products," "Best Method of Hydrating and Grinding Lime," "Coloring Matter for Sand Stone Brick," "Standardizing Sand Stone Brick," "Coloring Brick," and "Sand Stone Brick from the Architect's Standpoint." There is also promised a paper dealing with the material from the contractor's standpoint.

According to the plans which have been filed for the new hotel to be built on the site of the old Plaza, Fifth avenue, Fifty-eighth and Fifty-ninth streets, the structure will be 18 stories in hight, with mansard roof and façades of brick trimmed with limestone and terra cotta. It will have a frontage of 200 feet on the plaza and 125 and 250 feet on Fifty-eighth and Fifty-ninth streets, respectively. The architect, H. J. Hardenberg, places the cost of the new building at $2,500,000. The building contract has been awarded to the George A. Fuller Company of New York City.

# FRAME HOUSE IN BROOKLINE, MASS.

We have pleasure in laying before our readers this month another very interesting example illustrative of the present tendency toward the use of shingles in covering the entire exterior of a frame dwelling. The house is one recently erected in Brookline, Mass., and represents a type of suburban home of which many are to be found scattered along the eastern coast of the State named. The halftone supplemental plates show the appearance of the finished building, also the interior of the living and dining rooms. It will be seen from an inspection of the elevations and floor plans that the house has a much greater frontage than depth, thus giving space for the principal rooms at the front of the building. On the main floor are living room with alcove, a dining room, a commodious front hall, out of which opens a cozy reception room, a kitchen with pantry, a china closet and a lavatory. On the second floor are four sleeping rooms, out of one of which opens an alcove; a den and two bath rooms.

According to the specifications of the architects, the foundations are of field stone, the portions above grade being of selected Brighton stone laid 1-3 cement mortar, the joints pointed on the outside and finished with raised lines. The cellar floor is graded and has a layer of cement and coarse gravel 2½ inches thick. The building is of frame construction, the timber used being spruce. The sills are 6 x 8 inches, the girders 8 x 8 inches, the joists 4 x 8 inches, the first and second floor joists 2 x 10 inches, the third floor joists 2 x 8 inches, the cellar beams 2 x 6 inches, girts 4 x 8 inches, the studding 2 x 4 inches and 2 x 3 inches, the plates 4 x 4 inches, the rafters 2 x 6 inches, the veranda sills 6 x 6 inches and the veranda joists 2 x 6 inches.

The outside frame of the house is covered with ⅞ matched spruce sheathing boards, which in turn are covered with black Neponset sheathing felt, over which is laid cedar shingles exposed 5 inches to the weather and fastened with galvanized Swede iron cut nails. All other outside finish is of white pine. The roofs are covered with ⅞-inch planed hemlock boards, on which is placed three-ply tar sheathing felt well lapped, this in turn being covered with cedar shingles exposed 4¾ inches to the weather. The valleys are laid close and have pieces of 9-ounce zinc 10 inches square laid in with each course of shingles. An extra width of three-ply tar sheathing paper is placed next to the gutter. The floors of the verandas are of ⅞-inch rift Georgia pine not more than 3 inches wide, while the ceilings are of ¾-inch beaded spruce in equal widths of 2½ inches. All floors have a lining of ⅞-inch square edged hemlock. The kitchen, rear entry, pantry, china closet and second-story halls, as well as living room and two bathrooms, are laid with ⅞-inch rift grain Georgia pine boards not more than 2½ inches wide, matched and blind nailed. All other floors in the first and second stories and the finished part of the attic and laundry are of Alabama rift hard pine, matched and blind nailed, in equal widths of 3¼ inches. The floor in the laundry rests on 2 x 4 inch joists laid in the cement. The unfinished attic has a single floor of square edged spruce. All floors of the first story hall and vestibule, dining room and reception room are of ⅞-inch quartered oak in equal widths of 2 inches. Where the second floor hangs over the veranda or at the ends 1 x 3 inch pieces are nailed to the sides of the joists 3 inches from the top, covered with ⅞-inch spruce boards and filled in to the top of the joists with mortar. There is also thick sheathing felt laid between the floors. All ceilings above the cellar are furred with 1 x 3 inch pieces placed 16 inches on centers and all ceilings of bays and alcoves are furred down to within 6 inches of the window heads.

All walls, ceilings and partitions in the first and second stories and the finished part of the attic are plas-

Front Elevation.—Scale, ⅛ Inch to the Foot.

*Frame House in Brookline, Mass.—Loring & Phipps, Architects, Boston, Mass.*

tered with lime, sand and hair mortar, finishing with a skim coat of fine sand and lime putty. All walls have the plastering carried down to the lining floors. The laundry in the basement has the partitions, walls and ceiling plastered the same as the rooms above. The walls of the bath room and dressing room below the chair rail are plastered with hard plaster. All walls and roof of the first and second stories are back plastered with a heavy coat of rough mortar on 1-inch furring nailed to the boarding between the studding. The space on the sill between the joists is filled up to the floor boards with bricks laid in mortar.

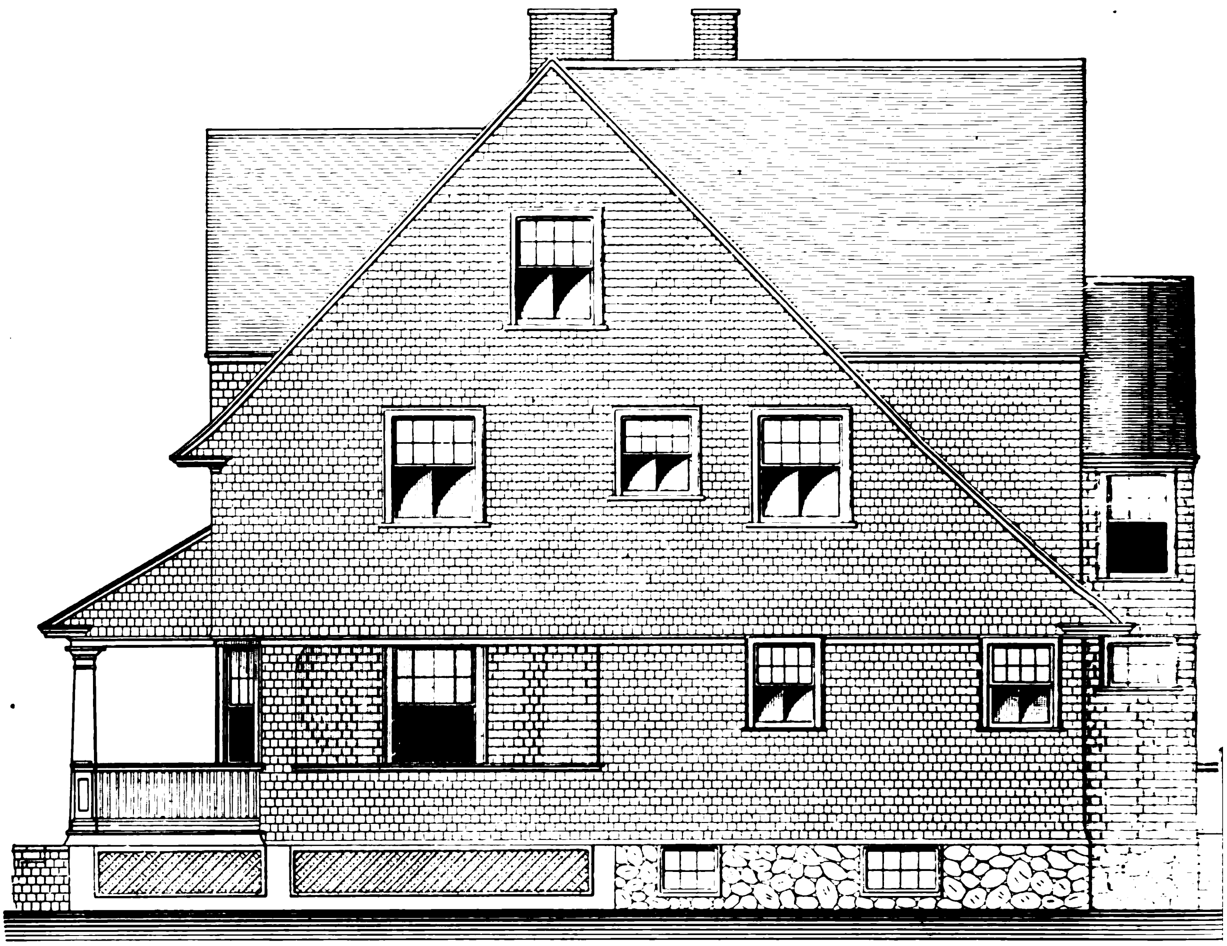
The front entrance and vestibule doors are of white pine 1⅞ inches thick, hung with selected hardware. The doors in the dining room are 1¾ inches thick of quartered oak, 4 panels to a door, and made with ¼-inch veneer. All other doors are white wood of the 4-panel type, 1¾ inches thick.

All inside finish in the dining room is of quartered oak and in the other rooms is of white wood. The kitchen is finished in selected spruce and is wainscoted 3 feet high with ¾-inch spruce beaded strips in equal widths of 2½ inches, fitted with cap at the top. The front stairs have treads, risers and platforms of ⅞-inch oak, while posts and balusters and all other finish are of white wood.

All white wood finish in the hall, living room and reception room has five coats of best lead and oil and one coat of Bigelow's Vitalene varnish rubbed down with pumice stone and water. All other inside white wood finish has four coats of lead and oil. The quartered oak finish has a coat of filling and two coats of Bigelow's Vitalene rubbed down with pumice and water. All oak floors have a filling and two coats of Butcher's floor finish rubbed down and polished. All hard pine floors have two coats of shellac and one coat of wax well rubbed down. The oak treads of the stairs are finished the same as the oak floors. The sashes are stained red and have two coats of varnish, painted white outside. All outside pine finish has three coats of lead and oil ... shingles on the walls and roofs have one coat of ... selected by the owner. The plaster walls of the ... first and second rear entries, pantry and china closet ... four coats of lead and oil. The veranda floors have ... coats of oil and all the wood work of the billiard room has one coat of oil stain and one coat of shellac. The plaster walls below the chair rail of the two bath rooms on the second floor and the hall have one coat of ... and four coats of paint to match the other finish of the rooms.

In each of the two bath rooms is a 5½-inch ... porcelain lined cast iron tub of Peck Brothers & Co.'s make: a plain white 15 x 19 inch basin, with ... nickel plated compression faucets, an Italian marble ... 32 x 22 inches, supported on nickel plated brackets ... a jet syphon "Fort Hill" water closet with nickel ... connections. The servants' closets in the laundry ... in the attic are short hoppers with copper lined ... In the kitchen is a 40-gallon copper boiler with ... connections and 42-inch soapstone sink with brass compression bibbs for hot and cold water, while in the ... closet is a 16 x 20 inch tin lined copper sink. The ... is piped for gas and wired for electric lighting ...

The residence here shown is located at the ... Evans road and Washington street, Brookline, Mass., was recently erected for Mr. George M. Glazier ... cordance with drawings prepared by Architects ... Phipps, 53 State street, Boston, Mass.



Side (Right) Elevation.—Scale, ⅛ Inch to the Foot.

*Frame House in Brookline, Mass.*

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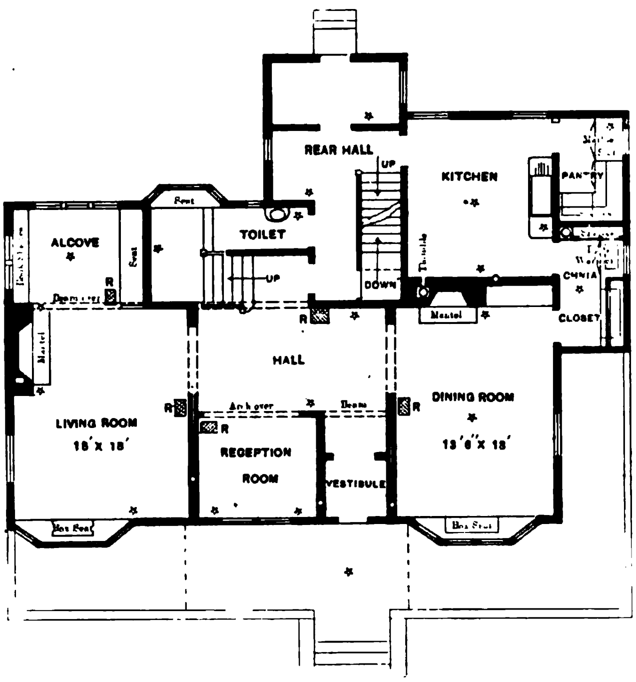
Examples of rapid building construction ... tinually developing not only in connection with ... office buildings but with private dwellings as ... of the more recent instances of quick work ... that of a two-story brick veneer house on Pal... Detroit, which was put up in just two days ... three weeks by William E. Hibbler, a general ... in the city named. The house contains eight ...

finished throughout in hardwood, has hard finish plaster, plumbing, furnace heating, &c., and was finished ready for occupancy in the period named.

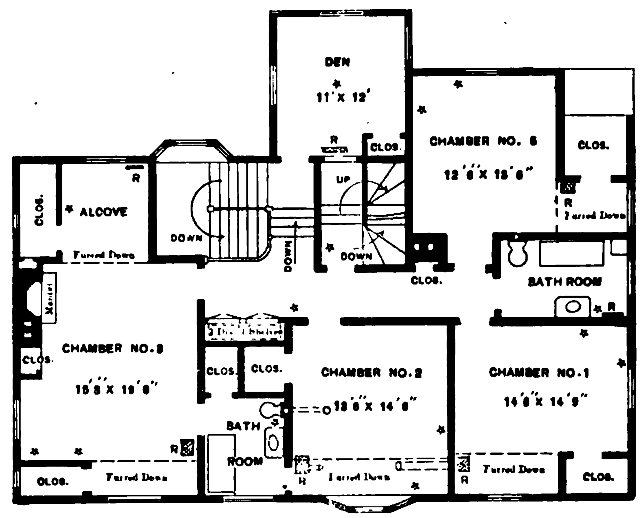
## Test of Concrete.

A large warehouse for a hardware concern in the city of St. Paul, Minn., is being erected of reinforced concrete, and with a view to determining the merits of the work a test on a floor section about 6½ feet wide by 16 feet long was recently made under the direction of W. H. Dillon, the engineer of the Trussed Concrete Steel Company, Detroit, Mich., which has the contract for the work. The initial test was of 43 tons of pig iron after the section had been in about 90 days. Four days later the load was increased to 78 tons, amounting to a dead weight of 1500 pounds pressure to the square foot. The building is to carry a stock of hardware, and is designed to carry a weight of 500 pounds per square foot on the lower floors and 300 pounds on the upper floors. This test is on one of the lower floors and is therefore a load of three times the weight which it is designed to carry.

The deflection under the heaviest weight was practically imperceptible. Two stakes, nailed securely and set firmly in the center of the loaded section, were marked squarely across with a pencil. The deflection was not the width of a black pencil mark.




First Floor.




Second Floor.

*Frame House in Brookline, Mass.—Floor Plans.—Scale,* 1-16 *Inch to the Foot.*

## Winter Roof Gardens.

Our flat city roofs are waste spaces which have been neglected by architects in the past, and with the sunshine and light which can be obtained from the top of the house some way of adapting them to useful purposes seems of paramount interest. The crowding out of light and sunshine in the winter season in our cities is one of the greatest hygienic evils and anything to relieve the situation should receive careful consideration. We suffer from the lack of sun parlors, light sleeping rooms and hygienic, sanitary, well ventilated living rooms. The average office of the business section in the tall sky scrapers is flooded with light and sunshine and occupants of these modern offices live under better sanitary surroundings than the family cooped up in dark or semidark, sunless apartments or houses.

The winter roof garden for the wealthy has been designed in a number of instances by architects, but the need of moderately expensive gardens for the average family home is far more important. The ordinary two and three story house of our cities, provided with a flat roof, with only a slight slope to it to carry off the water, provides almost ideal conditions for winter gardens. In Europe one finds these gardens quite common. In southern Europe they are not heated, but the sun is warm enough to keep them at a temperature sufficient to live in during the daytime. An ordinary stove or grate fire will dissipate any coldness that may gather there in the evening. Hardy plants thrive therein and furnish shade, green and blossoms to make the place delightful.

In our Northern winters the problem of warming the roof garden is in some respects the most formidable, says George E. Walsh in a recent issue of *The House Beautiful.* Dampness there never is in such a garden. The altitude from the street and the daily sun bath keep away moisture and make the roof the most healthful part of the house. This fact alone should be sufficiently important to tempt one to spend the price of a winter's southern trip or a summer's sojourn by the seashore to equip the roof with the necessary apparatus for making it an ideal winter sun parlor.

To cover the roof or a section of it with glass depends a good deal upon the cost of material and the conditions which prevail in each individual case. If one is satisfied with a wooden frame work, partitioned with boards 3 or 4 feet up and then covered with a dome of glass sash, the work is not expensive. Ordinary window pane glass may be employed and wooden sash at little cost will prove satisfactory. A steel or iron frame work with large plate glass on the sides and top, will naturally double the expense, and there will always of course be the danger of breaking the glass. The roof is not the safest place for glass on account of the violent winds which sweep across the tops of the houses and also because of hail storms, heavy snow falls and even flying missiles. Plate glass will not as a rule resist as much pressure as common window pane glass fastened securely in wooden sashes.

A space of 15 feet frontage and 20 feet deep which makes a large room for a sun parlor or winter flower garden can be constructed on the roof with all necessary equipments and details for about $300. It can be done for much less than this if one is willing to do much of the work at odd moments and economize in different ways in using second-hand material.

The upright posts of the garden should be made of pine 4 x 5 inches and 10 feet high. These should be firmly attached to the roof beams by means of L-shaped iron braces and then by supports of wood reaching 3 feet up from the floor. These posts of wood should be placed every 5 feet apart, which would make three in front and back and four on the two sides. When placed in position the side boards should be nailed on to hold them together. Six-inch planking should be used for this, making an inside and outside wall with an air space between. The flooring should be double. The first should be laid with ordinary 6 or 10 inch spruce boards laid diagonally. This flooring should be laid on beams placed across the roof and nailed to each wooden upright post. The top floor of 2 or 3 inch pine or hard wood should be laid over this rough flooring when the roof is inclosed.

The next step should be to make window sash extending from the double wall to the top of the sun parlor, or sash 6 feet long and 4 wide. Double sash should be used with an air space between. Sash like this may be purchased at factories for much less than they can be made by a local carpenter. Make the full measurements of all the sash needed and send to a sash and blind factory for an estimate. The glazing can be done easily at home. Have the window pane glass cut the right size and then with a few tin tacks and putty the glass can be put in the sash at odd moments.

#### Side Frames.

Several of the top sash and side frames should be put on hinges so they can be easily opened to give ventilation. Outside air must be admitted freely to such a parlor and the foul air must be able to escape through the roof sash in order to secure good sanitary results.

The roof is made by crossing from the upright posts beams of the same size. These should cross and be joined together in the middle. If additional strength is needed for such a parlor a single post may be erected in the very middle to support the roof beams. As the wind storms are sometimes very heavy and the pressure of several feet of snow is quite strong this middle support is a precaution that should be wisely considered. Such a central post instead of detracting from the interior effect of the sun parlor. may be made to contribute to its coziness. A flower stand may be built around it and the potted plants grouped in tiers so that the post will be almost entirely hidden from view. Or if it is needed for other purposes use an ordinary cart wheel for a circular seat. Take out the hub and attach the spokes to the central post and build supports for the outside of the rim. Then cover it with pillows, rattan or upholstery work, completely concealing the wheel from view. A most convenient and luxurious circular seat will thus be provided at little expense.

The roof sash should likewise be double. Those arranged to open for ventilation should be equipped with a spring and pulley so they can be manipulated by ropes from below. Such equipments may be obtained at almost any hardware store.

The structure so far should cost not more than $200, including the hardwood floor. The $100 left should be expended on the heating apparatus and shades. Every part of the inside sashes should be covered with window shades. Better results will be obtained if double shades are used. The outside ones should be of some light gray color and inner ones of dark heavy green, so that when pulled down the room will be made almost dark. These shades should all work easily so the light and sunshine admitted can be regulated to suit any plants on any kind of day. In the middle of a sunny day the light will be too strong for most plants and flowers, even when shaded by light colored shades. Often the green shades will be required to keep the sun out of a part of the parlor.

However, as the sun parlor is built for health as much as for flowers, the plants must be grouped so the sun can be admitted in the roof garden a good part of the day. This can be done by grouping the plants which thrive best in the sun in one corner and the semishade plants in another corner. One may then have the sun and shade at all times.

#### Heating.

The heating of such a sun parlor is greatly simplified if flowers and plants are not kept in it, for an ordinary small stove will then provide sufficient heat within a short time after the fire is made. To keep such a stove going all the time requires a little care. The plants must be protected on the coldest night. A good sized coal burning stove, however, of the self-feeding order should prove adequate. Such a stove will not prove an ornament exactly to the room, but after all it gives a cheerful aspect to the cozy sun parlor. A little ingenuity in arranging it so that it will not stand out too conspicuously in the room will make it serviceable without detracting from the general effect. If the house is heated by steam or hot water the problem is simplified by running a few coils of pipes up into the room. It will be found that the double sashes and the double shades when drawn at night time will greatly reduce the expense of heating the roof garden. The cold winds will be modified by the sash and the air space between will retain the heat of the room and keep the temperature from violent changes.

The ordinary house is provided with a scuttle opening to the roof and a rude pair of steps or ladder, but this must be improved to make the garden tempting on sunny days. A pair of pine stairs of easy ascent can be constructed for $10 or $15 and a door which opens upward by means of a spring and pulley placed in position for $10 more. The convenience of access will count much toward making the roof garden popular.

The interior of the roof garden may be decorated with rugs, potted plants, easy-chairs and tables with paper and magazines on them to suit the taste of the owner. The room is susceptible of the most artistic treatment. Everything depends upon the ingenuity and purse of the owner. Both the nerves and constitution of all of us would be greatly improved in our Northern cities in winter if every house were provided with such sun parlors where sun, light and good ventilation could be enjoyed without let or hindrance.

## Coal Tar for Basement Floors.

It was formerly believed and still is believed in many localities, says Edward Atkinson in a report of the Insurance Engineering Experiment Station, Boston, to be necessary either to put a cellar under every building or else to construct a timber and plank floor above the level of the ground. Cellars are apt to be dark, unwholesome and worse than useless under mills, workshops, tenements and single dwellings. Spaces of irregular hight under basement floors are almost invariably dark, damp, and are unwholesome reservoirs in which foul air is generated. Such cellars and spaces are useless and noxious from every point of view and may never be tolerated unless rendered necessary for carrying shafting under the floors, usually a bad method. If such air spaces are required they should be made as light as possible and should be ventilated, even if a forced circulation is required.

The true floor of a basement or of a one-story factory or workshop should be leveled up above the grade with gravel, sand or rubble, Mr. Atkinson holds, and should be thoroughly drained. On this base a thick coating of asphalt or coal tar concrete should be spread. Trenches may be made in which timbers may be imbedded in such concrete. When a plank floor is required it may be laid solid on the timbers, with concrete filling up the spaces, swabbed with coal tar so as to make a complete contact with the under side of the wood and so as to envelop the timber. Wood laid in this way on asphalt or coal tar products will last as long or longer than any other wood in the mill. Mr. Atkinson is acquainted with examples of such work which have been under the supervision of the station for more than 20 years.

If only a solid floor is needed, without planking or timber, the concrete may be finished the same as sidewalks are now finished, and in some places concrete made with coal tar products is, he explains, proving extremely serviceable in place of pavement on roadways. Cement concrete, stone or artificial stone is not advised for basement floors or for the floors of one-story shops. These contain water in a hygroscopic form. Wood laid in or upon such concrete is quickly destroyed. These floors are ready conductors of heat and are therefore very cold to the feet. In many stages of the atmosphere they become absolutely wet, probably from the condensation of moisture from a humid, warm atmosphere.

# CIRCULAR STAIRS OR STAIRWAYS IN STONE.

BY O. H. FOX.

IN considering the matter indicated by the above title it may be stated as a sort of prelude that stairs may be formed of straight flights with the steps supported by a wall at both ends, or by a vault, or the steps may be housed in the wall at one end and left free at the other, while the center of the staircase is an open well hole. In that case the steps are made to rest upon one another

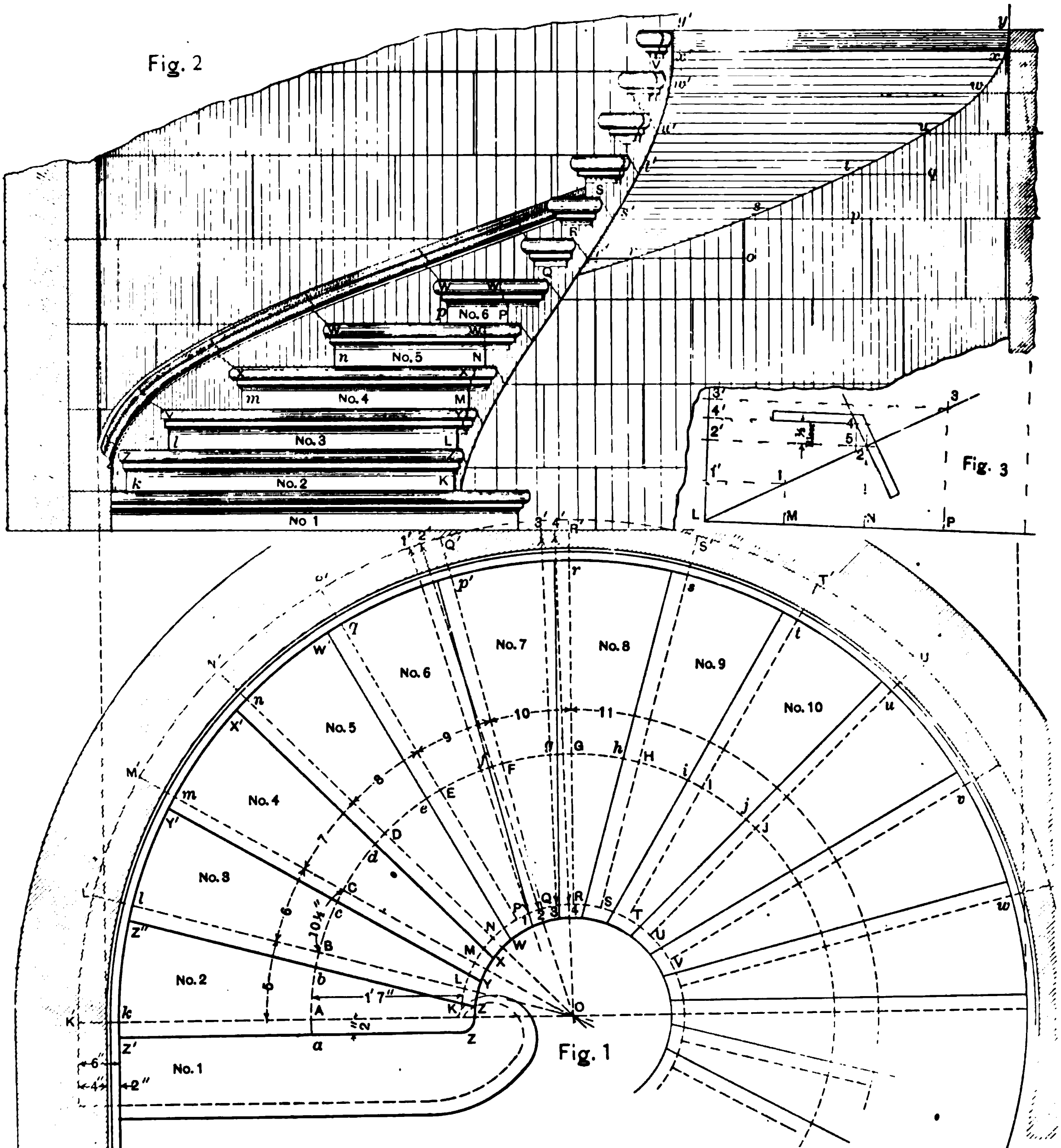



Fig. 1.—Plan View of Stairs. Fig. 2.—Partial Elevation of Stairs.
Fig. 3.—Development of Normal for Forming Joint Surfaces.

*Circular Stairs or Stairways in Stone.*

by joggled joints, such as are shown by X Q L and M Q L of Figs. 5 and 6 of the accompanying diagrams. The joint on the lower step is called a "back rebate" and in the upper step a "bird's mouth." If the well hole is curvilinear, as shown at Z, Y, X, W, of Fig. 1, the stairs are called geometrical, or better known to stone cutters as "winding stairs." In geometrical stairs, the widths of the steps vary from one end to the other, but the proportion of treads to risers is fixed on a line parallel to the well hole and at a distance from it, such as persons going up or down the stairs would naturally take, and where, on this account, the top of each step or tread should have a uniform breadth. This tread, added to the hight or rise, is usually assumed at 19 inches as a convenient distance for each step. A man's step is about 25 inches on the level and 12½ inches in going up a ladder. By combining these two facts we obtain for the formula $T + 2R = 25$ inches, in which $T$ = tread, $R$ = riser, as the basis for finding the proper proportion of tread to riser.

If $T = 12$, then $R = 6\frac{1}{2}$: if $T = 9$, then $R = 8$, &c., but the riser can only vary between the limits of 4½ and 8 inches.

The problem to be considered consists, first, in arranging the tread and rise to comply to above conditions; second, in making the under or soffit face of the stairway a helicoidal surface; third, in arranging the joints between the steps so as to be plane surfaces, and normal to the helicoidal surface at the middle point, and fourth, from these conditions determine the form and dimension of each step.

Generally in practice the above stated conditions are worked out in the office of the architect and are shown and given in the working drawings furnished to the cut stone contractor, so that all required of the stone cutter draftsman is that he enlarge the drawings to their true shape and size. However, for the benefit of beginners we will here explain the method by means of which the constructions may be projected. In the example presented in the diagrams, Figs. 1 and 2, we have assumed the stairway to be built into a circular wall at one end and the other end left free, forming what is generally termed a "circular well hole." In order to draw the plan we first take the point O of Fig. 1 as the center and O *k* as the radius of the wall curve. Let *k* K equal the

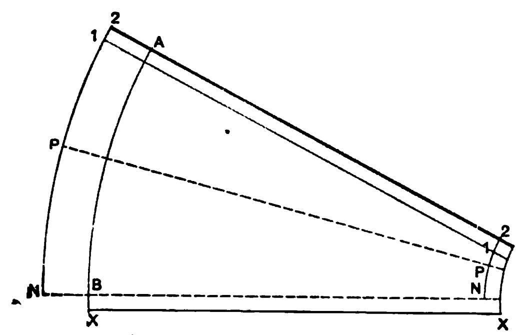


Fig. 4.—Full Size Bed Mold.

face. One point especially to be noted is that the riser lines only are the radial ones, the nose lines being drawn parallel with the riser lines. The next operation is to set off K Z equal to the projection of the molding, and with O as center and O Z as radius draw the arc Z Y W, which gives the plan of the nose at the return end of the well hole.

Now, in order to construct the normal of the plane surface joint we first set off L M N in Fig. 3, equal to the lengths as given in 5 6 7 8, &c., of the plan. At the points thus obtained and square with L P draw M 1, N 2 and P 3, equal respectively to the hight of 1, 2 and 3 risers. Now join L and 3, which gives the development of the under or soffit surface of the stairs, as found around a cylinder, of which we may take the line 5 6 7, &c., to represent the case. Without entering into a discussion of the subject at this time, it may simply be stated that the line L 3 is really the development of the helix and the helix is the curve generated by a point which has two different motions, each at a uniform rate, the one a uniform angular motion around a straight line as an axis, the other a uniform motion parallel to that axis. The helix, which in this example may be taken as the directing helic of the helicoidal surface of the soffit of the arch of the stairs, may be conceived as lying on the surface of the right cylinder of which the center line 5 6 7 may be taken to represent the basis. The axis of the cylinder represented at O may also be called the axis of the helix. The arcs 5 6 7, &c., which measure the angular motion of the generating point of the helix, are

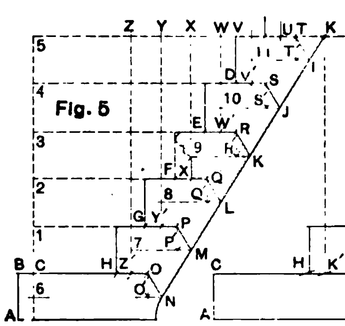


Fig. 5.—Development of Face Molds.

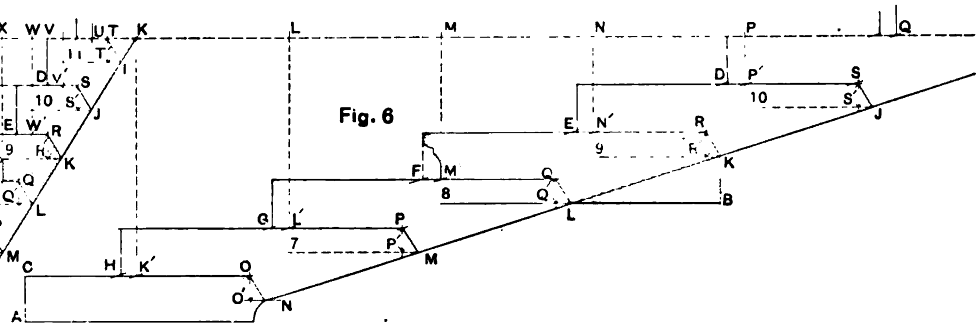


Fig. 6.—Development of Face Molds.

*Circular Stairs or Stairways in Stone.*

desired width of the stairway. Now with O as center and O K and O *k* respectively as the radii, draw the arcs K, R, V and *k*, *r*, *v*, these being respectively the wall lines of the steps, one being that of the circular wall and the other that of the well hole. Now set off *k* K' equal to the required depth of the steps in the wall, and with O again as center draw the arc K', R', T'. Now set off K A equal to 1' 7", or nearly so, and draw the treading line represented by the arc A F J. Divide this, as shown in A B C, &c., in equal parts, corresponding to the number of steps desired. Here we have taken the length A B, &c., as 10½ inches, which will give us a riser of about 7 inches. This width may, as stated above, be made either greater or smaller, according to the room available in which to construct the stairway. If the number of steps is not sufficient the proportions of the treads and riser may be made stiffer, or the steps themselves may be shorter, so as to extend or lengthen the treading line. This understood, we draw through the points in A, B, C, &c., the radials O-K-A-K', O-L-B-L', O-M, C-M', &c., these giving the plan of the risers. In practice the bottom step is generally made of an equal width throughout at the tread, similar to that shown in the diagram, and the second riser O K K' is then drawn parallel with that of the riser line of the first step. Now divide K K, as shown in 5, into two equal parts, and with O as center and O 5 as radius draw the center line 5 6 7 8 9, &c. Now set off A *a*, B *b*, C *c*, &c., equal to the projection of the riser molding and parallel with the riser lines draw Z *a* Z', Z *b* Z'', Y *c* Y', &c., which represent the plan of the nose line of the steps at the riser

proportional to the distances M 1, N 2, &c., cut off on the elements of the cylinder. Now the helicoidal or winding surface of the soffit of the stairs may be generated by moving a right line along the helix in such a manner that in each movement the line touches the axis O and is parallel with the horizontal plane, which may contain the base of the cylinder. The line will describe a surface such as that which forms the soffit of the stairs to be considered.

Square with the line L 3 and through any point as 2 draw the line 4 2, which gives the angle or inclination of the normal required in order to form the plane surface joint. Let the lower edge of each joint—that is, the edge which belongs to the soffit surface of the stairs, as shown in *r r'*, *s s'*, *t t'*, &c., of the diagram, Fig. 2, be taken at a distance of half a riser below the top or tread of the steps. Next set off 2' 4' of Fig. 3 equal to the half hight of a riser, and parallel with L P draw 4' 4, which represents the top or tread of the step. Square with 4' 4 draw 4 5, which will give the distance 5 2, that is to be transferred to the plan in order to complete the drawing.

Turning again to Fig. 1, we may assume that the tread of the steps at the well hole joints under the adjacent step—that is, the step above, a distance equal to 2 inches. Set off P 1 equal to this distance, then set off 2-3 equal to that of 5-2 of Fig. 3. and through the point 2 draw the radial 0 2 2', which gives the plan of the element of the winding surface of the soffit, which belongs to the joint surface considered. Parallel with 2 2' draw 1 1', which completes the plan of the step under consideration. In a manner similar to that shown in Q 3 4, &c., may the plan of other steps be constructed.

The figure comprised within the lines W', W, *q*, P, 2', 2, W, of Fig. 1, transferred to the similar figure in Fig. 4, determines the size required of the step at the top surface. The hight is equal to that of a riser and a half or equal to that given in 1 4' of Fig. 3. The hight, however, may be better determined by the direction given of the face molds.

The mold for the face which is housed in the wall is shown by the shaded portion of the diagram in Fig. 6; that for the face which forms the well hole is shown in the corresponding diagram in Fig. 5.

These may be developed as follows: In Fig. 5 set off Z Y X, &c., equal to the length of the arcs Z, Y, X, &c., of Fig. 1. Then at each point square with Z T draw the lines as shown. Make V V' equal to the hight of one riser, W W' equal to that of two risers, X X' equal to that of three risers, and so on. Now through each point draw lines parallel with Z T. Set off U, T, V' S, W' R, &c., equal to 2 inches, the distance each step may run under the one above it. Now square with V T, D S, E R, &c., draw T T', S S', R R', &c., each equal to the half hight of a riser; or the riser lines, as V V', D W', &c., may be divided as

and bed surfaces cut, the face at the well hole made ready for the application of the face mold, Fig. 5, and with reference letters corresponding in both diagrams. The surface represented by H R' R is also taken to be "roughed off" to the direction given in N 2 of the bed mold, Fig. 4. The method by which these surfaces may be prepared and worked will suggest itself to any ordinary stone cutter, therefore extended explanation would seem to be unnecessary.

In order to get the twisted surface of the soffit, as shown in the diagram, Fig. 8, we will assume the step to have a lug cut at the wall end, mention of which was made above. Having marked on the surface represented by K A E B, which of course is that of the level bed, the direction as given in the curve line X A of the bed mold, Fig. 4, rough out the sinking. The point A, together with point 4 of the arris of the joint at the back rebate, gives the direction for cutting the draft. Now cut true the triangular cylindrical face surface represented at A E 4, then the draft at A 4 of the soffit surface may be completed by making use of a "bender" having a "straight edge." Having cut the draft, divide it, as shown, by A 1 2 3 4 into any number of equal parts, then at the face of the well hole divide the draft K K' into a cor-

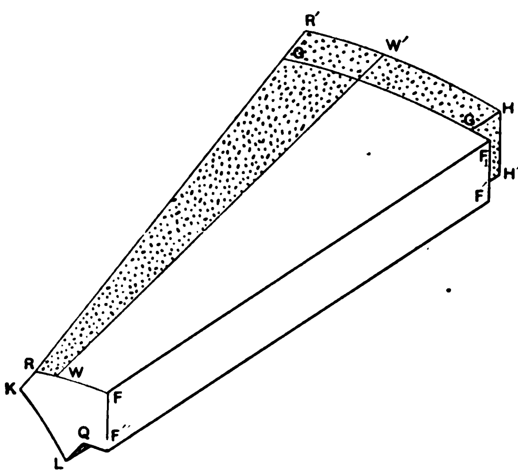


Fig. 7.—Representations of Finished Step.

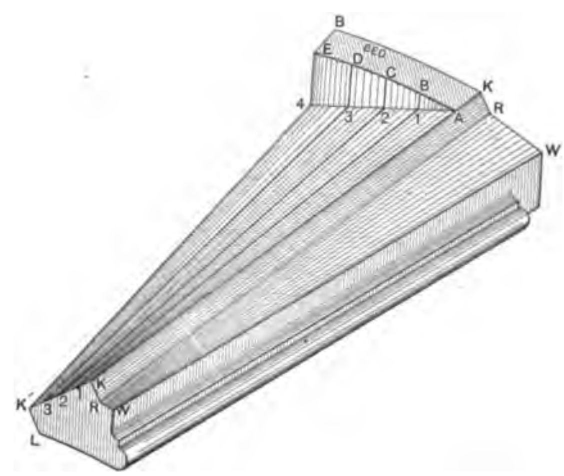


Fig. 8.—Representations of Finished Step.

*Circular Stairs or Stairways in Stone.*

shown in 11, 10, 9, &c., into two equal parts and through each point draw lines parallel to Z T. This done, set off T' I, S' J, R' K, &c., equal to the distance 5 2 of Fig. 3. Now draw N I, which will give the soffit line of the steps at the development. Then by joining T I, S J, R K, &c., the joint lines of the steps may be projected. Now set off V' D, W' E, X' F, &c., equal to the projection of the mold and draw through each point a line square with Z T, completing the development. In Fig. 6, on the line Q K set off Q P N, &c., equal to the length of the arcs, Q'-P'-N', &c., of Fig. 1, making P P', N N', &c., square with Q K and equal in length to the risers 1, 2, 3, &c. In the same manner as directed for the similar operation in Fig. 5, draw the parallels with Q K, giving the top surface of the steps. Set off P' S, N' R, M' Q, each equal to the length of the arc P' 1' of Fig. 1. Now square with Q K draw S S', R R', Q Q', each equal to the half hight of a riser, then parallel with Q K draw S' J, R' K, Q' L, each equal to the length of 5 2 in Fig. 3. Join N and J, which gives the soffit line of the steps, and joining S J, R K, &c., the joint lines of the steps may be projected. As before explained, set off P' D, N' E, &c., equal to the projection of the molding and the development of the face mold may be completed. In some cases, instead of extending the soffit surface through the whole length of the steps, a lug is formed at the wall end—that is, the triangular pieces of circular ashlar shown by *r o s*, *s p t*, *t q u*, &c., of Fig. 2, are cut on the step, giving it a better bearing or rest upon the wall. In that case triangular pieces, represented by L K B of the development, Fig. 6, are added to the face mold.

In Fig. 7 is an outline of the step "squared up,' joint

responding number of equal parts. This gives in 1 1', 2 2', &c., the direction for cutting straight drafts—that is, drafts which will throughout coincide with the surface of a straight edge. We may again subdivide A 1, &c., and other drafts be worked to corresponding divisions at each end until the whole soffit surface is finished to the winding surface required. In Figs. 1 2 7 8 we show the face molding checked back, this arrangement obviating the work of cutting out the circular base mold, the ashlar face of which will then form a joint behind the molding.

## Truing Up an Oil Stone.

The article relating to oil stones which appeared in our issue for October has called out the following comments from a correspondent who takes exception to some of the things there stated and relates how he would level an oil stone in order to obtain the most satisfactory results. Referring to the matter, he says that after 20 years' experience among pattern makers I have yet to see the method in use as there described. I have no desire to criticise the use of glass for the purpose, but think the methods practiced around New York may prove of interest to readers in other sections of the country.

This apparently simple but very necessary operation is found in many cases to be a most expensive one to some firms when all the facts are considered. Take, for instance, where a new sheet of coarse sandpaper or emery cloth is used but once for that purpose. The workman takes the sheet of sandpaper or emery cloth to the table of the jointer or circular saw, lays the smooth side upon the table and then rubs the oil stone back and forth until a level surface is obtained. This, no doubt, is a quick and good method, but has its disadvantages. The expense of furnishing sandpaper or emery cloth for such a purpose is costly and unnecessary. This is particularly the case where a large number of pattern makers are employed. One need say little or nothing of the fine particles of grit which are left on the table of either saw or jointer and are rubbed into the surface of the first piece of wood which passes over the cutters. Then the grit charged wood dulls the saw or knives when a second cut is made, dulls the workman's tools as they come into contact with the fine particles of grit in the wood, or keeps another workman waiting when he wants to use the blunted machine in question. These are all apparently small matters, but in an establishment where 80 pattern makers are employed the following method is used and none other allowed: A block of cast iron 1½ inches thick, 9 inches wide and 12 inches long has a projecting ledge on one side ½ inch wide and ½ inch high. This ledge prevents the block from moving when placed on a bench. The block is planed up true on both sides and on the three edges, and it is put on a conveniently placed bench or board near to the sink water. Coarse and fine emery powder are also placed in a small box on the table.

In order to true up an oil stone or slip, a small quantity of the coarse emery is placed in the middle of the block, a little water is poured on it, and the oil stone is rubbed back and forth until the surface of the stone is level, or until no spots show on it. The same operation is again gone through for the last time, using fine emery powder with water as before.

The round side of a slip can be rubbed true, retaining its original round or radius, by turning the stone as it is being rubbed true.

At first some of the old hands did not take kindly to the idea, but after several trials everybody fell into line and would use no other way of keeping oil stones or slips in good order.

This method entirely removed all the glaze which is so objectionable in oil stones, causing them to slip and not cut. The process leaves that nice surface on a stone which is similar to one obtained by grinding or holding the oil stone against the side of a running grindstone.

It is the opinion of the writer that a perfectly true stone is preferable to a hollow one, especially for jointer irons and other plane irons, also for hollow gouges or chisels, where the cutting edges should be as nearly straight as is possible on the cutting side. The finishing rub is always on the flat side before stropping on leather.

The face of an oil stone can be kept true a long time by placing the cutting edge to be sharpened square across the face of the stone. This saves not only the oil stone, but the tool as well, a much to be desired advantage in a paring chisel, gouge or a plane iron for either jointer or rabbet plane.

# METHODS OF CONCRETE BUILDING CONSTRUCTION.*

BY F. E. KIDDER, CONSULTING ARCHITECT.

FOR frame cottages, stables and small barns a wall such as shown in Fig. 7 will answer, and in localities where frost does not have to be taken into consideration, and where the ground is sufficiently firm to stand vertically, the cellar walls of small frame buildings can be built as shown in Fig. 8, the concrete being placed directly against the bank. In a wet climate the writer would not advise building a wall in this way.

It should always be kept in mind that the thinner the wall the stronger and more dense should be the concrete.

It should be noticed that all walls shown have bolts imbedded for securing the plate or sill. These bolts cost very little and are easily built in, while they hold the plate or sill tightly to the wall and also strengthen the wall to resist the thrust of dirt filling when there is no great weight on it.

### Quantities and Cost of Concrete Walls.

Concrete work, except in walks and floors, is almost always measured by the cubic yard, of 27 cubic feet. Sand and gravel are commonly contracted for by the cubic yard, while crushed stone is sold both by the ton and by the yard.

Knowing the cost per barrel of cement, and per yard of sand, gravel or broken stone, the cost of the ingredients per cubic yard of rammed concrete may be determined very closely by means of the following table:

*Quantities Required to Make a Cubic Yard of Rammed Concrete.*†

| Proportions. | | | Quantities required per yard of concrete. | | |
|---|---|---|---|---|---|
| Cement. Sack. | Sand. Cu. ft. | Gravel or stone. Cu. ft. | Cement. Bbls. | Sand. Yds. | Gravel or stone. Yds. |
| 1 | 1½ | 3 | 1.9 | 0.42 | 0.85 |
| 1 | 2 | 4 | 1.45 | 0.45 | 0.86 |
| 1 | 2 | 5 | 1.3 | 0.38 | 0.95 |
| 1 | 2½ | 5 | 1.2 | 0.45 | 0.90 |
| 1 | 3 | 6 | 1.0 | 0.40 | 0.92 |

Thus, if in any given locality cement costs $2 per barrel, sand 50 cents a yard, and coarse gravel 60 cents a yard, the cost per cubic yard for a 1 : 2 : 4 mixture will be:

For cement.........1.45 x $2.00 = 2.90
For sand...........0.45 x .50 = .22½
For gravel.........0.86 x .60 = .51½

Total cost for materials, $3.64 per yard.

*The cost of mixing concrete* by hand and placing in forms for cellar walls 8 to 12 inches thick should not exceed $1.50 per yard, with wages at 17½ cents per hour, and with experience may be reduced to $1.25 per yard. As a rule the thicker the body of concrete the cheaper it can be placed.

### Forms.

A considerable item in the cost of building concrete walls is the lumber and labor required for the forms, and in building entirely of reinforced concrete the cost of forms, placing and taking down, usually amounts to about one-third of the entire cost of the concrete work, and sometimes more, while it usually takes longer to make and place the forms than to place the concrete. An economical arrangement of the forms or false work, therefore, both as regards the amount of lumber required and the labor of putting up and taking down, is a matter of great importance, and as this is especially in the line of carpenter's work, the writer proposes to devote considerable space to this item. It is hardly necessary to say that the character of the forms, or false work, will vary greatly for different classes of work, and also with the rapidity with which the work must be done. When the work can proceed slowly, the forms can be used over two or three times; but if speed is necessary, then more false work is required, as the forms must stay in place for several days after the concrete is deposited.

It is also practical to build walls with movable molds, requiring but very little lumber, and such molds will be described in a succeeding paper.

For the cellar walls of wooden buildings it will be more economical to build the forms of material that may be afterward used in constructing the building, and this can be done so that there will be little waste of lumber.

Fig. 9 shows a good and economical method for building the false work for the wall shown in Fig. 6, the lumber required being of those dimensions most extensively used in the construction of frame buildings.

For a wall of the section shown in Fig. 6 the foot-

* Continued from page 303.

† These figures may be considered as a fair average where the aggregates contain stone up to 2 inches in diameter. For finer aggregates slightly greater quantities of all materials will be required.

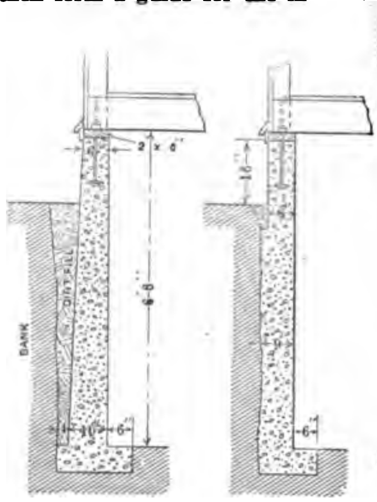
Where gravel is used just as it comes from the bank without the addition of sand add together the items for sand and gravel.

ing should be put in before the wall forms are set up. Except in sand and gravel, no side pieces are required for footings, as all other soils will stand vertically for a depth of 8 or 10 inches, hence all that is necessary is to dig the trench the exact width and depth required for the footings. The concrete is then placed in the trenches and tamped with a rammer such as is shown in Fig. 1. The concrete for footings should be mixed just wet enough so that when tamped the water will flush to the surface —not on account of strength, but because moderately dry concrete sets up quicker than wet concrete and is rather more convenient to handle.

Before placing the concrete for footings it is a good idea to drive stakes in the trenches about 6 feet apart, with their tops leveled to give the exact hight for the top of the footings.

The concrete can then be readily leveled with the tops of these stakes, which may be left in place without harm.

To start erecting the wall form, stringers T, T should first be carefully placed on the cellar bottom and secured by stakes in such a position as to give the correct line for the inside of the wall when the uprights and sheeting are placed inside of them. Two uprights 12 or 16 feet apart are then set up, and another stringer secured to them at about the level of the top of the wall. These uprights should be carefully plumbed and well braced by diagonal braces nailed to short stakes driven in the cellar bottom. The two stringers then form a guide for the in-



Figs. 7 and 8.—Cellar Walls for Frame Cottages, Stables, Barns, &c.

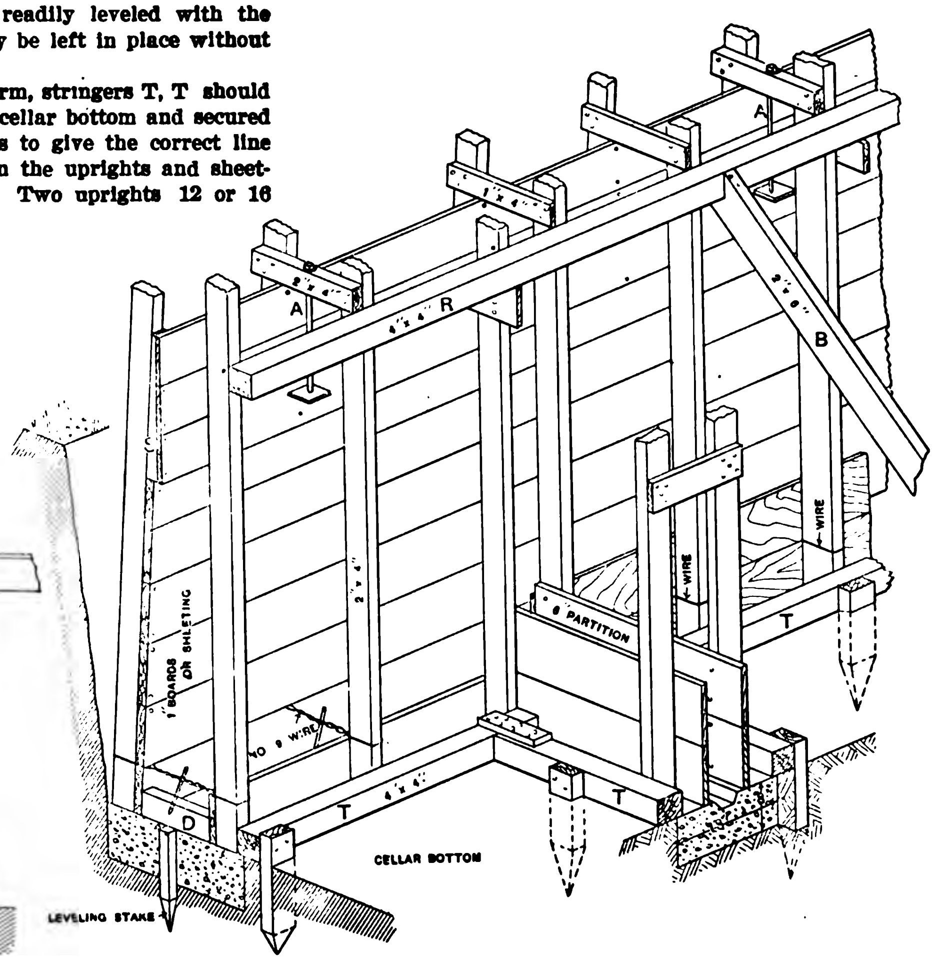



Fig. 9.—Forms for Building the Walls Shown in Fig. 6.

*Methods of Concrete Building Construction.*

termediate uprights, which can be quickly set up and lightly secured by nails. One sheeting board is then nailed at the bottom.

After the inner form is set up the outer one is easily erected and secured to the inner one as indicated.

On account of the close proximity of the bank it will usually be found more economical to secure the bottom of the outer uprights by twisted wires, as shown in Fig. 9, an 8-inch board being first nailed along the bottom, and loose spacing blocks D laid in. The wires are then twisted until the outer form is brought tight against the spacing blocks. After the wall has set the wires can be cut with a chisel and the form pulled up. The spacing blocks D should be removed as the concrete is put in.

The outer form should be sheeted to the top of the bank before placing any concrete, but it is more convenient to place the sheeting on the inner form just ahead of the concrete to facilitate tamping.

If the building happens to be built on a sand or gravel bank it will also be cheaper to mix the concrete in the cellar, otherwise the concrete can be more cheaply mixed on the bank and wheeled to the forms.

The outer face of the wall above the bank is plumbed by nailing tapered pieces to the uprights, as shown at S.

If this portion of the wall is to be blocked, then a separate form can be more economically used, as will be illustrated in the next paper.

At A, A is shown the method of suspending the bolts which are to be imbedded in the concrete for securing the sill to the wall.

The top of the sheeting should be leveled at the exact hight of the wall to form a guide for leveling the concrete.

It will be noticed that the method adopted for staying the uprights (Fig. 9) enables scantling of any length greater than the hight of the wall to be used, as 8 or 9-foot lengths, so that they can afterward be used for studding.

Fig. 10 shows the simplest method of building the forms for the wall shown by Fig. 7, the principal variation from Fig. 9 being the manner in which the uprights are secured at the bottom. For the method shown in Fig. 10 the form must be erected before the footings are put in, the sheeting being started 6 or 8 inches above the bottom of the trench and the concrete spread out under them. While this method will be satisfactory for a light wall, it is not as good as that shown by Fig 9 for a heavy wall.

The bottoms of the uprights in Fig. 10 should be tapered from the bottom of the sheeting and planed, otherwise it will be difficult to withdraw them without breaking the concrete. It is also a good idea to give the tapered ends a coat of crude oil.

Fig. 11 shows a method of erecting the forms where the concrete is placed directly against the bank. In this case the concrete should be put in to within about 6 or 10 inches of the top of the bank before the outer form is set up. The outer form is secured at the bottom to the inner form by ½-inch bolts, about 3 feet apart, with spacing blocks between the forms to hold them the right distance apart. As the concrete is placed these spacing blocks should be taken out.

In starting the concrete between the forms the top of the concrete already in place should be well wet and covered with about ½ inch of thin mortar, mixed 1 : 1, cement and sand, to cause adhesion.

Naturally the erection of the forms for concrete work admits of considerable variation in the details of construction and affords ample opportunity for the use of ingenuity and good judgment on the part of the contractor.

**Thickness of Sheeting, Size and Spacing of Uprights.**

These dimensions should be governed somewhat by the character of the concrete work. The forms should be stiff enough so that they will not spring under the weight of the concrete, or when the concrete is tamped. As a rule the pressure of wet concrete is considerably greater than that of dry concrete, although if the latter is properly tamped the effect on the forms is about the same. For a rough wall, built of wet concrete, a slight springing of the sheeting would do no particular harm, but where a nice appearance is desired there should be no springing.

For the class of work shown in the accompanying illustrations the uprights should be spaced about 2 feet on centers where ⅞-inch boards are used for sheeting, and if plank sheeting is used the uprights may be spaced 5 feet apart.

With ⅞-inch sheeting 2 x 4's may be used for the uprights, but they should be braced about every 5 feet in hight. In forms such as shown by Figs. 9, 10 and 11, if the 2 x 4's show a tendency to spring they may be tied together through the wall by soft iron wire—baling wire will answer—twisted as shown at the bottom of the form, Fig. 9. This will generally be cheaper than additional braces and is not in the way. If the forms do spring under the weight of the concrete they should be immediately braced to prevent further springing, but no attempt should be made to straighten them, as concrete should not be disturbed after it has commenced to set.

The sheeting should be nearly, although not absolutely, water tight, and should be free from knot holes, and the boards should be in 8-inch or 10-inch widths, and surfaced on the inner side.

**Kind of Lumber Required.**—For such forms as are described in this article either spruce, fir, hemlock or pine boards and scantlings may be used, and green lumber will be found better than dry, as it will not be as badly affected by the moisture in the concrete.

**When Forms May Be Removed.**—Where there is no pressure against the wall the forms can generally be removed in from 24 to 48 hours after the wall is completed, or just as soon as the top concrete is so hard that it cannot be indented by the thumb. The sooner the forms are removed the less the lumber will be affected.

After the forms are taken down the inside of the wall should be braced until the first floor is in place, to protect the wall from anything falling against it. If this is done the sill may be bolted on 24 hours after the wall is completed, and the floor joists set the next day, but no great weight should be placed on the wall until it is seven days old.

**Cost of Form Work.**—Very little data has been published as to the cost of erecting and taking down the forms for concrete work, and this is the most difficult part of the work to estimate accurately. For the forms shown in this article the writer estimates that the cost of puting up and taking down, not including the lumber, will run about 6 cents per square foot of wall, which for an average thickness of wall of 8 inches would be equivalent to $2.40 per yard of concrete.

With a 1 : 7½ mixture, cement at $2 a barrel, gravel at 60 cents a yard, delivered at the site, common labor at 17½ cents an hour, and carpenters' wages at 30 cents an hour, the total cost of the cellar walls, averaging 8 inches thick, should approximate $7 per yard, or 17½ cents per superficial foot. This does not include the cost of the lumber, as it is assumed that this will be used in the superstructure. At $10 per thousand in the wall, wall measure, an 8-inch common brick wall will cost 15 cents per square foot, and a 12-inch wall 22½ cents.

(*To be continued.*)

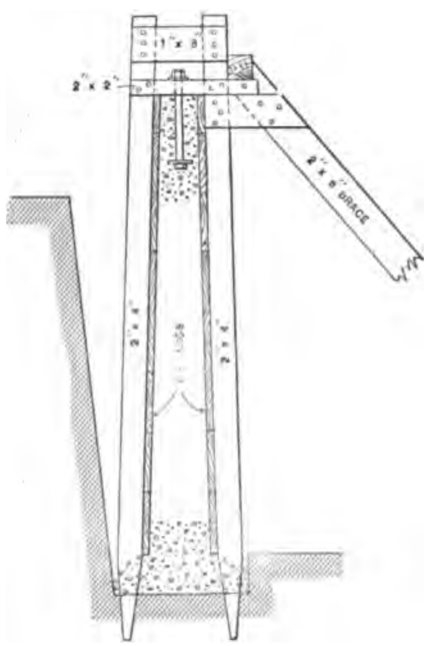



Fig. 10.—Forms for Building Wall Shown in Fig. 7.

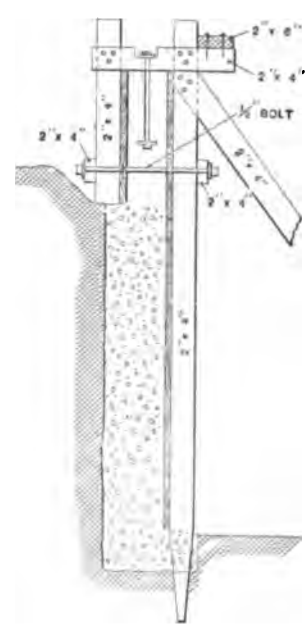



Fig. 11.—Forms for Building Wall Where the Concrete Is Placed Against the Bank.

*Methods of Concrete Building Construction.*

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THE improvements which are in progress in connection with the Manhattan terminal of the Brooklyn Bridge involve the construction of a building which is estimated to cost, exclusive of land, something like $3,000 000. The design by Carrere & Hastings is in keeping with the Hall of Records at Chambers and Center streets, and the walls will be constructed of similar material. The building will be of the steel skeleton frame type with fire proof floors and tile roof. Above the track floor the interior finish will be of marble and tile. The longitudinal axis of the main building will extend north and south, the bridge end being carried across Park Row and Center street.

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ZINC FLASHINGS are enduring, as shown by their use in connection with slate roofing. In almost any locality there are specimens of zinc used in valleys and on hips that have been laid 30 to 40 years ago. This may be taken as proof that zinc as a roofing material stands the ravages of time.

# LAYING AND FINISHING HARDWOOD FLOORS.

By Frank G. Odell.

THE general demand for finely finished floors of hard or soft wood in modern residences has given rise to such a variety of tools and finishes designed for this special purpose that natural confusion arises as to the best tools, finishes or methods to employ in this highly important branch of the trade.

The growing demand for the conveniences of the city residence in the homes of the smaller towns and the rural districts often brings the carpenter and the painter up against this sort of work, demanding methods of treatment with which they are unfamiliar, and many a good job of floor has been spoiled or indifferently treated by otherwise good mechanics, simply because they lacked the knowledge or experience so essential to success.

It has been the fortune of the writer to have a somewhat extended experience in the better grades of modern floor finishing, and it is with the hope of affording some degree of general information to the craft that this discussion of the topic is undertaken.

For convenience in treatment the subject will be considered with reference to the following elements:

Fig. 1.—Showing Manner of Scraping a Floor.

Fig. 2.—"Dutch" Plane with a Horn.

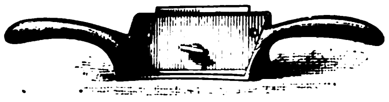


Fig. 3.—A Stanley No. 80 Scraper.

*Laying and Finishing Hardwood Floors.*

1. The carpenter.
2. The tools required.
3. The laying of the floor.
4. Preparation of the surface.
5. The painter's work.
6. Different varieties of finish.
7. Relative cost of floors and finishes.
8. Suggestions as to estimating.

Taking up the first phase of the subject, it may be stated that not every good carpenter can make a success of finishing floors; a peculiar degree of skill is required, of that sort which enables one to finish a surface as smooth and free from imperfections as fine furniture and to do this work under trying conditions and with sufficient rapidity to make it profitable. The hardest work about a building is to be found on a floor, and three days' continuous labor of this sort will give lame back, sore knees and a wire edge temper to any but a saintly character.

This is no place for a man who is lazy or grouchy. For the average sized room give us two good natured, active mechanics who can keep tools sharp and hustle, and they will usually work to a better advantage than a greater number. The view Fig. 1 shows a team at work. If your carpenter cannot sharpen plane or scraper to a razor edge and cut a clean shaving every time the tool is put to the floor, better put him at another job. In addition to these qualifications it is highly important that the workman be endowed with grace sufficient to keep his temper when his freshly sharpened tools hit a grain of sand. Floor finishing requires a good eye, a delicate touch and a sense of pride in perfect workmanship. Often a floor which appears perfect to the eye will be wavy, and have imperfections which show up badly through the finish which inevitably magnifies all imperfections. These imperfections can be detected often by lightly passing the finger tips over the surface and may be quickly scraped out as they are felt. "Feel your floor" as you work it; when eye and finger tips both approve you will usually have a good job.

There is a legal maxim which runs to the effect that "he who seeks equity must come with clean hands." To this might be added the maxim that "he who seeks to do a good job of floor work must come with clean feet." Many a beautiful piece of scraping has been ruined by unsightly scratches made by the shoes of thoughtless workmen, and very often the same workmen who are doing the work.

Soft slippers or stocking feet are preferable when getting the floor ready for the painter. If you think you must wear shoes be sure that they are scrupulously clean and that all nails in heels and soles are filed down smooth to the leather. Some may think this counsel superfluous: "Any good mechanic should know that much"; well, possibly, but they don't all remember it out this way, and the hardest task we have is often to keep the floor clean for the painter after the carpenter is done.

Keep plenty of good, clean building paper handy, and use it liberally in covering the finished stretches of your floor; if likely to be walked over much put two or three thicknesses where the travel will be, and if the house be occupied let the boss carpenter be wise enough to "round up" the whole family and "shoe them" with a flat file until every nail is cleaned off which is likely to do damage.

If it is a new house put up the bars and keep all visitors and other workmen off the floors until the painter is through, else you are likely to have your labor doubled by the dirty feet of careless visitors.

Above all, be sure that you charge enough for the job, for the more you charge the better the owner will appreciate the value of your work and the more care he will take to see that your floor is not abused.

Before leaving this portion of the topic let me refer in the most kindly spirit to another matter which is a legitimate subject for caution. A great many carpenters are unfortunately addicted to the tobacco chewing habit, and a goodly percentage of this number are careless about where they expectorate. It is very unpleasant for the owner of a building, and he usually makes it unpleasant for the contractor when his hot air registers are

**loaded up with tobacco quids and spittle left by the carpenter who finishes the floor. It is probable that few readers of *Carpentry and Building* would be guilty of such an indiscretion, but there are a lot of such fellows in Nebraska, and it is in the hope that this may meet their eye that this friendly word of caution is dropped.**

**There have been many tools devised for floor work, which are intended to reduce the labor to the minimum and make the job easy. I have never yet seen many of these which are successful. Of this sort are all long handled planes, sanders, &c., which are designed to be operated by the workman while in a standing position. Just as well understand, boys, that if you are to get a first-class job on that floor you must get right down next to it and put in the hard licks, relying on sharp tools and a willing disposition to get you out of it as speedily as possible. No intelligent mechanic would think of surfacing a casing or finishing a table top with a plane attached to a handle 4 feet long; no more can you finish a floor with any of these makeshifts. This brings us to a brief consideration of the tools required.**

**Jack and smooth planes are indispensable in finishing pine floors, though most well milled hard wood floors may be satisfactorily finished with the scraper if the stock has been well smoothed by the sander before leaving the mill. Most of the manufacturers of high grade flooring now give special attention to the surface finish of their prod-**

**used tool is the "Stanley No. 80," illustrated in Fig. 3 of the engravings.**

**Both the scraper plane and the "No. 80" are excellent tools in their place, but their place is not on the floor. Every carpenter knows that floor surfaces are more or less irregular and wavy and that while these irregularities are not so marked as to render it necessary to level the whole surface like a piece of plate glass, yet it is necessary to smooth up the joints and thoroughly clean the whole surface. The peculiar character of the cutting edge of the scraper (which will be studied in detail later on) is such as to require constant change of angle and position in order to keep the tool cutting at its best without constant sharpening. The very strong "talking point" of the tools referred to—*i.e.*, the plane surface next to the floor to serve as a guide to the tool and the rigid fastening of the scraper in the stock—are the two things which render these tools and all others of their class ineffective for floor work.**

**True that these tools are made susceptible of adjustment as to position of the cutter by shifting thumb screws, &c., but this takes too much time and experimenting before the proper position is secured to be of great value. That form of adjustment which is of most**

**Fig. 4.—The Starrett "Universal" Scraper.**

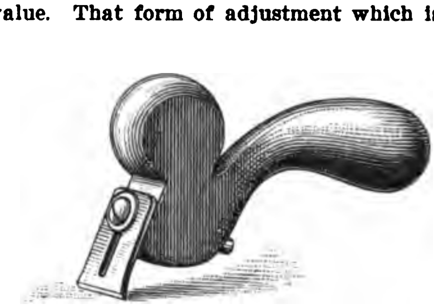


**Fig. 5.—A Good Home Made Scraper.**

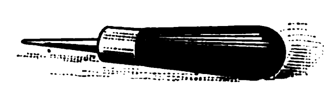


**Fig. 6.—Burnishing or Sharpening Tool.**

*Laying and Finishing Hardwood Floors.*

uct, and some of the material now on the market is a marvel of perfection in machine work. None is so perfect, however, as to dispense entirely with hand finishing, and nearly all lumber yard stock requires a lot of hard work to put it in condition. There may be cases in which the smooth plane and the sand paper will do the work, but plane marks will frequently show up on the surface, and it is safer to use the scraper freely. As to planes, every fellow has his favorite. Any plane is good that will do the work to the satisfaction of the user, but the writer confesses to a weakness for the old-fashioned Dutch plane with a "horn" on the front end. A home made tool of this kind, which is much more effective than handsome, is illustrated in Fig. 2.

This creation is the visible expression of a long felt desire for a plane that will "hug" the floor, run smooth, fit the hand and not "chatter" when a bit of hard grain is struck. In all these particulars it has proven a success. An ordinary 2-inch wooden jack plane was used to furnish the materials for it.

If partial to iron planes select one with a single cutter or a cutter without the ordinary cap which screws on to the bit. This precaution saves a deal of time in taking apart your plane for sharpening, and that's an operation which will be frequently necessary. The Siegley plane is one of the best types of this tool and not expensive.

The scraper must always be the mainstay for floor finishing as well as all other fine wood work. This tool is of such great variety and form as to deserve more than a passing notice, ranging from the common cabinet scraper to more complicated tools of every description.

One of the most common and universally used tools of this type is the scraper plane, in form resembling the smooth plane and having a scraper blade fixed in the stock in lieu of the ordinary plane bit. Another widely

value will be one which can be made automatically by the hands while the tool is in use.

Another defect of the tools under consideration is that they push instead of pull and cannot be worked up close to a corner or a baseboard.

I beg permission to say at this point that I have no interest in any tool manufacturing concern and no desire to give other than fair consideration to any and all tools offered to the trade for the purposes under consideration. The objections or criticisms which may appear in this article are frankly given as they have appeared to me or to workmen in my employ in practical use of the tools under consideration, all of which have had a fair and practical test in actual service.

Most veneer planes, &c., are excellent tools for their special uses in cleaning veneered doors, cabinet work and general bench work in the shop, but they have no business on a floor, and the mechanic who buys them for this purpose will waste his money and the time of his employer subsequently.

There is another class of scrapers equally good for floors or general wood work, which are equipped with a handle of convenient shape easily detachable from the scraper blade and adjustable to various angles as the case may require. These tools are generally designed to pull toward the operator and are so devised that both hands may find convenient hold of the tool.

The chief criticism to be made on the various tools of this class now offered to the trade by tool manufacturers is that the scraper is generally made of too light gauge of steel and the handles bear every appearance of having been designed by some one who never pulled a scraper across a board.

One of the best and neatest tools of this type is the "Starrett Universal," shown in Fig. 4.

This tool is a marvel of cheapness when its quality is considered, and like all Starrett tools is so neat and convenient of adjustment that any mechanic should be glad to have one in his chest. The only criticisms I would offer against this tool are such as I frankly wrote the manufacturers some months since — viz.: that they strengthen the union of the wood handle with the ball and socket joint, provide a heavier blade and substitute a ball fastening containing a nut for the thumb screw which secures the blade to the handle. I understand that the tool has been modified or improved along the line of the first two suggestions, but the thumb screw is still retained.

If the designer for the Starrett factory will spend thirty minutes on his knees in prayerful consideration of the needs of the craft and try for that length of time to use his "Universal Scraper" in actual work cleaning floors he will agree with me that the guard over the top, however useful as a protection for the hand, is utterly useless as a hand hold for the left hand, and he will lose no time in putting on the ball fastener where the left hand can get firm grip directly on the center line of draft.

This tool could be further improved for floor work if the manufacturers would furnish a special blade of heavy steel—say, about 2 inches wide and 3-32 thick, with a beveled cutting edge. Such a blade would cut faster and more evenly and not heat quickly.

The need of such a tool as this led the writer some five years ago to design and make for his own use a floor scraper illustrated some months ago in *Carpentry and Building*, which is here reproduced, Fig. 5, together with a convenient and easily made burnisher or sharpening tool, Fig. 6.

This tool is so obviously simple as to require little explanation or comment. It fits both hands, is easily adjustable to any position by a simple and automatic shifting of the position of the hand, will cut anywhere that any scraper will and some places that no other will, and can be easily and quickly made by any carpenter at a cost of but a few minutes' labor. As shown it is equipped with 1¾-inch blade as in actual use on a floor. It will take any flooring that runs decently even, and in the hands of a man who is not afraid to work will clean and finish without the use of plane or other tool more square feet of floor than any tool that I have ever seen. While the blade is slotted so as to permit quick removal, not the least of the advantages of this tool is that it can be sharpened without removing the blade and the handle affords a convenient hold for the sharpening process. In actual use we rarely remove the blade from the handle unless to substitute another.

The carpenter will find this tool convenient for cleaning plaster from the edges of jambs, for cleaning up quarter rounds and for a variety of uses.

That peculiar charactertistic of the scraper "edge" which makes it necessary to frequently change the angle of cut in order to get the best service and avoid frequent sharpening is something which must be reckoned with in determining the good qualities of any tool of the scraper type. Always avoid a tool which demands some other tool to adjust it. As a general proposition the simpler the tool the better suited it will be for the purpose and a greater quantity of work will be the result.

(*To be continued.*)

# CANADIAN ROUGH CASTING.

ROUGH casting, or, as it is sometimes called, slap dashing, both of which are synonymous with the French *hourdage*, rough work, and *ravalement*, having a similar meaning, is a method of plastering the outside of buildings much used in the northern part of Canada because of its being durable, cheap and well adapted to keep out cold winds during the long winters in that section of the world. The methods of applying rough cast and the mixing thereof do not materially differ from the methods adopted in Northern Europe or even in the Northwestern States, but it is these minor differences, says a writer in an exchange, that make the Canadian rough casting superior, so far as durability is concerned, to much that is done in other parts of the world.

There are frame cottages near the city of Toronto and along the northern shores of Lake Ontario that were plastered and rough casted exteriorly over 40 years ago, and the mortar to-day is as good and sound as when first put on, and it looks as though it was good for many years yet if the timbers of the building it preserves remain good. Rough cast buildings are plentiful in every province in the Dominion from Halifax to Vancouver and from Lake Erie to Hudson Bay, and when well built, and the rough cast properly mixed and properly applied, the result is always satisfactory. It is quite a common occurrence in Manitoba and the Northwest Territories in the winter to find the mercury frozen, yet this intensity of frost does not seem to affect the rough casting in the least, though it will chip bricks, contract and expand timber, and render stone as brittle as glass in many cases, and the effect on iron and steel is such as may prove dangerous if exposed to sudden and unexpected strain.

In preparing a frame or log building for rough casting care must be taken in putting down the foundation. A good stone or brick foundation is, of course, the best, but where rough casting is intended stone or brick foundations are seldom used because of their cost, and the builder is compelled to use posts of wood. The posts are generally made of white cedar, which has a lasting quality of 35 or 40 years if sound when used. The posts are put in the ground from 3 to 5 feet, the deeper the better, as they should be deep enough in any case to prevent frost from forcing them upward. When a sufficient number of posts have been properly placed a line is struck on them the proper hight from the ground and the tops leveled off. The sills are then placed—all joints being broken on top of posts—and the whole made level. These sills and all the other timber, scantlings and lumber should be well seasoned, if possible, for the greatest enemy to the plasterer is unseasoned timber; shrinkage of joists, posts and scantling not only breaks the bond of the mortar, but causes great cracks in corners and angles that no amount of pointing or patching can ever make good.

When the frame is up and the rafters on and well secured the whole of the outside should be covered with good, sound, common inch stock pine, hemlock, spruce or other suitable lumber, dressed to a thickness. If put on diagonally so much the better, but this is not absolutely necessary if the rough casting is to be of the best quality, as will appear hereafter.

When it can be done it is best to get all partitions set in place and lathed, the roof on and all necessary outside finish or grounds put in place and made ready to receive the lath. The carpenter must prepare his finish or grounds for finish to accommodate the extra lath, as the walls will be thickened accordingly.

For the cheaper sort of rough casting in one or two coats the following method of lathing is employed: Nail laths on the boarding—over paper or felt, if paper or felt is used—perpendicularly 16 inches from center to center if 4-foot laths are used, or 18 inches or 1 foot from center to center if 3-foot laths are used. The whole surface to be rough casted will require lathing this way. When done lath as is ordinarily done with No. 1 pine lath, breaking joints every 15 inches. Put five nails in each lath, driving each nail home solid, coat over with mortar, well haired, and that has been made four or more days; smooth and straighten as well as possible with a darby. When done and while yet soft the rough cast is thrown on it with such force as to drive the pebbles or small stones deep into it. The mixture or dash, as it is called, is composed of fine gravel, clean washed from all earthy particles and mixed with pure lime and water till the whole is of a semifluid consistency. This is mixed in a shallow tub or pail and is thrown upon the plastered wall with a wooden float about 5 or 6 inches long and as many wide, made of ½-inch pine and fitted with a wooden handle. While with this tool the plasterer throws on the rough cast with his right hand, he holds in his left a common whitewash brush, which he dips into the rough cast and then brushes over the mortar and rough cast, which gives them, when finished, a regular, uniform color and appearance.

For this sort of work the following proportions will answer: To one barrel of prepared gravel use a quarter of a barrel of putty; mix well before using. This may be colored to suit the taste by using the proper materials, as given further on. It must be understood that the foregoing is the cheapest sort of rough casting, and is not recommended where more durable but more expensive work is required.

The best mode of doing this work as practiced in the lake district of Ontario is nearly as follows: Have the frame of building prepared as indicated in the foregoing, with partitions all put in and well braced throughout and well secured. Lath diagonally with No. 1 pine lath, keeping 1½ inches space between the lath. Nail each lath with five nails, and break joints every 18 inches. Over this lath again diagonally in the opposite direction, keeping the same space between the lath and breaking joints as before. Careful and solid nailing is required for this layer of lathing, as the permanency of the work depends to some extent on this portion of it being honestly done. The mortar used for the first coat should have a goodly supply of cow's hair mixed in with it, and should be made at least four days before using. The operator must see to it that the mortar be well pressed into the key or interstices of the lathing to make it hold good. The face of the work must be well scratched to form a key for the second coat, which must not be put on before the first or scratch coat is dry. The mortar for the second coat is made in the same way as that required for the first coat, and is applied in a similar manner, with the exception that the scratch coat must be well damped before the second coat is put on in order to keep the second coat moist and soft until the dash or rough cast is thrown on. The rough casting is done exactly in the same manner as described for the cheaper sort of rough cast work.

A building finished in this manner, if the work is well done, possesses many advantages over the ordinary wood covered structure. It is much warmer, being almost air tight so far as the walls are concerned. It is safer, as fire will not eat its way through work of that kind for a long time. It is cleaner, as it will not prove such a harbor for insects. It may be made as handsome as desired, for before the rough cast is dashed it may be laid off in panels of any shape by having strips of battens tacked over the soft mortar, which may be removed after the rough casting is done and the coloring finished. It is much superior to the so-called brick veneered house, as it is warmer, more exempt from fire and cheaper.

For 100 yards of rough casting in the manner described the following quantities will be required: 1800 laths, 12 bushels of lime, 1½ barrels best cow hair, 1¾ yards of sand, ¾ yard of prepared gravel and 16 pounds of hot cut lath nails, 1¼ inches long. The gravel should be sifted through a ½-inch mesh screen, and should be washed before mixing with the lime putty.

To color 100 yards in any of the tints named herewith use the following quantities of ingredients: For a blue black mix 5 pounds of lampblack in the dash. For a buff use 5 pounds of green copperas, to which add 1 pound of fresh cow manure; strain all and mix well with the dash. A fine terra cotta is made by using 15 pounds of metallic oxide mixed with 5 pounds of green copperas. A dark green color is made by using 5 pounds of green copperas and 4 pounds of lampblack. Many tints of these colors may be obtained by varying the quantities given. The colors obtained by these methods are permanent; they do not fade or change with time or atmospheric variations. Many other colors are used, but few stand like the ones named. A brick color may be obtained by the use of Venetian red and umber mixed in whisky first and then poured into the dash until the proper tint is obtained. In time, however, like all earthy pigments, these colors fade and have a sickly appearance; they answer better in cements than when incorporated with fat limes.

## Moving Five Buildings Simultaneously.

Supplementing our reference to the moving in one operation of five three-story and basement houses on Jefferson avenue, Brooklyn, turning them half way round during the operation, it may be stated that the work is accomplished with twelve powerful jack screws placed at intervals in the rear of the building. Heavy chains are made fast to the temporary foundation and passed around huge timbers, and it is against these latter that the jacks get a purchase. At a given signal all the twelve jacks are turned at once, but those at one end are given more turns, and this accomplishes the turning of the building as well as its forward motion. About 20 feet a day is the progress made and it is expected to have the first block in its new position on the north side of Jefferson avenue in a little more than three weeks. In order to take extra precaution against the possibility of damage to the walls heavy steel cables have been passed through the building and fastened to beams across the window openings wherever there is any chance of the walls being weak. The temporary foundation is a layer of rollers as wheels. The building is moved as a cart is pushed along a street, only the rate of motion is so slow that it is barely perceptible. The moving of the houses, of which there are ten altogether, was made necessary through the proposed addition to the Thirteenth Regiment Armory. The work is in charge of Iversen & Gustavsen, house movers and shorers of 28 Second Place, Brooklyn.

## Bronze Doors from Old Designs.

The entrance of the National House of Representatives at Washington, says the *Commercial Bulletin*, is being fitted with massive and most attractive bronze doors to correspond with those at the entrance to the Senate wing. The history of these doors is remarkable. Though they are only now being placed in position a generation has passed since they were designed by one of America's greatest sculptors.

The designs were made in 1858, at the same time when those for the present Senate doors were produced. The designer to whom the important and artistic work was intrusted was William Crawford, who was the sculptor of the statue of Freedom which surmounts the lofty Capitol dome. Soon after completing this work Mr. Crawford died and the modeling of the doors was intrusted to William H. Rinehart. The casts completed, inspected and approved, they were laid away in a crypt in the Capitol Building, where they seem to have been quite forgotten for nearly half a century. A few years ago Mr. Woods, superintendent of the Capitol, came across them while rummaging among forgotten rubbish, finding them in the original boxes in which they had been stored upon their completion. Congress was appealed to and finally appropriated $45,000 for the construction of the doors.

The work of casting and finishing the doors occupied two years and was done at Chicopee, Mass., under the direction of Melzar H. Mossman, who, singularly enough, when a boy assisted his father in making the Senate doors. The doors are of solid bronze and are 14 feet high and 6½ feet wide. Each one weighs two tons, and the two, with the framework, weigh seven tons. The front side of the doors is divided into five panels and each panel, save the top one, is carved in relief, representing scenes of the time of the Revolutionary War. The top panel of each door consists of an oak wreath, with oak leaves and acorns filling the space on either side of the wreath.

THE Supreme Court of North Dakota has just handed down an important decision which holds that a supervising architect has the same right to file a lien on a structure for which he has made plans and specifications and superintended the construction as has a contractor or mechanic who labored on the building.

# TURNING FACE WORK.

BY C. TOBYANSEN.

IN wood turning the words "face work" imply work fastened on the face plate and generally turned with the face of the grain. It is a branch of work which often taxes the ingenuity and skill of the turner to the last degree, as in this line the turner lends a helping hand to almost every member of the wood working fraternity. Circular moldings are required by the sash maker in the form of sash bars; the door maker needs them for his circular panels; the joiner must have circular headed casings for his trim, the stair builder requires small rail segments, and all of them, inclusive of the cabinet maker, require the thousand and one forms of corner block and ornamental rosettes of whatever design the architect's, builder's or house owner's fancy may dictate.

The most common form of face work is the corner block, of which examples are shown in Figs. 1 to 5 inclusive. In the example shown in Fig. 1, where there are a plurality of members, a scratch marker similar to the one shown at A will be required. The central marker B may be slightly longer than the other points. It will be noted that the points C, D, and E are placed central to the respective recesses, and it follows that the narrow chisel used for cutting in must catch the mark on its centre. The same idea is carried out at F. This pointer might have been placed to the edge of the bead, but we would then have had to make this same exception with the chisel for each block, and this is apt to be confusing, while if we place the markers as shown the chisel deals with all marks alike, the result is the same and we can progress more surely and speedily.

Patterns like those shown in Fig. 2 and Fig. 3 require one guiding mark only—the extreme diameter—and this is quickly obtained by the use of the compasses. The members can be turned near enough alike by guess or judgment. In Fig. 4 two guiding lines are obtained by applying the same compasses twice. Making the compass points equal to the radius it is applied with the legs equidistant from the center, as at A, and again with one leg central and the other spacing the extreme diameter of mold, as at B. It is immaterial whether the compass in Fig. 4 is spaced on the diameter as shown or the radius. It is perhaps needless to remark that this guiding line is always obtained while the block is revolving.

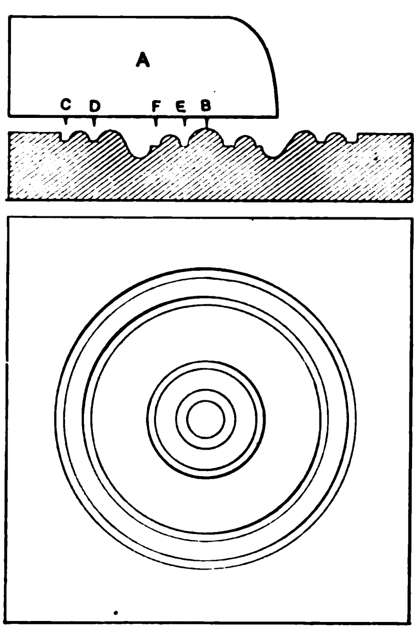
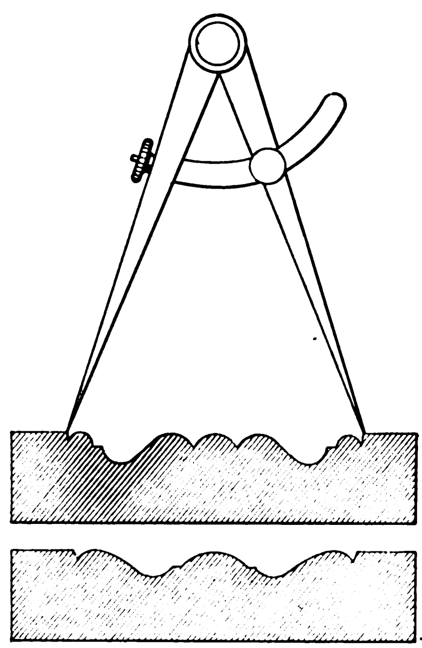



Fig. 1.—Face and Sectional View of Corner Block.



Figs. 2 and 3.—Sectional Views of Corner Blocks, Showing How Guiding Line is Obtained by Use of Compasses.

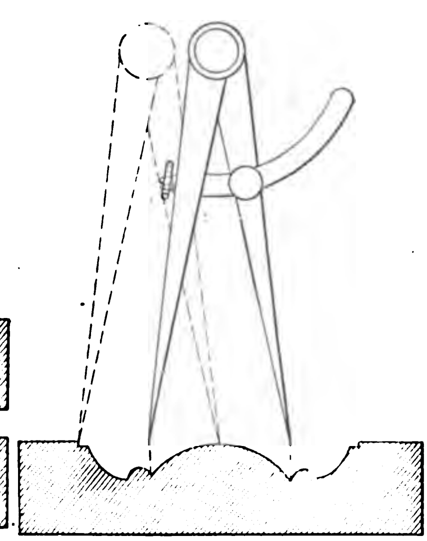


Fig. 4.—Sectional View of Corner Block, Showing How Guiding Lines are Obtained by Applying Compasses Twice.

*Turning Face Work.*

In Fig. 5 we show a design which while quickly made has the appearance of a hand carved piece of work. This design became very popular here as soon as originated. The rosette A is first turned, as shown at the section D, and then divided into five or six equal parts or nearly so, and sawed in with the band saw. By wiggling the material a little the saw cut is enlarged to form the lobes B. We now round off the leaves, using the band saw, giving the form shown at C, and the rosette is complete. By turning a recess in a square block and inserting the rosette, as shown in the section D, fastening with brads or glue, we have produced a highly ornamental block at comparatively slight cost. This rosette shown at C, Fig. 5, makes a very pleasing finish when inserted in a newel post or for any other ornamental purpose. Such rosettes may also be "planted on" the flat of the wood, but should then be shaped more like the suggestions presented in Fig. 6, giving more preponderance to the central member and tapering down toward the edges.

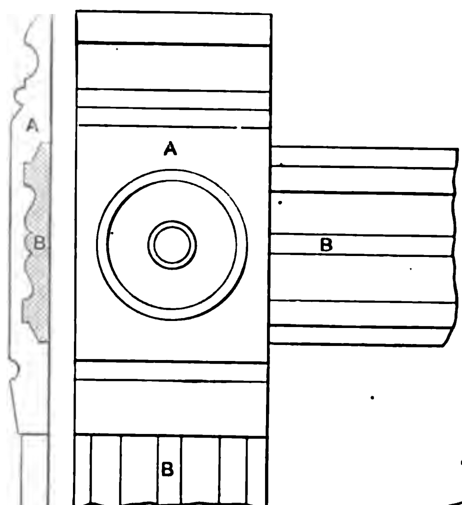
Frequently the corner block is still further ornamented by molded ends, as at Fig. 7, of which A A is the corner block and B B the casing or trim. Again the upper end may be further molded by sawing the sides on the upper end, as in Fig. 8. While on the subject of trim the base or plinth block must be included, which while not turned is necessary to completion. This is indicated by A A in Fig. 9. It is commonly molded on the upper end, only the lower part which meets the base B B being left plain.

As a rule this mold is formed on the band saw. It requires a fine saw, and as the cut is a deep one, 4½ to 6 inches, it is necessarily a slow process, consequently if we have a large quantity of blocks it pays to devise better and speedier means of doing the work. Such a device is shown in Fig. 10. The machine now brought into use is the shaper or variety molder, the most adaptable tool at the wood worker's command. As will be readily observed cutters are made to form the mold at A A. A false table is rigged up as B, on which the block C rests during the operation. This false table slides against the mandrel collar D on top of the shaper table E.

In Fig. 11 this sliding rig is shown in detail with end and front views. The block C is between B B and fastened by the wedge A. It is essential that the table should project at D, as shown, in order to get a bearing against the collar before the actual cutting commences. Care must be taken that the screws E E are deeply enough set to be below the cut. The strip B on the left should be the full thickness of the block, thereby forming a shoulder for the cut and keeping the edges from tearing out. This manner of molding base or corner blocks will be found most satisfactory. The cut will be far smoother than a sawed mold and can be made in the twentieth part of the time required for sawing. At times quarter segments of base boards are required for round corners of walls, and these may be turned on a core—four at a time. First the stuff is sawed out of 3 or 4 inch material so as to give edge grain, as indicated at A in Fig. 12, after which we screw them fast on the core at B and turn them to whatever shape desired. The same core may be used for any number of segments. When doing this kind of turning where the grain of the wood runs against the tool, as indicated by the arrow C, it is needful that the tool be kept very keen of edge, lest it lift the grain and tear it out in slivers, thus spoiling the work in hand.

We will next consider the turning of a door molding, the different processes in connection with which are ferred to a piece of stuff shaped like G and the horizontal dimensions taken off on the piece H. The pieces G and H are of hard wood, preferably maple, and about ⅛ of an inch in thickness. At C and D, which represent different stages of "blocking out," the manner of applying Grand H are shown plainly enough to require no further explanation.

After careful blocking, as at C, it only remains to shape the members, which can be done close enough by good judgment. Templets, however, may be used if desired or needed. The recess or rabbet R may be cut last and measured directly with rule and calipers. It should be cut a little under so as to fit snugly on the door rail. The molding under consideration is supposed to be about




Figs. 7 and 8.—Molded and Turned Corner Block with Trim.

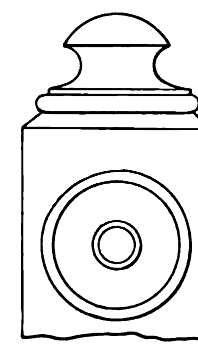


Fig.8

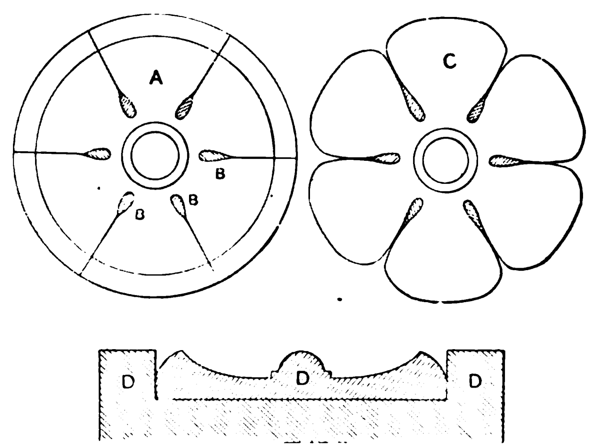



Fig. 5.—Views Showing Construction of Ornamental Corner Block.

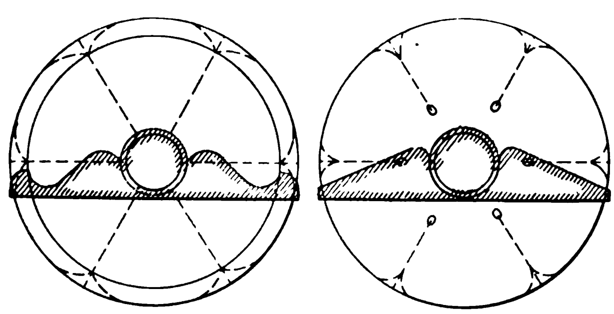


Fig. 6.—Ornamental Rosette to "Plant on" Face of Work.

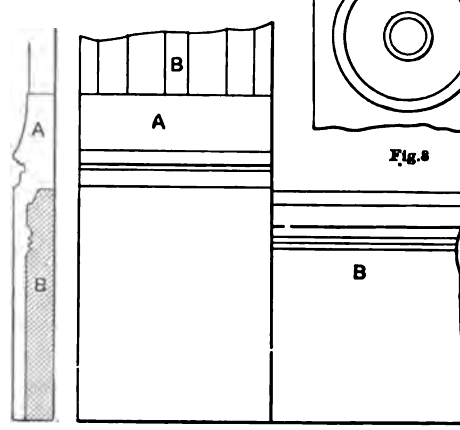



Fig. 9.—Molded Base Block and Trim.

*Turning Face Work.*

shown by A, B, C, D, in Fig. 13 of the sketches. A shows the finished circular mold as it would leave the lathe, M being the section. It must be borne in mind that these moldings will be used in half circular or quarter segments in combination with the straight molding which it meets at the joints, and which consequently it should match closely, lest it necessitate extra labor. Remember also that there is no way of testing the fit until after it is cut in parts, when if it does not match it must be thrown away or made to fit by hand work. When it leaves the lathe, therefore, it should be right in all respects. So we proceed with care and eliminate all uncertainty. First we cut a piece on the straight molding and place it squarely endwise on the base line E E, drawn on a suitable piece of board B. We then trace around it with a sharp lead pencil, giving us the segment F. By drawing lines vertically and horizontally, thus dividing the members and getting their respective distances and dimensions, we obtain a chart, so to speak, of our molding. The vertical lines may now be trans- 12 to 14 inches in diameter and turned out of solid stuff, therefore simply fastening on the central screw plate. Larger moldings, such as head casings, must be gotten out in segments and fastened on a face plate with screws coming through the back of the plate. The method of procedure is otherwise practically the same for any size of molding.

## Paint Peeling from Porch Floors.

The question often arises among painters and builders as to the cause of paint peeling from porch floors and what is the best remedy for overcoming the difficulty. This topic is taken up for comment by "The Veteran Painter," a writer who has a most interesting talk in each issue of the *Painters' Magazine* touching trade matters. In the present instance he expresses wonder, not at the peeling, but that more porch floors do not peel. "When the house is built," he says, "the carpenter and the owner worry their lives out till they get it primed, thinking that one coat of paint is going to keep the moisture from getting into the wood. But they never think anything about painting the under side of the porch floor. They go to work and lay a floor about 2 feet, or maybe 30 inches above the ground and then they box it all in so that the moisture is kept under there and the bottom of the floor cannot help getting damp. Even if they put in a lattice the air doesn't get free circulation under the stoop to dry it out. If they would leave it open entirely it would be better, but that they never do. Well, after they have painted it a good many times the coat of paint gets thick, and when the dampness rises up through the boards, if it is a white lead paint it will blister, and if it is a brittle paint containing zinc white it will peel off.

"We have lots of stoops to burn off. You see there is not only the dampness from underneath to contend with, but once or twice every week the stoop floor is washed down with soap and water or perhaps with a hose. Now the joints are supposed to be laid in white lead, but often the carpenters are in a hurry and very little white lead gets into them. But at any rate the shrinkage of the boards leaves cracks between them, and when the floor is washed the water finds its way into the boards and it will cause blistering, just the same as a leak on the broad side of a house that will admit the water in behind the clapboards will cause blistering.

"The only way to make a permanent job is to paint of the ordinary dryer it is best to use litharge as a dryer. But do what you will you are always going to have more or less trouble with both porch and kitchen floors.

"Why is that? Well, in the first place they have to be done in a hurry. People want them to dry over night, and it is practically impossible to get the most durable work if it is hurried in the drying. And then these floors have to stand the hardest kind of wear and lots of scrubbing. If people didn't pick up sand and dirt on their shoes and then walk over the floors maybe they would last longer, but this wears the paint off just

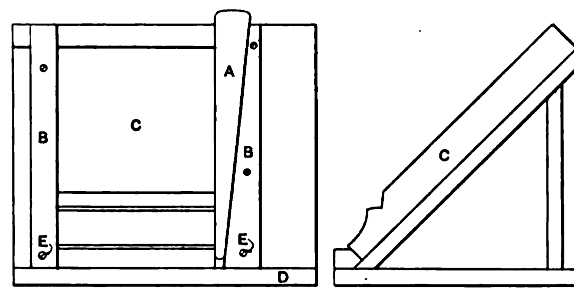



**Fig. 11.—False Table for Shaper.**

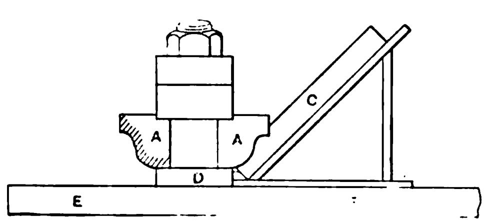



**Fig. 10.—Molding Base Block on Shaper.**

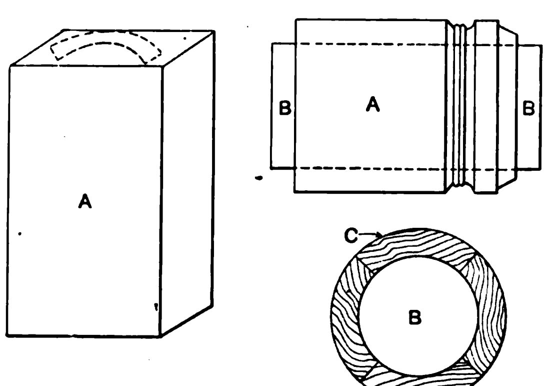



**Fig. 12.—Base Segments.**

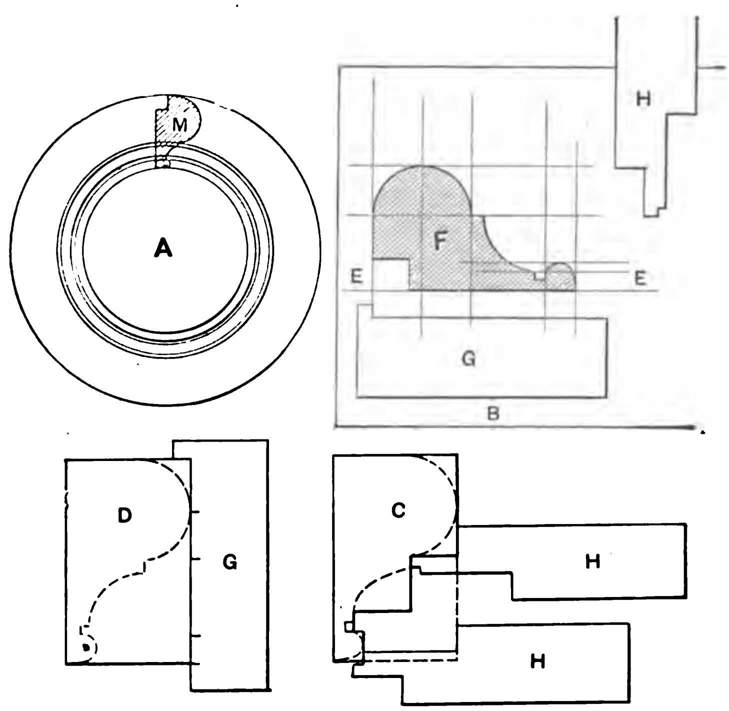



**Fig. 13.—Turned Door Molding.**

*Turning Face Work.*

the under side of the boards. They ought to have three good coats of paint, just the same as the rest of the house. Of course they do not get the same wear as the paint on the rest of the house, and so they would not have to be repainted as often; indeed, they might never have to be painted again, but unless it is done once you must always run the chance of the paint blistering or peeling off.

"In the case of an old house, if the owner was willing to pay for it I would get underneath the stoop and paint the under side of the floor. It is the only way to do a satisfactory job. If your house was built on a sandy soil that will not hold moisture, but will allow it to sink in, there may not be so much difficulty, but in this part of New Jersey, where we have such a heavy clay soil that it will hold the water for days or even weeks, there is no other way to do. Why, our soil holds water so that I have seen a cistern dug in this town and not lined with anything except the clay that came out of it, and it held water without any trouble. So how can you hope to keep the under side of a porch floor dry unless it is painted? But if you were to ask my advice about the best way to paint a stoop floor I should say that instead like so much sandpaper. I had a man complain to me once that his stoop floor, which I had painted a few months before, was wearing very badly. 'Well,' says I, 'I passed your house yesterday and I saw eight or ten children playing on the stoop, dancing and jumping round and tracking sand and mud on it, and I suppose afterward your maid scrubbed it off with sand soap. Now, no floor will stand such treatment as that without wearing the paint off. If you don't walk on your stoop floor it will last forever.' He saw the logic of what I had said, and he realized that it was impossible to paint stoop floors so it would not wear out."

"How would it do to lay canvas on a porch floor and paint that, the same as they do on the upper decks of steamboats?" "I would not do it, except on an upper floor. Then it is all right to canvas it if it is made water proof. But you must not put too much paint on it. I had a good deal of experience painting cloth when I was in the oilcloth works. Too much oil will cause the canvas to get hard and then it will crack. I remember my father covered a roof once with oilcloth that he had made himself, but after a year or so he had to take it off and put shingles on instead."

# CORRESPONDENCE.

**Framing of House Completed Before Sheathing Was Commenced.**

*From* WILLIAM R. MATTHEWS, *Princeton, N. J.*—I inclose herewith a photograph of a building which I recently erected here and which may prove of interest to some of the readers of the paper. Owing to a delay in the shipment of the sheathing boards the carpenters were enabled to complete the entire rough framing before any of the outside covering was put on. It is seldom a structure is seen in this condition, and when the framing was finished I had the picture taken as a novelty and send a print to the paper. The architects of the house were Leinau & Nash, of New York City, and the house was erected for a Miss Coddington of Princeton. It is possible that some of the readers have had an experience similar to this and, if so, I should be glad to learn through the Correspondent Department of the circumstances attending it.

**Derivation of the Term "Penny" as Applied to Nails.**

*From* T. K. W., *Lake Providence, La.*—In regard to the word "pitch" as applied to roofs, if the correspondent in the September number discussing the subject will construct a few sentences and bring in the long reference of rise to the foot run he will see the necessity of shortening the sentence, and as pitch, though technical, is proper and expressive, I see nothing wrong in it.

Again he says "pitch," like "penny" for nails, was a word used by the old builders. With his permission I should like to set him and many others right on the penny nail matter. A little while before he began to use nails they were made by hand and sold at retail by the hundred, and this is the story of the prefix which designates the size of the nail. When I was a boy at school the nail makers were considered well to do folks for working people. The nail maker would go to the hardware store, obtain his iron rods of suitable size for the nails he was to make, return to his forge and with some one to blow the bellows for him would put six or eight of the iron rods in the fire, having cut them about 4 feet in length. Taking one from the fire when hot enough, he would hammer it out to about the shape and size of the nail he wanted, then cutting it nearly off on his hot chisel he would stick it into a mold and with a quick twist break off what he did not cut on the chisel. He would then pop the end of the rod back into the fire and drive the still red hot nail into the mold. With three more taps of the hammer he would shape the head of the nail, then turn the mold over, drop the nail out of it and go through the same process with each one. The writer has seen whole families working at the forges, two nailers at one fire and a boy, girl or woman to blow for them, the man with four to eight rods, his wife with from two to five, and three or four boys and girls in proportion. They were a clannish lot, one nailer's son marrying another nailer's daughter, the parents not permitting them to marry out of the trade if they could help it. In this way they became very expert, both from practice and heredity. They seldom worked more than four or five days a week and earned big money, as money went in those days. The rods were weighed to the nailer and when he took back the nails they too were weighed. A little before my advent they had discontinued counting nails, but the 6d., 8d., &c., means the retail price at which they were sold per 100, ranging from 2d. to 20d., and all above were spikes. Twenty years ago the best horseshoe nails were made by hand, but I do not know if this is done now. The only other nails in common use 60 years ago or more that I ever saw were cut nails—cut by a press out of sheet iron, say about 2½ or 3 inches wide, and were used to lay floors, &c. Strange to say, in taking up a floor in an old plantation house here that was built in the early '40's I found the very same make of nails had been used, and I do not doubt they were imported. Everything in that house was hand work. The frame was whip sawed, doors, windows and moldings hand made, floors all hand plowed on both edges and a strip run in between two boards as they were laid. I wonder how the boys would like that now.

*Direct Reproduction from a Photograph of a House which Was Entirely Framed Before the Sheathing Was Commenced.*

**Amount of Air Necessary for Ventilation.**

*From* W. H., *Raleigh, N. C.*—How much air is required per minute for each person occupying a room? How large an air duct should be used to supply the air when it passes through a radiator to be heated?

*Answer.*—Our correspondent has not stated the purposes of the room, whether it is to be occupied for residential purposes or for some kind of manufacturing. The amount of air necessary would vary according to the habits of the occupants. For school house work it is generally accepted that 30 cubic feet of air per minute should be supplied for each pupil, and in fact this is the legal requirement in Pennsylvania, New York and Massachusetts. Some of the foremost engineers have lately been supplying a much greater quantity of air in buildings of a semipublic character, but for ordinary residential work a much smaller provision would be ample under normal conditions. For factories where unhealthy trades are carried on this amount should probably be doubled. The size of the air ducts depends on the amount of air passing through them and should be so proportioned that the velocity of the air will not exceed 4 feet per second and the velocity at the outlet should not be over 3 feet per second, as at the higher velocities unpleasant drafts are likely to be created.

### Protecting Tank Pipe from Freezing.

*From* C. J., *Albany, N. Y.*—In order to protect a stand pipe from freezing I may say I have frequently boxed the pipe carefully with 1½-inch material, leaving an air space on all sides of about an inch. Around this I built a second box of the same kind of material, leaving a space of approximately 4 inches on each side. Then I built a third one with similar air space, making three air spaces surrounding the box. These boxes were made as tight as possible and I have had no difficulty with any of the pipes freezing, although the thermometer in this locality goes down to 10 and 20 degrees below zero.

### Removing Acid Stains from Polished Floor.

*From* J. N. D., *Southampton, N. Y.*—It may be interesting to state that white blotting paper saturated with white wine vinegar (not too wet) and applied several times to the spots will ordinarily remove acid stains from a polished floor. I would further say for the benefit of the craft that I use a brass receptacle for my acid, which is always ready and never spills. Turn it upside down, let it roll about the roof, on the bathroom floor, carry it in your clothes case, tool chest, on your wheel, in any position, never a drop spills and you always have it at hand.

### Tool Chest Construction.

*From* R. W. McD., *Uniontown, Pa.*—In the October number of *Carpentry and Building* "S. A. T." of Bay City, Mich., says in his description of his tool chest that he would like to hear further from readers on this subject. Accordingly I inclose herewith sketches of a chest I have just started to build for my own use. The design is not original nor is it new by any means, yet I regard it as one of the most convenient chests in use, as any tool can be reached without the necessity of handling any of the others. The chest is 3 feet in length, 2 feet in width and 2 feet in hight, inside measurements. Fig. 1 represents the front of the chest with the drop leaf raised exposing the drawers. The drawer marked A is for level, steel square, rules, bevels, try squares and tools of that class, as well as any tools whose length makes them inconvenient for the smaller drawers. The drawer B is for bits of various kinds; C is for gouges; D for chisels; E is for hammers and hatchets; G is for gauges; H for spoke shaves, &c., and I for miscellaneous tools. The large drawer F is for the Universal plane, mallet and other large tools. These drawers are all 1 foot 10 inches in length so there is plenty of space provided for tools not named here.

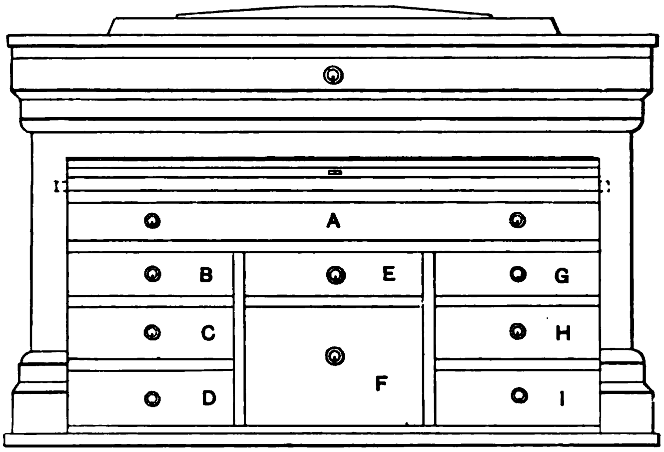


Fig. 1.—Front View with Drop Leaf Raised Exposing the Drawers.

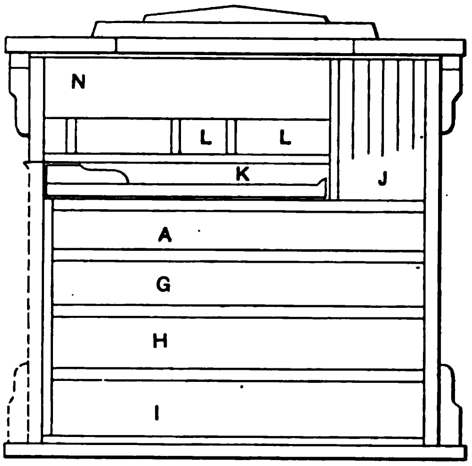


Fig. 2.—Cross Section of Chest.

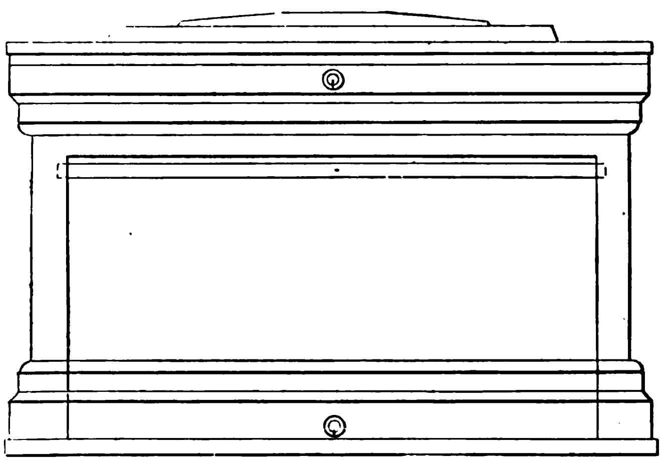


Fig. 3.—Front View of Chest as It Appears Closed.

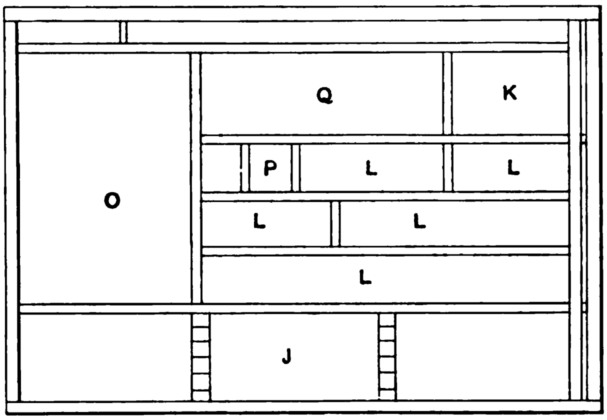


Fig. 4.—Plan of Chest.

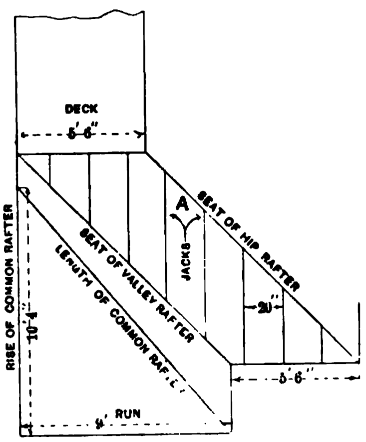
*Tool Chest Construction.—Scale, 1 Inch to the Foot.*

Referring to Fig. 2, the space J is the saw rack and L is for planes, with considerable space left for any other tools. A till can be placed in the space N if needed. The drop leaf is shown in the space K. Fig. 3 represents a front view of the chest and Fig. 4 a plan of the saw rack, spaces for the planes, brace and other tools.

The main advantage of this design over the ordinary style of chest is that the space inside the chest is all taken up with places for tools, while in the ordinary style there is always considerable space between the tills and the saw rack which is not utilized. In addition to this the tools will keep their places when the chest is being moved as the drawers cannot slip about, the drop leaf holding them firmly in position. These are likewise desirable features in the chest shown by "S. A. T." in the October number. My chest will be rather heavy, as about 125 feet of lumber is required to build it complete, but at the same time this construction will give strength and rigidity.

**Finding Lengths and Bevels of Jack Rafters for Deck Roof.**

*From* J. A. K., *Detroit, Mich.*—Allow me a little space in the columns of your valuable paper to present to my brother chips a request for information regarding the proper method of finding lengths and bevels of jack rafters for a deck roof. I inclose a sketch of a deck roof,




*Finding Lengths and Bevels of Jack Rafters for Deck Roof.*

the lengths and bevels of the rafters at A being the difficulty. If some of the practical readers who are experienced in this line will give me the desired information it will be greatly appreciated by me and possibly by some other members of the craft who have been similarly puzzled.

**Relative Cost of Stone and Concrete Cellar Walls.**

*From* G. G., *Great Barrington, Mass.*—I would like to ask through the Correspondence columns what is the difference in cost between a cellar wall of stone masonry and one built of concrete, supposing the material to be on the job in each case.

**Why Is "Newel" So Called?**

*From* A. M., *York, Pa.*—I would like to ask a question through the Correspondence department of your excellent paper: Why is the first post on a stair called a newel?

*Note.*—The word "newel" is derived from the Latin *nux*, meaning "a nut," and while we are unable to find any authority for the reason given, it may be that as the nut is employed to fasten the bolt, so the newel is used to secure the hand rail of the stairs. Can any of our readers assist in answering the question of the correspondent?

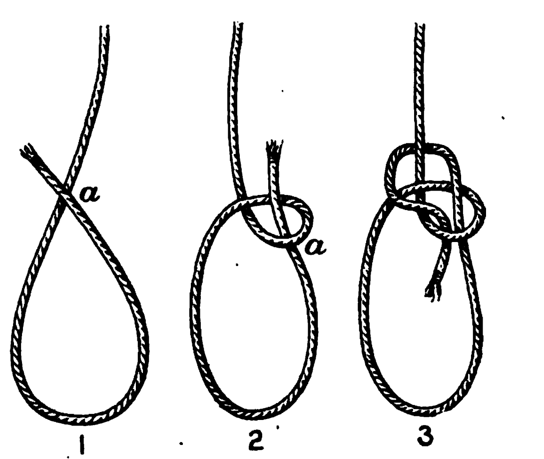
**Tying Knots in Sash Cord.**

*From* Hee H. See, *Brockville, Ont.*—Away back in the month of May, 1905, "Old Reader," Evanston, Wyo., asked for a good knot for tying sash cord. Now, there lived a man at Lake Providence, La., whose name answered to the initials "T. K. W.," who knew all about this business—knew the one and only knot proper to use for it. Did he sit down and write a few lines to the Correspondence pages explaining this knot? No, sir; he did not, but a fellow by the name of "Hee H. See" (who has probably hung a few sash in his time, having learned his trade in a country where almost all the windows have "hung sash") gave in the September issue the method he considered the best. Then was the time for "T. K. W." to spread himself. I quote from his letter: "Hee H. See of Brockville, Ont., gives his method for tying a sash cord, which certainly is new to me. If he could get hold of one of those 'salty old Barnacles' who have been sailors on Lake Ontario he could perhaps learn to tie a bowline knot and after that I think he would never hang a sash weight on a granny's knot."

Now I suppose I am about the only person who is interested in this little piece of prose, but I really cannot let it pass without making a few remarks. If "T. K. W." had shown us how to make a bowline knot there would have been some excuse for his letter, and it is more than probable that I should not have written this one. Kindly lend me your ears, "T. K. W.," while I assist your geography a little. Lake Ontario is a large body of water bounded on both sides by land, on the two ends by water and on the bottom by mud. The water it contains is fresh and "salty old barnacles" do not grow in it. Now as to whether I could learn to tie a bowline knot. I won't say I could tie one before you were born, because as likely as not you are half as old again as I am, but I would almost be willing to say that I could tie one at an age when you could not properly lace your boots. I was taught it with a lot of other things by a stepfather who learned his trade where they make real sailors—among the fishers of the North Sea. As to whether I shall ever after hang a sash weight on a granny's knot, who said that I ever had? Does the correspondent mean to say that the knot I illustrated in the September issue of the paper is a granny's knot? Dear dear! what a lot he does not know. Listen attentively, "T. K. W.," while I tell you its real name. It is called a "running knot," and in some places they hang people with it, let alone sash weights, and it does not give way.

Now, to sum up, there are several reasons why I use this knot for hanging sash weights, and the most important of all is because it is the simplest good knot that can be used for the purpose. There are also several reasons why I do not use a bowline knot. One is because it takes longer to tie and another is that is uses up too much cord. You cannot slip the loop down tight to the weight after it is tied, as you can with the knot I use. However, if "Old Reader" or anybody else wishes to hang his weights with a bowline knot the accompanying sketches will show them how it is tied.

First take the end of the cord in the right hand and lay it over the standing part of the rope, forming a loop, as shown in Fig. 1; grasp the cord with the right hand




*Tying Knots in Sash Cord.*

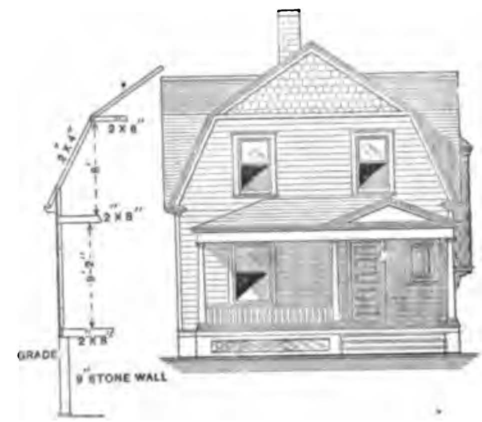
at A and do not move this hand. Take the left side of the loopin the left hand and bring it up and over the end of the cord, at the same time bringing the right hand, still grasping the rope, in under till the cord assumes the position shown in Fig. 2. This is the most difficult part of the knot to learn. Next take the end round behind the standing part and down through the small loop, as shown in Fig. 3, adjust the loop and pull tight. Once it is pulled tight the loop will not slip. This is a very useful knot in many places and a knowledge of it is a good thing.

I had intended making a sketch to show "T. K. W." what a granny's knot is, but this letter is already far too long and it is hardly necessary, as it is probably the knot with which he ties his boot lace every morning.

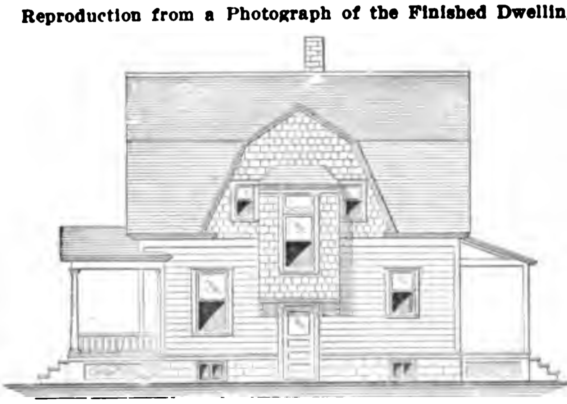
### Design for a Cottage.

*From* W. S. WYLIE, *Sterling, Kansas.*—In an issue of the paper some time ago I noticed a request from "N. U." of Johnstown, Pa., for the publication of designs of some small houses. In reply to that request I send to-day blue prints and photograph of a cottage which may suit him. I am sure it suits me, for it is the house in which I live. I built it for my own use in the summer of 1903. It comes within the limits of his price. It is 24 by 28 feet, has a cellar under the entire area divided into coal room, furnace room, laundry and store room. It is heated with a hot air furnace, has city hydrant water and cistern water brought to the sink. If the readers should want more particulars relative to the construction of the house I shall be glad to give them through the columns of the paper.

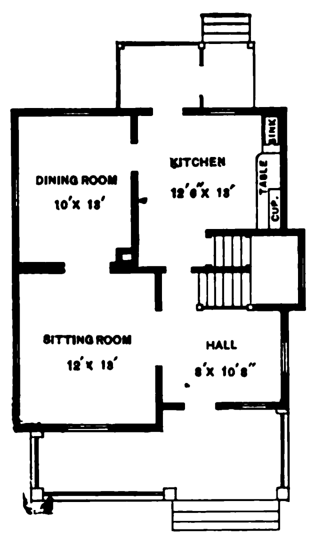
Reproduction from a Photograph of the Finished Dwelling.



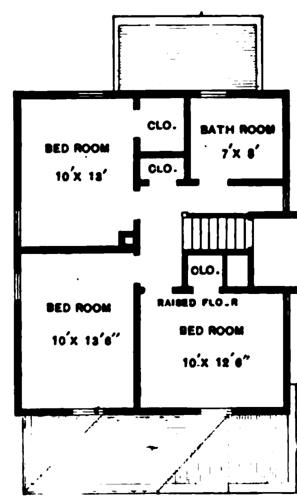

Section and Front Elevation.



Side (Right) Elevation.




First Floor.




Second Floor.

Scale, 1-16 Inch to the Foot.

*Design for a Frame Cottage.*—*W. S. Wylie, Architect, Sterling, Kan.*

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### Encouragement for Young Builders.

*From* WESTERN BUILDER.—A matter which has impressed me as needing some attention from the disciples of the "simple life" in carpentry is the "short cuts" in framing and construction, especially in the simpler elements of roof framing. Learned dissertations in roof framing, profusely illustrated with cuts, are well enough for the student in structural geometry, but the average carpenter is bewildered by their very technical accuracy and gives it up in despair as being beyond his comprehension. I know how "the boys" feel about these things, for we often talk it over on the job at lunch hour. I will undertake to teach any fairly intelligent "jour" to frame an ordinary hip and valley roof with exact lengths of all rafters and jacks and bevels cut to fit in two lessons of 30 minutes each, without any intricate calculations or particularly accurate knowledge of arithmetic, to say nothing of geometry. I have done this for years and am doing it constantly with my apprentices and frequently with my older workmen.

The ability to get there quickly and with accuracy is what counts in these days. The finer calculations are well enough for we old heads who appreciate them, but they shoot far over the head of the average mechanic whose fundamental education has generally been neglected. Pardon me for speaking somewhat vigorously. I am not criticising the policy of the journal and would not omit a line of what you have published. But I think the "practical-get-there-quick-and-have-it-fit" sort of teaching will appeal to the practical sense of your readers.

I find that these short cuts taught to my workmen frequently make the difference between profit and loss. For instance, here is a good man who takes an hour and a half to hang and trim a door. I teach him to do the job in an hour, and do it better. That means 33 per cent. saved to me when that fellow hangs doors. Another rattling good man is sweating along laying 2000 shingles a day. I teach him to make a little three-cornered stool, put a gauge on his hatchet, and his speed is rapidly increased from 25 to 50 per cent. Let me tell you an actual happening on my present job. I had two men shingling, costing me 75 cents per hour. I went on the roof and, alone and unaided, laid 3500 shingles, double-nailed and split to 4 inches wide, in three hours, or more shingles than my two high-priced men laid in a day of eight hours. I realize fully that speed cannot be developed in every man, but methods count when they are practical.

I fully credit the reports sent in from California of men laying 10,000 shingles in a day. In fact, I had men work for me who could do as well on a large roof. Let me quote another experience at the risk of tiring the readers. This happened on one of my jobs last fall in connection with a roof 80 feet long with straight shingling. The shingles were all put up in advance by common labor, and there were seven carpenters on one side to tackle 14,000 shingles. They would use lots of scaffolding and a chalk line every two courses. One lone man on the other side, with a three-cornered perch and a pin in his hatchet, finished his side of the roof when the seven men had yet four courses to lay.

This man has been drawing 50 cents per hour from me ever since then, though the scale is only 32½ cents, for he proved to be just as good at everything else as he was on the roof.

By all means, encourage the spirit of investigation along the line of "the average day's work." We need a reasonable and fair standard which will stimulate our younger men to try and reach something that means a fair day's work.

### Capacity of Cisterns and Number of Bricks Required for Constructing Them.

*From* D. C. C., *Jacksonville, Ill.*—So often persons come to me and ask how many brick will it take to build a cistern so many feet in diameter and so many feet deep or how many barrels will a cistern so deep and so wide hold, that many readers of *Carpentry and Building*, more especially the younger ones, may desire to know more about these things. I have therefore prepared a table which will be found approximately correct and by means of which any one can tell not only the number of brick required but the number of barrels a cistern will contain, measuring from the bottom to the spring of the crown or arch. If it is desired to know how many brick it will take to build a cistern a certain diameter, measured inside the walls, find the number of brick given for "around the side" and multiply this by the hight in feet and inches that it is desired to make the cistern. To this add the number of brick given for a crown of that diameter, the number given for the bottom and the number given for the neck, which will be the number of brick required.

*Capacity in Barrels of Cisterns of Certain Diameter, Also Number of Brick Required for Their Construction and Cubic Feet of Dirt to Be Excavated.*

| Diameter in feet. Ft. | In. | Area in square feet. | Depth. Feet. | Thickness of wall. Inches. | Number brick in bottom. | Number brick in crown. | Number brick around sides. | Number brick in neck. | Number of barrels. | Number cubic feet of dirt. |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 0 | 3.1416— | 1 | 4 | 18 | 15.1145+ | 39.33+ | 33 | 0.7460 | 5.5822+ |
| 2 | 6 | 4.908 | 1 | 4 | 25 | 25.6— | 49.17+ | 33 | 1.1656+ | 7.8758+ |
| 2 | 10 | 6.30+ | 1 | 4 | 26.33+ | 38.1448— | 55.72+ | 33 | 1.4971+ | 9.8811+ |
| 3 | 3 | 8.2958+ | 1 | 4 | 34.7 | 52.3541+ | 63.92475 | 33 | 1.8754+ | 12.0489+ |
| 3 | 8 | 10.56— | 1 | 4 | 44 | 68.48— | 72.1219+ | 33 | 2.7784+ | 14.7480+ |
| 4 | 1 | 13.1— | 1 | 4 | 55+ | 86.48— | 80.343 | 33 | 3.1083+ | 17.7205+ |
| 4 | 6 | 15.9+ | 1 | 4 | 66.36+ | 106.2917— | 88.5109+ | 33 | 3.7766+ | 20.9658+ |
| 5 | 0 | 19.64— | 1 | 4 | 82.21— | 128 | 98.6724+ | 33 | 4.6625 | 25.2200+ |
| 5 | 4 | 22.34+ | 1 | 4 | 93.25— | 151 | 104.899 | 33 | 5.3049 | 28.2744+ |
| 5 | 8 | 25.22— | 1 | 4 | 105.80+ | 176 | 111.414 | 33 | 5.9887+ | 31.5032+ |
| 6 | 0 | 28.27+ | 1 | 4 | 118.3— | 202.4166+ | 118.018 | 33 | 6.714 | 34.9066+ |
| 6 | 4 | 31.50+ | 1 | 4 | 140.0— | 230.4166+ | 124.571 | 33 | 7.4807+ | 38.4746+ |
| 6 | 9 | 35.85+ | 1 | 4 | 150.26+ | 260.0625 | 132.7666 | 33 | 8.4974+ | 43.2024+ |
| 7 | 0 | 38.48+ | 1 | 4 | 160.61— | 290.6453+ | 137.6838 | 33 | 9.1385 | 46.1640+ |
| 7 | 4 | 42.23+ | 1 | 4 | 176.26+ | 323.0939+ | 144.2403 | 33 | 10.0295+ | 50.2656 |
| 7 | 8 | 46.16+ | 1 | 4 | 192.684+ | 356.5417— | 150.7963 | 33 | 10.9510+ | 54.5416+ |
| 8 | 0 | 50.26+ | 1 | 4 | 205.46— | 391.1562+ | 157.2876 | 33 | 11.9363 | 58.9922+ |
| 8 | 4 | 54.54+ | 1 | 4 | 227.65+ | 427.5731+ | 164.8882 | 33 | 13.0085+ | 63.6174+ |
| 8 | 8 | 58.9922+ | 1 | 4 | 246.228 | 466.0625 | 170 3605 | 33 | 14.0082+ | 68.4170+ |
| 9 | 0 | 63.617+ | 1 | 4 | 265.533 | 506.0625 | 177.0119 | 33 | 15.1065 | 73.3912 |

If it is required to ascertain the number of barrels the cistern will contain when full to the spring of the crown multiply the number given in the table by the intended hight and the result will be the number of barrels.

*Example.*—How many brick will be required to build a cistern 6 feet in diameter inside the wall and 6 feet high measured from the bottom to the spring of the crown or arch? How many barrels will the cistern hold?

*Solution.*—Referring to the table presented herewith it is found that a cistern 6 feet in diameter inside the walls requires to each foot of side wall 118.018 brick to the foot in hight, which multiplied by the hight required—6 feet—gives 718.108 for the side wall. To this we add the crown, which is 202.4166, and the bottom, which is 118.3, and the neck, which is 33. The sum of these gives us 1061.8246, or, say, 1062 brick, which is the number required.

Now a cistern 6 feet in diameter inside the wall contains to each foot in hight 6.714 barrels, and multiplying this by 6 feet, the hight to the crown, gives us 40.284 barrels. As in the table the walls are given as 4 inches up to 9 feet in diameter, and exceeding 9 feet the walls should be increased to 9 inches, a cistern 6 feet in diameter and 6 feet high should be excavated 6 feet 8 inches in diameter and 7 feet deep, as the crown should have at least one foot of solid ground on the "quartes" as a bearing. The number of cubic feet of excavating therefore in a cistern of the size mentioned would be 34.9066 cubic feet, which multiplied by 6 feet gives 244.3462 cubic feet, or nearly two cords of dirt. I have carried out in many instances the decimals to four places, although this is not absolutely necessary. I trust the table may be found useful to the readers of the paper and that those who are interested will express their views.

### Silvering Plate Glass.

*From* S. A. T., *Boyne City, Mich.*—I wish some one who has the information will tell me how to put quicksilver on plate glass to make a mirror? I have a nice piece of glass which I desire to use as a looking glass, but do not know how to put on the mercury.

*From* O. D. S., *San Diego, Cal.*—I have been reading with much interest the Correspondence columns of the paper and from them have learned many useful things. I now come for some information, and will be glad to have some of my brother chips tell me how to silver plate glass, so that when we make a piece of furniture we can make the mirror as well.

*Answer.*—A formula introduced by Dr. Draper for silvering plate glass is as follows: In 3 ounces of water dissolve 1¼ ounces of Rochelle salts and, when dissolved, filter. A second solution, containing 1¾ ounces of nitrate of silver to 4 ounces of water, should be added cautiously to 1 ounce of liquor ammonia, until a brown precipitate remains; then add fresh ammonia, and again alternately silver solution and ammonia, until the whole 4 ounces of silver solution has been used and the mixture has still some of the brown oxide in suspension. This solution should be filtered, and when wanted for use mix the two solutions together and add 12 ounces of water. The plate glass, having been thoroughly cleansed, must be laid face downward on the solution, and in from 20 to 30 minutes the plate will be silvered. If it is desired to silver a large plate use more solution; or one may use the following: Distilled water, 6 ounces; nitrate of silver, 2½ drams, to which add ammonia carefully until the precipitate is redissolved. Make a second solution containing ¾ ounces of caustic potash to 16 ounces of water. Add this to the first solution, when a brown precipitate will be formed, which must be redissolved by the addition of the requisite quantity of ammonia, added carefully. Now add 1½ pints of water; to this add nitrate of silver until an insoluble precipitate is formed. The solutions may then be kept ready for use. When about to use mix it with one-tenth of its volume of a solution containing 1 ounce of milk sugar to 10 ounces of water. The great essential is to have the glass perfectly clean, otherwise the silvering will be patchy.

Another method relates to a silvering solution made by melting 1 part, by weight, of lead and 1 part of tin: when these are melted 1 part of bismuth is added, and before this mass cools or sets 10 parts of mercury is stirred in and the liquid poured over the glass, so that every spot is covered, when it is stood on edge to drain quickly. When dry and hard it is given a coat of flat black.

# CABINET WORK FOR THE CARPENTER.

## THE DINING ROOM.

BY PAUL D. OTTER.

IT is a fact that cannot be gainsaid that we are and probably always will be creatures of habit. The point is well illustrated by Rover who, after the plate is cleaned, moseys back of the stove to ruminate; the old gentleman retires to the kitchen corner for his after dinner smoke and the children rally about the sitting room table with their books and games, while Mary at the piano gives a quickened impulse for the evening's enjoyment. We are happily getting over the habit, however, of eating in a chilly dining room where there are just table, chairs and one helpful or admonishing motto on the wall. A uniform temperature now as a rule pervades all rooms and the mother takes pride in all her dining room possessions; the china closet holds safely all her valuable breakables and the plate racks about the walls display the ware and family plate. The children have helped purchase suitable articles for the sideboard, so where else could the home feeling be more strengthened than about the table of such a congenial room?

Pretense, expense and extravagance may readily be evidenced in the sideboard, for this is a matter to be individually dealt with as befits circumstances. Without doubt many dining rooms would look better with a sideboard less lavishly designed and the form and detail more in keeping with other articles about the room. Many a woman you know will keep saving her "stamps" or go without an extra occasion dress to buy a certain showy sideboard which afterward does not keep company with the old chairs and table; in fact it stands out too much in relief that is bold.

It may be with some people the plain is little sought after, but in furniture the plain has the stamp of quality and is growing in favor, looking just right wherever it is placed. All the attention it is given in dusting and after polish tends to improve its appearance. Fig. 2 the reader may see is severely plain—on paper—and for this reason it is offered as a model, for within its measurements other forms lighter or more ornamental may be drawn embodying also features or compartments according to individual needs. Right here consult the lady of the house, for you are not supposed to know how few folds she may put into her table cloths, and the top drawer is intended for this purpose, giving as much space as possible. This drawer is the width between outside pilasters and carries with it when open a false cap—a portion of the middle pilaster. The drawers at the bottom run between the three pilasters and can afterward be partly subdivided for small tableware and table linen. The disposition of large space between drawers may also be made "elastic" by notched shelve strips in each corner to accommodate two shelves regulated by the hight of the dishes or silverware intended to be placed therein.

It is a matter of fancy or later addition whether a back board be secured on top or some form of hanging shelves be added in keeping with the style of the lower case work. A broad sheet of beveled plate mirror glass gives tone and a reflecting surface for all the cut glass one expects to buy for the house as time goes on. It is a sort of rising barometer of a couple's prosperity.

The back consists of a one-mullion framing of ⅞ x 4 inch material paneled with ⅜-inch clear matched and beaded boards. The framing over which the lower drawers slide also has a mullion or rail and a straining rail or board joining the middle pilaster to the back framing. There should be no division back of the middle pilaster in the cupboard proper. The bottom of the cupboard over the lower drawers should be particularly clear and carefully smoothed over for the after finish. The long top drawer slides over an open framing similar to the bottom frame. The use of a neat three-corner strip is recommended here and under similar supporting places, well glued and bradded. Under the bottom framing in the corner the stock should be built up by gluing in corner blocks substantial in character for heavy casters. Heavy corner blocks should also be glued in the corners of the pilasters and the ends on the opposite side of the drawers.

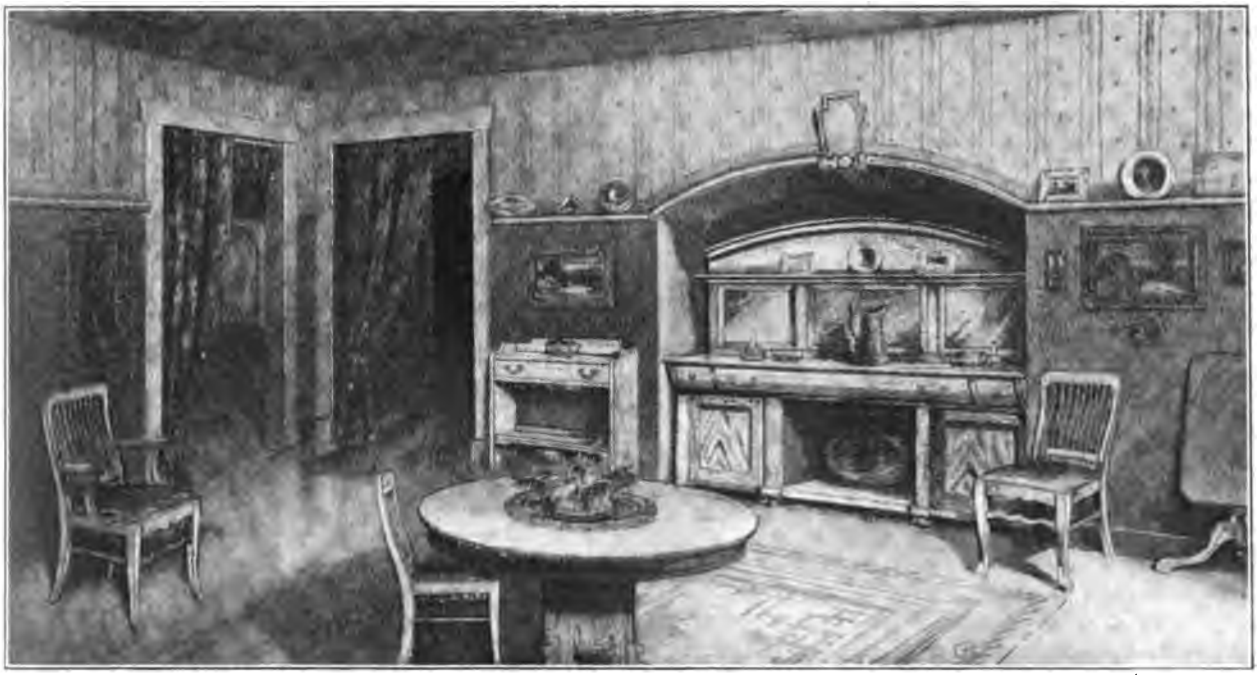


Fig. 1.—View in the Dining Room.

*Cabinet Work for the Carpenter.—The Dining Room.*

For this style of case plain, solid cast brass hardware should be used, the new "brush finish" or "satin finish" adding greatly to its final appearance. It is recommended here to provide each drawer on the bottom in the middle with a wide tongued sliding strip corresponding with a grooved strip glued to the under framing. This when carefully fitted avoids the sticking of the drawers and allows of their being readily pulled with one hand.

The use of veneers for the under panels will undoubtedly be the most satisfactory for strength and a fine display of figure or quarter should be used. Where veneer can be obtained it is evident that by using the thick whitewood rotary cut veneer as a "filler," say ¼ inch thick, facing the inner side to be with rotary cut and the outer side with a select figure of sawed or sliced veneer, a cheaper and more durable panel will result. The whitewood filling should run crosswise with the oak veneers.

The use of veneers has grown so general that there should be little difficulty in obtaining flat or curved veneer panels in many sections of the North, South and West, made up to order. As an equipment of heavy presses, however primitive they may be, is required for gluing surfaces of large extent, it is not recommended to attempt anything of this kind unless with serious intent of making many articles where veneers could be used to cheaper advantage. A more attractive and well matched figure would result for such a handsome piece as this sideboard by using plain oak or inferior grade for the top and facing it with well selected sawed veneer, which in a finished condition would have every indication of representing the board to be high grade.

The pattern shown in Fig. 3 has been prepared with the idea of showing the buffet, so-called, and which shorn of the top trimming and lower drawer would make what is generally sold as a serving stand—two pieces which will suit modest requirements. The serving stand, however, does duty in a well equipped establishment as an adjunct to the sideboard.

The size of the buffet or serving stand appeals naturally to those occupying small homes, and for this reason they are extensively sold to flat dwellers. The buffet illustrated may be made to do greater service by putting the lower drawer 3 inches from the floor and building within

## Cleaning Marbles.

It has long been considered inexpedient to scrape marbles which have been blackened or turned green by the air and dampness, since whatever precautions may be taken the work which is to be restored is always scratched more or less and it is also impossible to practice it in the excavated or carved parts without breaking the delicate sculptures and causing sad incongruities between the designs in relief and those which are sculptured. It is therefore very desirable to find a wash that may be substituted for this destructive process. With respect to soiled articles which have not been tarnished by exposure to the open air, to restore their original color it is sufficient to use a moderately strong solution of

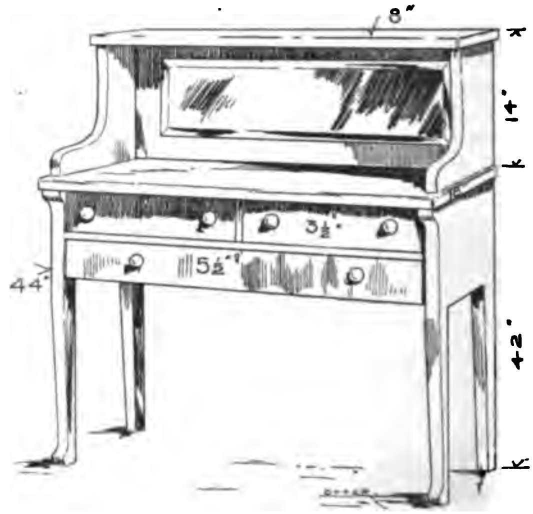



**Fig. 3.—The Buffet.**

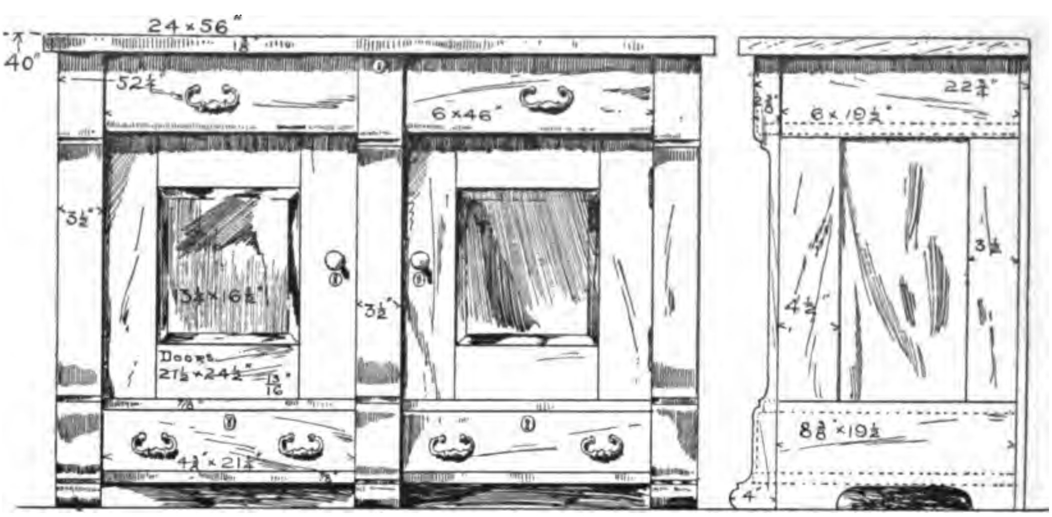



**Fig. 2.—Front and End Elevations of Sideboard, Showing Dimensions of Various Parts.**

***Cabinet Work for the Carpenter.—The Dining Room.***

the intervening space a two-glass door cupboard, which would truly make it as a miniature sideboard of great use and beauty. The sketch, Fig. 3, is sufficiently explanatory in its outward form to dispense with a detailed description. The legs are 1 15-16 x 2 inch material with end board of same thickness jointed and flush faced. The top and end material is 1 inch dressed, the drawer fronts and mirror framing may be ⅞ inch dressed.

The framing between the drawers and a similar framing under the large lower drawer, which does not show, are made without panels 3 inches in width with one middle stile. The back may be neatly filled with any thin material.

Plain turned drawer knobs in wood with sunk brass escutcheons would look well.

A wax or oil rub gives a refined finish which will be far more satisfactory than maintaining a high polish.

(*To be continued.*)

potash in water, then to wash off with pure water and finally to finish them with a very weak solution of hydrochloric acid and water—that is, muriatic acid and water. It is often sufficient in such cases to use a very strong, almost a saturated, solution of soft soap in water. This is spread on with a stiff brush, preferably a wire brush, and introduced into the sculptured parts by a somewhat stiff pencil.

The hydrochloric acid and water have been most successfully tried in every part of the civilized world upon statues, stone balustrades and fascias, and has been considered a most economical and expedient method. The essential point in this operation is to always use water which is perfectly clean and also in an abundant quantity. Showering with a garden pump or sprinkler appears to be the best method of removing the mixture of muriatic acid and water from all the places in which it may rest despite the washing with the brush.

# WHAT BUILDERS ARE DOING.

CONSIDERING the season, building continues on a very active scale all over the country, and reports which have reached us since our last issue indicate a most encouraging outlook not only for the remainder of the year but also for the coming spring. The weather has been unusually favorable and builders have pushed the work in hand as rapidly as possible in order to get everything inclosed before cold weather interferes. In the majority of cases the volume of business in progress is largely in excess of that in the corresponding period last year, the gains in many instances making a most striking exhibit. Prices of building materials and the cost of labor seem to have been no serious deterrent to carrying forward work which has been for some time in prospect and the indications point to a healthy condition all round. There are no serious labor disturbances and the situation, broadly speaking, is indicative of a much better understanding between employer and employed than existed in years gone by.

### Chicago, Ill.

The building record for October shows a moderate increase over the corresponding month a year ago. Architects report a large amount of prospective work in hand and the outlook is encouraging. Permits were taken out in October for the construction of 724 buildings, involving a total cost of $4,918,155, against permits for 707 buildings at an aggregate cost of $4,703,500 for the same month a year ago. The number of permits taken out this year totals 7859, as compared with 6141 during the same period in 1904, and the aggregate cost of the building this year amounts to $52,655,270, as compared with $35,785,790 last year.

The apartment house fever seems to have attacked the city with considerable violence, for it is stated that the demand for them is so strong that contractors are working Sundays in order to have the buildings well under way before the advent of winter weather. This, it is said, is a condition which has not prevailed in the city since the winter prior to the World's Columbian Exposition.

Supplementing the many instances of rapid construction work which have been referred to in these columns, mention may be made of the putting in of the foundations for the new Boston Store. The statement is made that in 50 days 40 caissons, measuring from 8 to 10 feet in diameter, were sunk to bedrock, 106 feet below the level of the street. After the caissons were sunk the excavations were filled with 140,000 feet of concrete, the work being done in ten days less time than any similar undertaking ever carried to a successful issue in that city.

### Cleveland, Ohio.

A special meeting of the Builders' Exchange was held on Thursday, November 2, at which a number of suggested amendments to the constitution and by-laws of the exchange were presented. The amendments to the constitution dealt with the various sections under article IV, touching active, associate and honorary membership in the organization; to article V, regarding mode of election and expulsion, and to articles III, V, VI and VII of the by-laws, touching meetings, committees, fees and delinquents.

This meeting was preliminary to the annual election, which is being held as we go to press with this issue of the paper. The Nominating Committee and judges of election are F. H. Peters, R. R. Wills, J. J. Cummerford, George B. McMillan and H. A. Taylor. This committee acts as a canvassing board to count the ballots and report the result to the president, who announces the same to the exchange. There are 20 candidates for the Board of Directors and the ten receiving the highest number of votes will be declared elected. The polls remain open from 11 in the morning until 8 in the evening. In our next issue we will be able to give the names of officers for the ensuing year.

The building situation shows steady improvement, with the aggregate of business in excess of last year at this season. During October 507 permits were issued for buildings estimated to cost $1,177,545, as against 430 permits for improvements costing $811,820 in the same month a year ago.

### Los Angeles, Cal.

The official building record shows that work is keeping up well in Los Angeles and that as compared with the year preceding the fall building operations have been very heavy. During October a total of 1070 building permits were issued for improvements aggregating $1,348,556, showing a net gain over October, 1904, of 433 permits and in valuation of $80,696. There is a noticeable dropping off in the construction of costly office and store buildings and a large increase in the cheaper grade of frame residences. The majority of the frame buildings now being put up average in cost about $1000. There are, however, a number of costly buildings planned for the near future, and as weather conditions are usually favorable for building during the winter months no great falling off during the next month or two is expected.

### Lowell, Mass.

The members of the Builders' Exchange enjoyed on Wednesday evening, November 1, the first of the series of socials which has been inaugurated for the winter. Frank L. Weaver acted as master of ceremonies in his usual creditable style, and the Entertainment Committee, of which he was chairman, agreeably surprised the members by a programme which was delightful from beginning to end. Local and professional talent assisted in the entertainment, one of the most taking numbers being the song by Sidney Barton, son of Cyrus Barton, vice-president of the exchange, which was entitled "Everybody Works but Father." The programme was varied and pleasant; the music by a harp and violin orchestra was heartily applauded and the refreshments served during the evening added to the satisfaction of the occasion. In addition to Chairman Weaver, the committee in charge of the entertainment consisted of W. H. Fuller, James Whittet, C. M. Forrest, T. F. Costello, with Secretary Herbert White as "coadjutor bishop" of the occasion.

### New York City.

The volume of building operations continues to grow apace, and as the weather has been most favorable for carrying forward the work in hand unusual progress has been made. The number of permits issued from week to week by the building departments of the boroughs of Manhattan and the Bronx shows a striking increase as compared with the same period last year, while the value of the contemplated improvements aggregates a very appreciable total. Up to the time of going to press the value of the new buildings for which permits were issued since January 1 aggregates something over $144,000,000, as against $84,000,000 for the corresponding period of 1904. These figures do not include the amount expended for alterations, which runs up into the millions. The estimated value of the new buildings projected in the Borough of Brooklyn since the first of the year is placed at about $59,000,000, while in the same time last year the new buildings projected were estimated to involve an outlay of a trifle over $33,000,000.

While the labor situation is comparatively quiet just at present negotiations are in progress with the members of certain branches of trade looking to an understanding for the ensuing year. In the case of the bricklayers it is felt that the present agreement will be renewed in all essential particulars save one, which refers to the installation of fire proof blocks. It is thought that this section is likely to be eliminated altogether and thus simplify a question which has been the basis of more or less friction and contention in the past.

Brief editorial reference was made last month to the activity prevailing in the various boroughs of Greater New York and to the fact that records in Queens were being broken pretty nearly every month. The report of Superintendent Joseph Powers, covering the first nine months of the current year, shows that permits were issued for 2403 new buildings, estimated to cost, according to the figures submitted by the owners, $10,879,787, which is an increase of nearly 25 per cent. over the business of the entire 12 months of 1904, which was itself a record breaker, and indicating an increase of 50 per cent. over the year 1903. In classifying the buildings it is interesting to state that 337 were of brick and 2066 were frame. There were 503 tenements, 1900 dwellings, 2 schools, 18 factories, 5 churches and 146 stores. The bulk of the increase occurred in the confines of Newtown, in which permits were issued for 1063 new buildings and 168 alterations. There have been already constructed 225 brick tenements and two-family dwellings, besides several hundred frame tenements and two-family houses. Among the prominent structures for which permits have been issued which are in process of erection are the new buildings of the McClure Publishing Company, the Brunswick-Balke Company, the National Stamping Company, a large telephone exchange and the Queens County Trust Company's building.

The Building Trades Employers' Association held its semiannual meeting on Tuesday, October 10, and the report of the secretary showed the affairs of the organization to have improved in many ways during the past six months. The present membership is about 900, but the necessity for increasing the membership in the outlying districts of Brooklyn and the Borough of the Bronx was strongly urged. Reports of the Board of Governors, the Finance Committee and the Building Committee were presented showing what had been accomplished in the several departments, the tenor of all being of a satisfactory nature. An incident of the meeting was the official announcement of the resignation of P. K. Stephenson as secretary of the association, in order that he might give his entire attention to private business. Assistant

Secretary William J. Holmes will continue for the present to act as secretary. A Nominating Committee was elected and three inspectors of election were appointed.

At the annual meeting of the New York Lumber Trade Association on October 11, and which is said to have been the largest in its history, the unanimous choice of officers for the ensuing year was: President, James S. Davis, Brooklyn; first vice-president, Abner P. Bigelow, New York; second vice-president, Guy Loomis, Brooklyn; treasurer, Charles F. Fischer, New York.

The Concrete Association is the name of a body just organized that is likely to assume national importance, so widely distributed throughout the country and so varied and powerful are the interests for which it will stand. It is made up of the leading concerns representing the several divisions of the concrete industry and allied arts.

### Philadelphia, Pa.

Building operations continue on a large scale. During the month of October 879 permits, covering 1189 operations at an estimated cost of $1,993,200, were taken out, and while this falls somewhat behind the figures for the month of September it ranks fourth in the records of the Bureau of Building for the month of October, being exceeded in 1897, when building work cost $2,188,895; in 1901, when the cost was $3,154,570, and in 1904, when the total reached $2,143,785. During the past ten months of this year the cost of 15,163 building operations has aggregated a total of $31,057,030, as compared with $26,041,505 for 12,648 operations in the same period of 1904. It is confidently expected, judging from the present active conditions of the building trade, that this year will exceed that of 1902, which was the largest on record, aggregating a total of $32,509,575 for the entire 12 months.

Operation work continues the leading feature in the past month's business, permits for two and three story dwellings alone aggregating a total of $960,100. A permit was also taken out for the erection of a two-story "taxpayer" on the site of the Lippincott mansion at Broad and Walnut streets, for the Board Street Realty Company, which recently purchased that property. This building will be two stories high and is to be divided into a number of stores. The cost of the work is estimated at $100,000.

The demand for building continues active, particularly when the season of the year is taken into consideration. The labor situation has improved. The house painters, who were on strike for some seven weeks, withdrew their demands and have returned to work. Skilled mechanics are in good demand and hard to get in some branches of the trade.

Thomas F. Armstrong, president of the Master Builders' Exchange, appointed on October 18 the following committee to co-operate with Col. Sheldon Potter, Director of Public Safety, in reference to all matters in the Bureau of Building Inspection on which he may wish to confer: John Atkinson, ex-president of the Master Builders' Exchange; John S. Stevens, president of the National Association of Builders; James Johnston, president of the Carpenters' Company; Joseph M. Steele, a leading contractor, and Percival M. Sax, a leading engineer. Members of the committee are of the opinion that the present laws are entirely too rigid and work great hardships both to owners and contractors. The great cost of building material and that of labor, in addition to the severity of the present laws, it is feared will cause a falling off in the number of factory buildings to be erected in the future.

### Pittsburgh, Pa.

The figures furnished by the Bureau of Building Inspection indicate a slight falling off in building operations in October as compared with this season a year ago. During the month permits were issued for 329 structures, estimated to cost $1,427,066, while in October last year 339 permits were granted calling for an outlay of $1,494,081. From this it will be seen that the average cost per building was about the same in both years. The report of building operations in Allegheny for October shows 75 permits to have been granted for building improvements estimated to cost $209,525, which is a slight increase over the total for the previous month.

One of the annoying features of the building situation just at present is the trouble in securing an adequate supply of lath. The usual stock from which lath is made is said to have been taken up by the paper manufacturers, the claim being made that it is more convenient for the lumbermen to dispose of their slabs and lath material in this way than to make it into lath. This shortage is being reflected to some extent in an increased demand for metal lath.

### Portland, Oregon.

Building has been decidedly active for a number of weeks past, notwithstanding the approach of winter and the closing of the Lewis and Clark Exposition. Weather conditions have been favorable and builders are rushing work in consequence. Urgency is the rule, not only in the smaller buildings but in the larger structures as well. A new turn in building is the tendency toward the erection of flats and apartment houses. Heretofore, owing to the fact that Portland is not cramped for room, the residence district has shown a tendency to spread out and flats and apartment houses have generally been avoided. Now, however, there seems to be a certain demand for residences in the heart of the city and a number of flats recently completed have been rented at a good figure. As a result builders and investors are planning for the construction of a large number of these dwellings. One large apartment house of eight stories is to be built at the corner of Eleventh and Washington streets by M. A. Gunst of San Francisco. The lower floor will be devoted to stores and the upper floors to apartments.

Builders expect a busy time throughout the winter notwithstanding the rains which will interfere seriously with smaller work. Plans have already been drawn for a number of more or less pretentious office and store buildings which are to be erected during the winter and spring.

### Rochester, N. Y.

While the building season is drawing to a close and operations might naturally be expected to show a decided shrinkage, yet the report of Fire Marshal Walter indicates a volume of business which is considerably ahead of the corresponding period last year. Comparatively few large manufacturing plants are contemplated but many fine residences are in process of construction, and plans are on the board for others which will bring the total valuation of the building improvements of the year up to a gratifying aggregate. The report for the nine months of the current year shows the value of the projected improvements to have been $3,930,492, whereas in the same period of 1904 the valuation was $3,192,374. It is thought that the total for the current year will closely approximate $5,000,000.

### San Francisco, Cal.

Building operations in San Francisco and its environs continue very active, as the holding off of the fall rains has enabled contractors to rush construction work on the many new buildings under way. The architects' offices are kept busy with new plans and inquiries and the outlook for the winter and spring is very favorable. Supplies of building materials are being drawn upon very heavily, with a scarcity in some lines. The shortage of vessels and cars available for shipments of materials to this city is partly responsible. The rush in grain shipping from Oregon and Washington both to foreign and California ports keeps some vessels busy that would otherwise carry lumber. The report of the Bureau of Buildings shows that permits were granted during October for 638 new buildings, aggregating in estimated cost $1,641,670. For alterations to old buildings 57 permits were granted, bringing the total amount of proposed building operations up to $1,791,636.

An advance of $1 per 1000 feet on domestic cargoes of fir lumber, such as is commonly used in California building operations, has been followed by an advance of $2 per 1000 feet by the Retail Lumber Dealers' Association on rough fir lumber. There has been no change in redwood. The rise in fir will not interfere with building operations, as it had long been expected owing to the small margin that the retailers were receiving over cargo prices. There is no improvement in the stocks of lumber at the local yards, fir lumber being especially scarce, and the lines are badly broken. The demand for building lumber has been larger than ever of late. It will probably subside somewhat before the yards get well stocked up in the spring.

The supply of common brick is ample, but pressed brick is rather scarce. The cement situation has not yet improved much, although large amounts of foreign cement are now *en route* to the Coast to supply the shortage. Contractors are paying $3.50 to $4 in many cases for cement. The Pacific Coast cement factories are unable to do much locally, as they are filling large contracts for irrigation projects and other Government works at present. Two new cement mills are being constructed in California.

Labor conditions are still in the high figures, but there are no disturbances. The unions are very independent and some show a tendency to discriminate against building materials that are not of home manufacture. There is an instance of men refusing to handle certain materials made in Chicago.

The use of brick and stone is increasing in San Francisco, especially in the fashionable residence districts. Inquiry in the architects' offices shows that the demand for expensive residences of the best designs has greatly increased during the past year.

The walls of the new Monadnock Building are completed and rooms have already been engaged, although it will not be opened until well into next year. The new Shreve Building at the corner of Grant avenue and Post street is ready for occupancy, adding much to the appearance of the fashionable shopping district. Thomas Butler has filed his official bond as contractor for the construction of the new Custom House in San Francisco, which is to cost $1,194,000. The old buildings are to be cleared away in time to permit of starting work on the new structure by January 1 next.

California granite is to be used for the walls, but a lot of Italian marble is specified for the interior finish. The California Title Insurance & Trust Company contemplates the erection of a 14-story building on California street, between Sansome and Montgomery streets, adjoining the Bank of California. It will be a fire proof structure covering an area of 45 x 124 feet. The investment, including the land, will reach nearly $1,000,000. Besides accommodating the California Title Insurance & Trust Company the proposed building will contain a large number of offices for rent. Rudolph Spreckels has had plans prepared by J. R. Miller for two seven and eight story buildings of brick and terra cotta to be erected on the south side of Ellis street, between Jones and Leavenworth streets. The lot covered is 82½ x 137½ feet. It is the intention to have 168 rooms in one building and 198 in the other, the aggregate cost being $100,000. It is understood that the architectural terra cotta used in the construction of the Hotel Fairmont in San Francisco was supplied by a firm in Perth Amboy, N. J., for $275,000, freight paid. The lowest bid from Pacific Coast manufacturers was $490,000, f.o.b. San Francisco.

### Scranton, Pa.

The growth of a city cannot perhaps be better indicated than by the increase from year to year in the amount of building which is carried on within its corporate limits and by the value of the completed improvements. During the ten months of the current year the figures of the Building Department strikingly demonstrate the progress which Scranton has made in this line as compared with a year ago. There were 981 permits issued for improvements calling for an outlay of $1,863 549, as against 870 permits for improvements valued at $1,664,097 in the first ten months of 1904. In the month of October the number of permits issued was less than in October a year ago, but the valuation was greater, showing that a better class of building is being constructed. A large proportion of the new structures are readily sold at their completion, more particularly in the residential sections, showing that there has existed an active demand for dwelling houses. Among real estate men and architects the opinion is almost unanimous that building operations are likely to increase rather than decrease the coming year. The high price of building materials appears to have little or no effect as a check upon operations, owing no doubt to the fact that under present conditions there is an absolute necessity for hundreds of additional homes. There is an unusually large number now in course of erection and plans are on the boards of city architects for buildings which will be commenced next year just as soon as the weather will permit.

### Seattle, Wash.

Building operations during October show up well for the season, though there was a pronounced dropping off from the record of the previous month. During October a total of 686 permits were issued for improvements valued at $372,544. This is almost the same as the record for October, 1904, when 608 permits, valued at $371,943, were issued. The permits issued during September, 1905, numbered 743, valued at $499,073. During October the permits issued were 98 for one-story frame buildings, valued at $72,755; 42 for one and one-half story frame buildings, valued at $44,100; 37 for two-story frame buildings, valued at $107,800; 6 for one-story brick buildings, valued at $10,000; 2 for four-story brick buildings, valued at $55,000; 6 for foundations, valued at $1150, and the remaining permits for alterations, repairs and miscellaneous.

### Tacoma, Wash.

During October builders continued actively engaged on old work, as they were desirous of accomplishing as much as possible before the rainy season set in. So far the weather is favorable for building operations and the rush is still continued. In the matter of new contracts the situation is rather quiet, as is expected at this season of the year. Architects, however, report that much work is in prospect and that the outlook is for an unusually active spring. Several large buildings, including one seven-story hotel to cost $125,000, are already planned for early commencement. Plans for dwellings for erection next spring are also being made, though the bulk of this work will not be completed for some time. Residence building, however, is still quite active and will continue until the rainy season puts a stop to it.

### Notes.

The great demand for houses in Spencerport, N. Y., has resulted in a veritable building boom. Many dwellings are in course of erection, a new Masonic temple is under way and a number of projects are contemplated.

The present season has witnessed a greater amount of building in Dresden, Tenn., than ever before in the history of the town. Many brick and frame residences are in progress, others are about to be commenced and improvements are being made in many directions.

Building activity in Omaha, Neb., was well maintained during October, when 68 permits for construction, estimated to cost $424,700, were issued, as against 66 permits, calling for only $128,920, during the same month a year ago. The figures for the ten months of the year are $3,652,014, against $1,928,560 in the same period of 1904, a gain of 88 per cent.

If the present rate of activity continues to the close of the year, 1905 will be the greatest building year in the history of the city of Reading, Pa. Already over 850 new homes have been erected, most of them being located in the northeastern and northwestern sections of the city. Building Inspector Heckman expresses the opinion that there will be 1000 new dwellings constructed before the end of the current year.

The stimulus which has been given to building operations in Springfield, Mass., the past season is said to have resulted in a scarcity of competent carpenters in that vicinty. The statement is made that there has not been a period for more than 10 years when employees in the building trades were so much in demand. The fact that there have been no labor disturbances during the year has been to some extent accountable for the great activity in building, coupled with the fact that strikes in the past two or three years have had a tendency to keep building below the normal.

Something of a building boom is in progress in Port Chester, N. Y., and vicinity, where at present a large number of houses are in course of construction, and architects are busy on plans for many more. The signing of agreements by the carpenters and masons thus insuring peace until a year from next May has instilled confidence in the investing public, and many appear to be determined to take advantage of the opportunity to put their money into buildings of various kinds. The new high speed electric railroad between New York City and Port Chester with trolley connections in various directions is not without influence upon building operations.

Although the building season is pretty well advanced dwelling houses are going up in all sections of Wilmington, Del., and a considerable number are being erected in the suburbs. The latter do not come under the direction of the building inspector because they are outside of the city limits, but they are counted as a portion of the general boom which prevails, because it is understood that in the near future all these outlying sections will be brought within the corporate limits. It appears to be the general opinion of builders that the construction of dwelling houses will continue until cold weather makes it impossible to carry on the work.

## California Department Store Building.

The new building designed by Reid Brothers for Emma Butler, which is being erected at the southeast corner of Stockton and Geary streets, San Francisco, at a cost of about $600,000, has nine stories above the street level, four of which will be occupied by Newman & Levinson's store. The basement will be used as a salesroom and a subbasement will be used as a packing and shipping room, besides containing the steam heating plant and machinery pertaining to the building. An area of 137½ feet square is covered by the structure, which has two fronts of California standstone, while the dead walls and backing are of brick. Massive concrete foundations have been put in. The building is of heavy steel frame fire proof construction, with reinforced concrete floor arches. The public hall spaces, corridors, &c., will have mosaic floors and the wainscoting will be of marble. There will be about 250 offices fitted up with all the latest improvements. A special feature in which the Butler Building will be in advance of any other building in San Francisco is in the number and arrangement of the elevators, of which there will be eight for passenger service, operated by electricity. One group of these will furnish service for the office floors and those for the store department will be arranged in two groups. There will also be ten electric package lifts and two freight elevators for the store service. A gravity system of steam heating will be installed.

CAPTAIN JOHN S. DAMRELL, for nearly thirty years Building Commissioner of the city of Boston, died November 3 of a paralytic shock, in the seventy-eighth year of his age. Few Boston men of the present generation have been better known in the business community than Mr. Damrell, as previous to his connection with the Building Department he was for twenty years with the Fire Department and for six years its chief, including the period of the great Boston fire.

# BUILDING A PLANK TOWER.

BY JAMES F. HOBART.

AN acid tower, built upon entirely novel lines, was recently put up in Ypsilanti, Mich., for a paper manufacturing concern in that place. The tower is about 24 feet square at the base, the sides taper 9-32 inch per foot on each side, making the entire taper or batter of tower 9-16 inch per foot. The tower contains four wooden gas tubes 157 feet high, and an elevator which is located in the middle of the tower between the gas tubes. The tower is not closed in, the framing being open to the weather. The timber of which the tower is constructed is built up of 2 and 3 inch planks, no piece being used larger than 8 x 12 inches.

The corner posts, Figs. 1 and 2, are built up of 2-inch planks, with a single outside layer of 3-inch. To build a corner post a 2 x 6 and a 2 x 8 inch were spiked together, trough fashion; then a 2 x 8 and a 2 x 10 inch were spiked on the outside of the two first mentioned. Next, a 2 x 10 and a 2 x 12 inch were spiked outside the others, and finally two 12 x 3 inch planks were spiked outside of the whole. The latter are so arranged that a 3 x 3 inch corner is left outside, and a 6 x 6 inch corner inside. The outside corner is filled with a 3-inch quarter round, which is white leaded and spiked in. The outer corner edges of the corner posts are held by spikes, the inner edges being screw bolted every 2 feet. The middle posts are built up of five 2 x 12 inch planks, as also are the two elevator timbers which run from top to bottom of the tower in line with two of the middle posts.

The girts are built up of three 2 x 12 inch planks, two of which pass through the middle posts and tenon into the corner posts, being fastened there by two ½-inch bolts, which pass through the post and girt tenons, also through a 5-16 inch iron strap 10 inches wide and 3 feet long, bent at right angles to fit the inner angle of corner post after the girt has been built in flush therewith. This happens when two of the girt planks are in place. The corner strap is then fitted and let into the inner angle of the corner post, Fig. 3, and receives the two bolts mentioned above. In addition to the two bolts through each side of the corner post there are six more bolts drilled through the three plank thicknesses at each girt end. There are thus 16 bolts through each corner angle plate. Four bolts are put through each intersection of center posts and girts, and two bolts are also placed intermediate between corner and center posts. In addition to this fastening two ¾-inch joint bolts are put through the girts 2 feet away from and each side of the center posts.

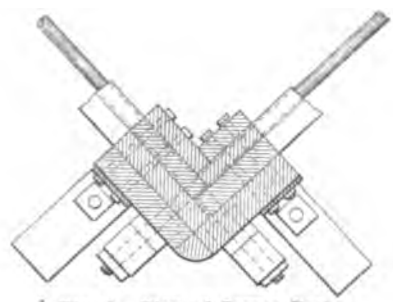


Fig. 2.—Plan of Corner Post.

Fig. 3.—Inside Angle of Corner Post.

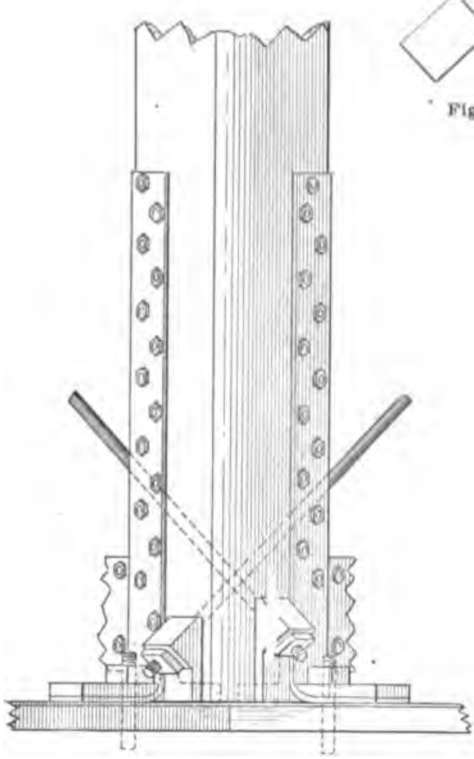


Fig. 1.—Elevation of Base of Corner Post.

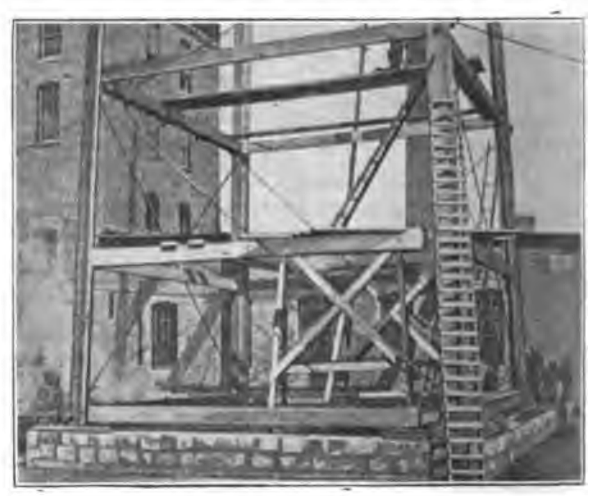


Fig. 4.—Putting in the Girts.

*Building a Plank Tower.*

These bolts are for holding the floor timbers, which will be described later.

The first floor is 15 inches from the top of foundation, and the next floor is up 13 feet, and the third floor 12 feet further. In bracing the towers these two floors, or the spaces between them, were made a sort of double bent of 25 feet, all succeeding floors being spaced 15 feet apart. The lower space of 25 feet is braced by four 1½-inch iron rods each about 32 feet long and placed in pairs. This is to avoid using a single rod of large diameter.

Each corner post is made fast to two 1½-inch anchor bolts, as shown in Figs. 1 and 2, which come up through a cement and rock foundation 15 feet deep and about 28 feet square. The middle posts are also anchored, each with a single bolt. The anchorage of each bolt, at the bottom, is an oak log 16 inches in diameter. The logs extend inward to the center of the tower. The middle post bolt passes directly through its log, the corner bolts pass down on either side of a log laid diagonally toward the center of the foundation, and a heavy iron yoke passes under the log and receives the ends of both anchor bolts.

This gives a foundation of 435 cubic yards of solid stone and cement, all imbedded in the ground.

The corner posts are attached to the anchor bolts by means of two iron straps to each post, said straps being about 6½ feet long, 5 inches wide, and ⅝ inch thick. A piece of 5 x 1½ inch flat iron about 12 inches long has one end rounded on one side, then it is fastened to one end of a strap by two ⅝-inch rivets, and a hole for the anchor bolt is drilled through both pieces of iron, after which the ⅝-inch strip is bent around the rounded corner of the thick piece, thereby forming a foot to the strap, with a bearing for the anchor bolt nut on the thick piece above mentioned. Seventeen ¾-inch bolts are then put in each strap and the four thicknesses of plank constituting the post inside of each strap. The center posts are strapped in the same manner. The holding power of these straps would be increased by turning over the top edge thereof and mortising it into the post. This was done with two castings on each corner post, said castings being used to receive the lower ends of the brace rods. These castings are 4 inches wide and are gained under the posts 3 inches. The upper ends of the lower rods pass through angle castings, which also receive the lower ends of the next pair of rods, and so on to the top of the tower.

The top of the foundation is of cobbles, grouted roughly, and a 3-inch bed of cement placed thereon under each post. Later this thickness of cement is to be continued all over the top of the foundation, and so graded as to form a drainage around the four lime tubs to carry off any water that may find its way down the outside thereof. Each post was raised ¼ inch from the cement, blocked under the girts as soon as the lower portion of the tower was raised, then thin cement was poured and worked under each post, forming a perfect bearing for the bottom of each post upon the foundation.

As each side of the tower forms a Howe truss, the construction indicates that the completed tower would remain rigid if extended out horizontally from a vertical face. In calculating the wind resistant power, the above comparison was taken by the contractor, Henry Stout, who supplied the main points of the scheme, subject to some modifications and embellishments by the owners, the Ypsilanti Paper Company.

A neat scheme was employed in laying out and framing this tower, all the marks and cuts being made to a common steel square, with a clip screwed flush with the inner edge of the blade, at the extreme end thereof, another clip being placed on the outside edge of the tongue, 9-16 inch in from the edge of the blade, thus giving the batter of the tower on the blade, the clips resting against the edge of a plank, and the working mark being made along the tongue, generally on the insde edge thereof, so as to avoid the clip above mentioned. The steel square thus prepared was handled very carefully, and kept with the clips on until the entire tower was finished, all the marks being made without changing or removing the clips.

When the tower was raised, the two opposite bents were put together, three of the inside 3-inch planks being run up together, end to end, and reaching about 36 feet The planks then "broke back" until the highest point was reached in the 6-inch plank of each corner post, 57 feet above the foundation. The bottom girts of the two opposite sides of the tower were framed in and sent up, the side girts and all the middle posts being added after the first section of the tower was raised. The upper girts of each bent were temporarily stiffened for raising, by bolting on a 2 x 12 inch plank endwise, yokes being used on either side of the stiffening plank. For raising plank masts were set up and braced, tackle attached to the top thereof, and the bents raised upon tall horses. Two telegraph poles were then set up as shears, and a cable passed over the top thereof and attached to the lower bent, being made fast about 30 feet from the ground. A hoisting engine was used for working the cable, which was given a turn around the gipsy head, but was not coiled upon the drum.

A 20-foot rope-guyed ladder derrick was set up on each floor as that was finished, and used with a single and double block hand fall to hoist all the material from the ground, also to swing the girts and other timbers directly into place. The floors were put in flush-timbered with the girts, Fig. 5, the timbers thereof being 3 x 12 inches. Two through timbers were used under each floor, and the elevator posts were built into both of these floor timbers. A 3 x ⅜ inch wrought iron hanger was used to carry each end of every floor timber, the iron being bent over upon the girt, then passing down between the girt and the end of floor timber, and bent again under the timber. In addition to this, two ¾-inch joint bolts were put through the girts into each end of every floor timber, holes being drilled in the iron hangers to allow the passage of the bolts. Cross floor timbers were cut in after the same manner between the floor timbers above mentioned and the side girts, also between the through floor timbers.

Fig. 5.—Framing of the Floor Timbers.

Fig. 6.—Raising the Upper Section of the Tower.

*Building a Plank Tower.*

# AN INNOVATION IN FURNACE HEATING.

THE enterprise that is being devoted to exploiting methods for improving the service of furnace heating systems and at the same time to reducing the cost of installation lends interest to a system which has been satisfactory in a cold section. Through the courtesy of R. L. Spellerberg, Dubuque, Iowa, we are enabled to present the plans and an analysis of a furnace heating system which he installed for one of his customers. It is one of a type of which he has made a specialty for more than ten years with general satisfaction. In this particular system the conditions which he had to meet rendered necessary some departure from what would be accepted as the proper location for the furnace. The building contains a spacious cellar, but has two girders running through from front to back, 8 feet apart, between which the cellar stairs come down in exactly the place where the furnace should be located to equalize as much as possible the lengths of the pipes to each one of the different registers and wall stacks. However, with the large cellar main system, which he uses extensively, there was little trouble in getting around the difficulties presented.

The plan of the basement, Fig. 1, shows the furnace located far enough away from the foot of the stairs not to interfere with their use. A No. 48-inch Ideal Novelty furnace was connected with the smoke flue by means of a 9-inch galvanized iron pipe. The furnace is supplied with air both from out of doors and from within, an underground trench having an area of 275 square inches leading from a window on the northwest side and a 19-inch round pipe leading from a 14 x 30 inch register face in the front hall near the outer door, the two having a total area of 548 square inches. The notable feature of the plan is the piping and the location of the furnace. It will be seen that all of the pipes are comparatively short, the longest pipe, running to the riser for the kitchen chamber, being less than 12 feet long. The cellar main for feeding the 9-inch riser for the kitchen chamber, the 10-inch pipe to the register in the kitchen, the 9-inch pipe to the library chamber riser and the 12-inch pipe to the library register are supplied by means of a 20-inch pipe from the furnace, which is reduced as the different branches are taken off from it until it is a 9-inch pipe at the far end. The 20-inch pipe has an area of 314 square inches. For supplying the floor registers on the other side of the house a 21-inch pipe having an area of 346 square inches supplies a 13-inch pipe to the floor register used for heating the upper and lower hall, the 8-inch pipe to the riser for the chamber on the second floor, the 10-inch pipe for the parlor and the 11-inch pipe for the dining room. The areas of both the 20-inch and the 21-inch pipes correspond to the combined areas of the pipes mentioned, as the combined area of the pipes supplied by these two large mains is 635 square inches.

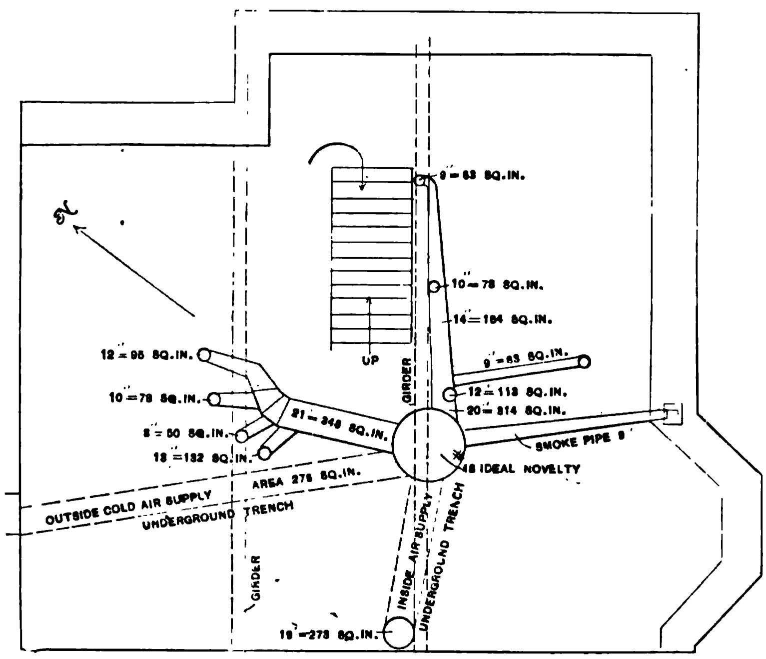



Fig. 1.—Foundation Plan, Showing Furnace Mains.

Another feature of this piping is the arrangement of the outlets so as to secure the pull or exhaust effect on the large horizontal main that is exerted by the accelerated flow in the risers to the second floor. The 12-inch pipe to the library register would seriously affect the supply and flow of air in the 9-inch horizontal branch if it did not connect with a riser having a head of 12 feet

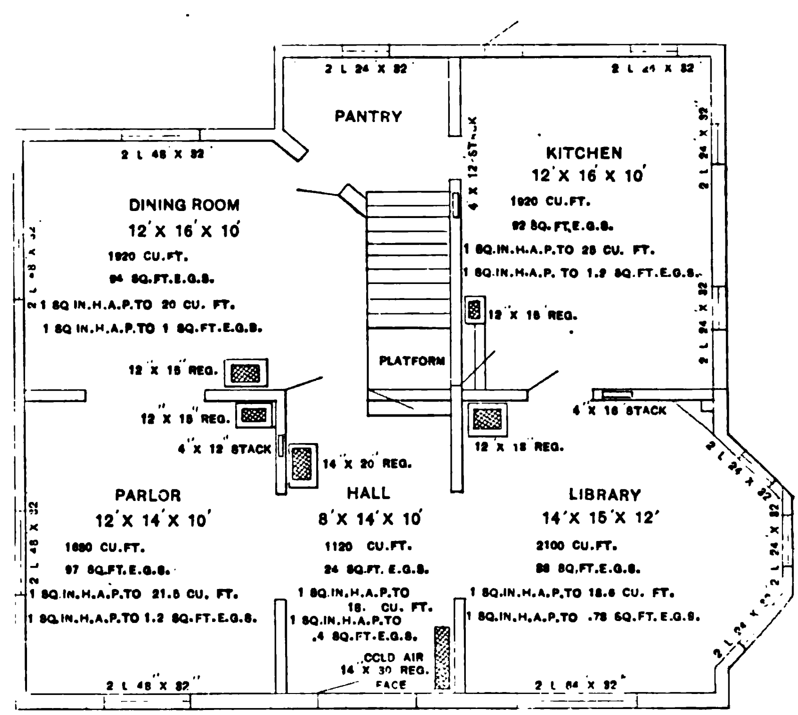



Fig. 2.—First Floor, Showing Register and Riser Locations.

*An Innovation in Furnace Heating.*

to a second-floor register in the library chamber. The termination of this main in a 9-inch pipe after passing a 10-inch outlet is done safely, as it connects with a riser to another second-floor room, the kitchen chamber. The flow in the 21-inch pipe to the other outlets is benefited by the 8-inch connection with a riser to the second-floor room over the parlor and dining room. While the areas of the mains and branches agree correctly there can be little doubt that the connections with the second-floor risers exert in every instance an influence of substantial benefit to the general result.

The plan of the first floor, Fig. 2, shows the location of the registers and risers and the inside cold air supply register in the front hall. As already stated, the inside and outside cold air supply together have an area of 548 square inches, or a little more than three-quarters of the combined area of the hot air outlets, which is 635 square inches. Neither the inside nor outside air supply is sufficient to furnish air for the hot air pipes alone and both must be used. This is different from the practice of some heating men. More frequently the air supply is arranged so that either one or the other may be used, or both may be used together by suitably arranging the dampers to furnish the proper supply of air. In this system it is clear that air is brought in from out of doors to insure ventilation, and the use of the inside supply at the same time prevents overventilation with the consequent waste of heat, which has been pointed out by some competent critics as a wasteful feature of furnace heating. In this system there is provision for a circulation of a large portion of the air in the building, which in very cold climates is essential in the interest of economy, a provision that can be made more widely in furnace systems without disadvantage.

The first-floor plan also gives the dimensions of the various rooms, the cubic space, the equivalent glass surface and the proportion of the hot air pipe area to both space and exposure. The windows all have two lights, varying from 24 x 30 inches in size to 72 x 32 inches. The equivalent glass surface is calculated on a basis of 4 square feet of wall, being the equivalent of 1 square foot of glass. It is evident also that there has been no desire for more than merely warming the sleeping rooms, the direct provision being designed to temper the air rather than to maintain a temperature suitable for sitting rooms. A study of the information given on the first and second floor plans will show that in the principal rooms of the second floor 1 square inch of area in the hot air pipe is provided to take care of about 60 cubic feet of space and about 2 square feet of equivalent glass surface, while in the first-floor rooms 1 square inch of area in the hot air pipes is provided to take care of about 20 cubic feet of space and about 1 square foot of equivalent glass surface. This liberal provision for heating the first-floor rooms reduces the work of the pipes to the second floor and accounts in a measure for the wide difference in the proportions. The building contains a total of 17,766 cubic feet of space and has an exposure of 765 square feet of equivalent glass surface. It is heated by means of a furnace having a grate 25 inches in diameter with an area of 490 squares inches. In relative proportions the various parts show that 1 square inch in the hot air pipe is provided for every 28 cubic feet of space in the building and for every 1.2 square feet of equivalent glass surface. It will also be noted that 1 square inch of area in the grate surface is provided for every 36 cubic feet of space and for 1.5 square feet of equivalent glass surface.

In addition to these interesting comparisons and proportions attention is directed to the cost of installing such a system as compared with one in which a separate pipe would be carried to each register or riser, a computation which can be readily made by furnacemen. It will also be noted that the hot air pipe area in proportion to the work to be done on the first floor is ample and probably generous, insuring a good movement of the air, so that the heating work may be done without requiring the air to be raised to a high temperature and at fully as low a temperature as when the work would be done by an individual system of piping. The large cellar main facilitates a free flow of air owing to the large volume and the consequent reduction in friction due to the use of the large pipe.

**Economy with Circulation.**

To show the advantage from the standpoint of economy in arranging for an internal circulation of the air in furnace heating a calculation may be made on a heat unit basis of the amount of coal that would be needed to heat the residence in severe weather: First, when all the air for warming is taken from out of doors; second, when all the air is taken from within the building and rewarmed by the furnace; third, when a part of the air is taken from out of doors and the rest from the building's interior. It must be remembered at the outset that the calculation is based on extreme weather and that it is in no wise intended as a method for obtaining the coal consumption of such a heating system over an entire heating season.

As already stated, there is an equivalent glass surface in the exposed walls of the building of 765 square feet. When the outside temperature is zero and the inside temperature is 70 degrees it is a common practice to charge glass surface with a capacity to transmit 85 heat units per hour per square foot of surface, so that for the

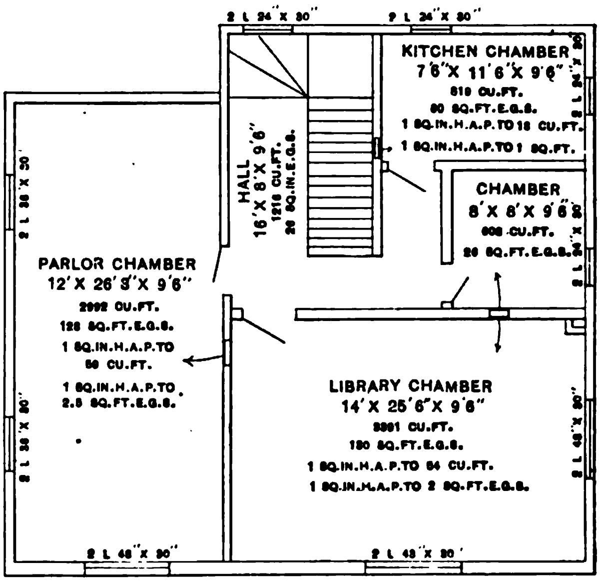



Fig. 3.—Plan of Second Floor.

*An Innovation in Furnace Heating.*

765 square feet of equivalent glass surface there is an hourly expenditure in severe weather of about 65,000 heat units. If we assume that the air from the furnace is introduced into the rooms at a temperature of 140 degrees and in supplying the stated amount of heat is allowed to cool to room temperature—that is, to 70 degrees—the problem is to find out the volume of air that must be supplied per hour so that in cooling from 140 to 70 degrees it will give up 65,000 heat units.

As 1 cubic foot of air heated or cooled 1 degree involves the transfer of 0.019 heat unit, 1 cubic foot cooled 70 degrees will lose $70 \times 0.019 = 1.33$ heat units. There will accordingly be required to supply the given amount of heat $65{,}000 \div 1.33 = 49{,}000$ (about) cubic feet per hour. Incidentally it may be noted that this is equivalent to a change of air in the house at the rate of about 2¾ changes per hour, the cubical contents of the building being, as stated, 17,766 cubic feet.

When air is admitted to the furnace from out of doors it must be heated from zero to 140 degrees. This means, therefore, for the 49,000 cubic feet required per hour that the furnace must give up $49{,}000 \times 0.019 \times 140 = 130{,}000$ heat units. If we assume that 1 pound of coal burned in a furnace will supply 8000 heat units to the air passing over the furnace, it will be seen that $130{,}000 \div 8000 = 16\frac{1}{4}$ pounds of coal will be required per hour. If, now, instead of being taken from out of doors, the air is led from the hall to the furnace, which it enters, say, at 60 degrees, the 49,000 cubic feet per hour will need to be heated only

80 degrees. It will, therefore, require but 80-140 of the amount of coal required in the case just mentioned—that is, about 9¼ pounds of coal per hour.

It will be recalled, however, that the system is designed so that part of the air must be taken from indoors. The cross sectional area of the cold air passage from the outside and that of the passage from the hall are equal, and while the difference in the density of the air outside (being at zero) as compared with that inside (being at 60 degrees) would tend to provide for the inflow of a relatively greater quantity of fresh cold air as compared with indoor air, we may, for the purposes of this calculation, assume that an equal amount of air is received from both sources. This will, therefore, mean that for the system as designed the amount of coal required per hour under severe conditions would be the average between the two values stated—that is, 12¾ pounds. This is a saving of 3½ pounds per hour over the system with only outside air supplied, and were the severe weather to extend over four months would mean a saving of 10,000 pounds, or 5 tons of coal.

## Electric Wiring of Buildings.

House owners and builders do not appreciate the importance of proper specifications for wiring buildings for electric light in order to make it safe and most serviceable. As a rule wires are used much too small to carry the necessary current.

This condition is brought about by the ignorance of the public in matters electrical and the lack of proper specifications for the electric wiring in the building specifications furnished by the architects to the contractors.

All other work is carefully covered by specifications, but the wiring is generally passed over as something quite unimportant with the mere statement of the number of lights or outlets and the locations of lights to be "where the gas jets are."

If left to his own devices, says an exchange, the wiring contractor will invariably use only one size of wire throughout the house, and that the smallest size allowed at all by the Board of Fire Underwriters, No. 14 wire.

He will almost invariably connect all of the wires together without any branch cutouts or fuses and depend upon only the main fuse at the point of entrance to blow in case of trouble with the wiring. Wires should be proportioned to the number of lights which they are to carry; the same as water pipes or gas pipes; consequently the main wires should be larger than the branch wires leading to the fixtures.

Wherever a small wire is to connect to a larger wire there must be a fuse or "cut out."

It is more convenient, safer and far more sightly to arrange the wiring so that all "cut outs" and fuses may be installed in a central cabinet box or panel in the wall.

In an ordinary size residence, one of these cut out cabinets is sufficient for the whole house, but in the larger residences it is best to arrange the wiring for a cabinet on each floor.

Where one is used it should be centrally located, preferably in a hall. The three main wires lead to this from the main switch and meter, and the lights in the different rooms should be distributed on several branch circuits leading out from the cabinet and each protected by a fuse in the cabinet.

The rule is that each branch shall not carry current to exceed 660 watts, equivalent to about 12 16 candle-power lights to a circuit.

The advantage of this plan of wiring is that being cut up into small independent sections, with a few lights on each, small size wires can be used, and even if the contractor uses the smallest size allowed they will still be of sufficient capacity for the number of lights on them, provided distances are not too great.

Other advantages are:

1. Only a few lights extinguished by the blowing of a branch fuse, instead of all lights out by the blowing of the main fuse, usually located in the cellar or attic.

2. No danger of sockets burning out with explosive noises and sparks, and in case of wires becoming crossed or grounded onto the gas pipe at the ceiling the small fuse will be blown quietly before any damage is done to the ceiling.

3. Cut outs being necessary, it is better and more convenient to have them located in one place easily accessible for inspection and replacing of burned out fuses, instead of having a man bring in a tall stepladder to reach a cutout located on the wall or ceiling, the decorations of which he may injure. The following simple specifications will cover most wiring and are applicable to large and small buildings for concealed wiring:

1. Best approved double rubber covered tinned copper wire must be used.

2. All joints in wires must be soldered, and after inspection must be taped.

3. Wiring must be on three-wire system from point of entrance to the one or more "cut out" cabinets or panels.

4. Cut out cabinets must be arranged for three-wire supply and two-wire branch circuits.

5. Cut outs must have either Edison screw plugs or inclosed cartridge type fuses.

6. Loops must be left for meter connection and a smooth board installed upon which meter will be mounted, at a hight not exceeding 7 feet above the floor.

7. A three-pole switch and cut out of ample carrying capacity must be installed at the point of entrance to the building and on the inside.

8. Wires from entrance to cut out cabinet must be of such size as to not cause more than 1 per cent. drop or loss in volts when all lights are lighted.

9. Branch wires from cabinets to outlets must be of such size as not to have more than 1 per cent. drop or loss in volts when all lights are lighted.

Nor a maximum of 12 16-candle-power lights. No. 14 wire can be used for branch circuits not exceeding 31 feet in length one way. If distance is greater No. 12 must be used.

10. All overhead lights to be turned on and off by switches on walls near the doors of each room.

11. Flush push button switches in steel cases preferred.

12. Wires to be kept free from crosses, grounds and open circuits until inspected and covered in, and to be guaranteed and kept free from all defects for one year.

13. Wiring must be done in a workmanlike manner and in accordance with rules of National Board of Fire Underwriters.

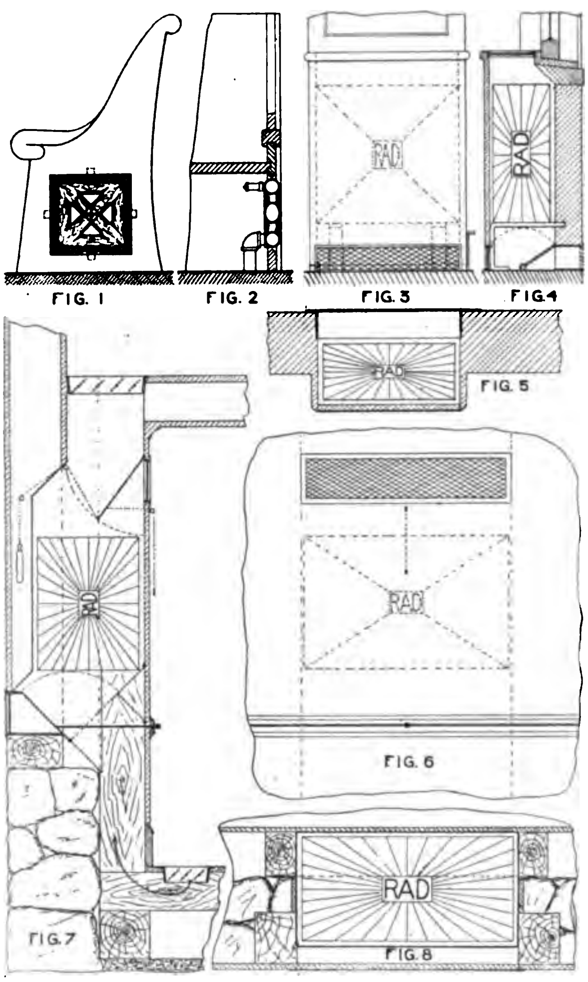
14. Contract to include all labor and material, wire, main line switch and cut outs, cut out cabinets and cut outs, and any and all other switches and necessary fittings to make the wiring complete from point of entrance to each outlet, but not to include any chandeliers, brackets, fixtures or portable cords.

## Fire Test of a Sheet Steel Floor.

Not long since a fire broke out in the top story of the garbage disposal plant operated on Barren Island, New York Harbor, by the New York Sanitary Utilization Company. The building is one of three stories, entirely of wood, 80 x 150 feet in plan. The third floor was made with 4 inches of crossed planks on steel I-beams and was sheathed on the under side with thick sheet steel plates nailed to it between the top flanges of the beams. The fire soon became so fierce that it was impossible to approach close enough to fight it to best advantage. The entire roof and side walls down to the floor line were consumed and the fire ate through the walls below the floor in many places, but the floor itself was saved by the steel plates and the fire was finally extinguished by the company's own fire brigade. The contents of the building were so little damaged that work in the lower story was resumed the same day and only a few days' delay was occasioned in the operation of the machinery in the upper stories. The small proportions of the damage are, the owners feel, due largely to the protection afforded by the steel ceiling sheathing.

## Some Wrinkles in Church Apparatus.

The accompanying sketches show several new features in the construction of heating apparatus, particularly adapted to church work. A square wall radiator placed in the panel of the pew base, at the aisle end, is shown in Fig. 1. The radiator is connected by one pipe, has an automatic valve, and has lugs cast on to it for attachment to the seat. A sectional view is given in Fig. 2, showing the arrangement of the supply pipe and vent. A method of placing a direct-indirect radiator, as recommended by the Massachusetts State inspectors of heating and ventilation, is shown in Fig. 3, which is a front ele-




*Some Wrinkles in Church Heating Apparatus.*

vation, while Fig. 4 is a side elevation in section and Fig. 5 a plan. It will be noticed that the wall is recessed under the window; that the radiator is placed in the recess, and the front half cased out into the room. The air supply damper is arranged to throw the outside air, or air from the room, against the radiator, by which it is heated, and discharged through a screen at the top of the casing.

For ordinary wooden buildings, such as churches, public halls, &c., it has been found that, on a basis of 1 square foot of radiation to 40 cubic feet of space in the room, there will be sufficient steam surface to warm the room to 70 degrees in zero weather, and that each square foot of surface (direct-indirect) will supply about 5 cubic feet of air per minute at a temperature of about 100 degrees. An indirect heat and rotating flue for the basement and body of a church is shown by means of Fig. 6, which gives a partial front view, while Fig. 7 shows a sectional side elevation, and Fig. 8 a plan. As will be seen by the sketch, the stone underpining extends up about 3 feet above the basement floor. On this rests the main frame timber, the basement studding (2 x 4) being placed inside the main framing. This allows sufficient space for the arrangement shown. Under the radiator is a damper, which controls the outside and rotated air. The damper above the radiator throws the air into the church or Sunday school, as desired. In the floor of the basement and the church are placed registers, the first for rotating, the second to control the heat supply. This arrangement, although quite expensive to install, has given very good results.

## Cement for Stopping Leaks in Metal Roofs.

It is a well known fact that metal roofs are with annoying frequency in need of repair by reason of their developing a leaky condition and a ready means of remedying the trouble is therefore of interest to a large class in the trade. There are, it is true, various ways of accomplishing the desired results, but some are much more convenient and satisfactory than others and therefore greatly to be preferred. Some points of suggestive value in connection with this subject are contained in the reply to a correspondent of the *Painters' Magazine* who asked for a good formula for a cement for patching metal roofs that have become perforated previous to re-painting, and we present them herewith. The journal in question stated that the very best cement for the purpose "is made by boiling paint skins, of which every large paint factory has a supply, in linseed oil until every lump is thoroughly dissolved. When sufficiently cooled it is run through a paint mill with oxide of iron, red or brown, to give the desired color. with a small quantity of rosin oil in the consistency of semi-paste. When ground smooth the mass is placed in a mixer and one-half pound of finely chopped cow's hair is added for every 100 pounds of the semi-paste. This material has the elasticity of soft rubber and does not become brittle.

"If paint skins are not available, equal parts of graphite for slate colored roofs, cheap red oxide for red roofs, mineral brown for brown roofs, ground slate and whiting are ground to a stiff paste in heavy boiled linseed oil, the paste placed in a power mixer and enough rosin oil to make a smooth paste is added. To give it proper binding properties add finely chopped cow's hair or other fibrous matter.

"A few experiments on a small scale will be sufficient to prove whether the user is on the right track or not. The manufacture of roof cements should be conducted pretty much on the same plan as that of glazier's putty. The stiff paste is best made in a putty chaser and then permitted to rest for several days before the cement is reduced to proper consistency with rosin oil, whose function is to keep the cement from cracking."

## Architecture in India.

In a paper read a short time ago by Sir W. Lee Warner before the Indian Section of the Society of Arts reference was made to some of the architectural features of Bombay, the author intimating that in many respects the city was full of interest to the architect and builder.

The ruins of the Adil Shahi dynasty at Bijapur crowd into a single century from 1557 onward a marvelous wealth of architectural power. The Titanic size and beautiful proportions of its domes and arches, tombs and palaces are as striking as the exquisite ornament and rich tracery of their windows and other details. Veritable chips from the workshop of the gods lie all over the sparsely inhabited city of to-day, surrounded by inhospitable plains, which once numbered its inhabitants by hundreds of thousands, and they tell to ears that can hear the tale of departed glory and wasted opportunity. More eloquent are the Indo-Saracenic mosques, tombs and wells of Ahmedabad, which combine the finish of Chalukian artists with the largeness and unity of conception of the Mohammedans. The window on the walls of the Bhudder, with its arrangement of three trees and four palms, is a gem of art in its design and tracery. But the point on which I wish to insist is the tale which the builders of these relics tell of a Mohammedan rule raised upon Hindoo foundations and of conquerors forced by the strong influence of the place and its inhabitants to alter their rigid rules and become partners with the conquered, even in the solemn duty of expressing in stone their laments for the dead or their devotion to God. Cambay, Dholka and other places in Gujerat contribute worthy memorials of the past, while in Sind the colored tiles, with the beauty of the patterns and the harmony of their tints, still remind the people of Tatta of their Persian connection. In short, the stones of the Presidency tell their story of conquerors following conquerors, and leaving behind them confusion and variety.

## Zinc Roofing.

Although roofs of zinc have been used in Europe for nearly a century and have given good satisfaction there, it being the common practice to guarantee this kind of roofing for 40 years, comparatively few roofs of this character have been used in this country. The Lanyon Zinc Company, Iola, Kan., however, has made a study of the subject, and recently emphasized its desire to bring the zinc roof into more prominence by presenting to the Young Men's Christian Association of Iola the material to roof its new building with zinc. The advantages claimed for zinc roofing are durability, lightness and economy, as described in the following notes received from the company:

When exposed a thin coating of oxide is formed on sheet zinc, which is insoluble in water and becomes a permanent protection, preventing further corrosion and doing away with the need of painting. Zinc roofs have practically an unlimited life and should, in the opinion of the company, be preferred to methods of roofing that require periodic repairs and painting.

A square (100 superficial feet) of plain tiling weighs 15 hundredweight, a square of slate weighs 7½ to 9 hundredweight, a square of lead weighs 7 hundredweight and a square of 18-ounce zinc weighs 1¼ hundredweight.

A minimum quantity of timber or iron is necessary for the frame work of a roof of sheet zinc because of its lightness. A zinc roof requires a very slight incline, and so the principals, purlins, &c., are relatively short, thus saving in frame work, timber and iron. Old zinc when stripped off a roof is, according to the company, worth about one-half of its original value.

The advantages inherent in the metal are its tenacity, which compared to lead is 10.8 to 2.77; its density, which is 7.19, compared to that of lead, which is 11.35; so a given substance of zinc is one and one-half times lighter and four times stronger than the same substance of lead.

Zinc is, of course, not inflammable. It is therefore a safe covering for any building, including the private residence. There is a current belief among architects that zinc is inflammable. It is true that a very high temperature sufficient to make iron red hot and cause it to buckle or sufficient to crack slate would cause zinc to vaporize and appear as though burning by giving off a bright green flame, but no ordinary temperature would do this.

The expansion and contraction of zinc are greater than of any other metal. Care should therefore be taken in laying zinc roofs that plenty of play be allowed. Zinc sheets used for roofing are usually 6 x 3 feet, 7 x 3 feet and 8 x 3 feet. The usual thickness for zinc roofs varies from 0.029 to 0.053 inch, and in weight from 1 pound to 1 pound 14 ounces per square foot.

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THE new Colored Orphan Asylum Home which is to be erected at Riverdale, in the Borough of the Bronx, New York, is estimated to involve an outlay of $400,000. The plans have been drawn by Robertson & Potter and the general contract has been awarded to Isaac A. Hopper & Son, both of the Borough of Manhattan.

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THE result of the architectural competition in the matter of the 20-story skyscraper which the Union National Bank is to erect at the corner of Fourth avenue and Wood street, Pittsburgh, Pa., has been to award the prize to architects MacClure & Spahr of that city. The new building will have a frontage of 84 feet in Fourth avenue and 86 feet in Wood street, and will cost in the neighborhood of $1,000,000. The area covered will be larger than that occupied by the Arrott or People's Bank buildings, which are on the opposite corners and reference to which has been made in these columns.

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A FORM of building slab which is meeting with more or less favor in England and has long been known in Continental centers is constructed from a specially prepared gypsum having embedded in it strong hollow reeds of the nature of bamboo. In general effect it is very much on the principle of reinforced concrete, except that the materials differ and the bamboo runs in lines parallel to the length of the slab. The reeds form air tight chambers and with the plaster are said to make a high class, light, nonconducting material of great strength. The air cells formed by the reeds break up the vibrations of sound and prevent it from passing through partitions and walls. The construction is also a nonconductor of heat and cold and at the same time serves as an excellent fire retardent. This form of construction is known as the Mack system and is being introduced to the attention of English architects and builders by J. S. King & Co., 171 Queen Victoria street, E. C., London.

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CONTENTS.

—THOSE GIRLS.—Patience: "Peggy had twenty-two candles in her birthday cake."

Patrice: "What was the matter? Wasn't the cake large enough to get any more in?"—*Yonkers Statesman.*

# NOVELTIES.

### The Cannon Ventilating Window Lock.

The Cannon Mfg. Company, 388 La Salle avenue, Chicago, Ill., is offering a ventilating window lock which is made of malleable iron and has a swinging leaf to allow the sashes to pass each other when the lock is not in use. The lock is secured in its open or closed position by a safety catch. It is screwed on to the right hand side of the upper sash about 5 or 6 inches from the bottom of the sash, as shown in Fig. 1, thus per-

*Novelties.—Fig. 1.—The Cannon Ventilating Window Lock.*

mitting ventilation by having either the bottom or the top sash open, or both. The dotted lines in the illustration indicate the position of the swinging leaf when the sashes are to pass so that the window will be wide open. In places where articles in the room can be reached from the outside through the lower window another lock may be placed on the casing or molding just over the top of the lower sash, thus permitting the locking of the lower sash independently of the upper one.

### Protection Brand Asphalt Ready Roofing.

The Asphalt Ready Roofing Company, 136 Water street, New York, is now manufacturing Protection brand asphalt ready roofing, Fig. 2, which can be laid so that no nails are exposed. This roofing comes in rolls already surfaced with gravel or sand, and has a 6-inch lap edge which should be nailed to the roof boards. The next sheet overlaps and is cemented to the lap edge of the preceding sheet so that no nails need to be driven through from the weather surface. This avoids the danger of leaks caused by nails rusting or being drawn out, leaving a hole for the water to pass through. Equal advantage is claimed for this product on roofs subjected to gases arising from boilers, locomotives, coke ovens, chemicals, &c., since it is stated that the nails need not be exposed to the gases, either from underneath or outside. It is further claimed that while any handy man should be able to lay this roofing, the work consisting only of nailing and cementing the joints, it is similar in effect to a built up gravel roof, the joints being so tight and strong as to amount to one continuous sheet. A descriptive booklet with samples will be mailed by the company on application.

*Fig. 2.—Protection Brand Asphalt Ready Roofing.*

### Metal Ceilings and Side Wall Decorations.

A handsome catalogue of 176 pages, each measuring 10 inches in hight by 13½ inches in length, has just been issued from the press by the New York Iron Roofing & Corrugating Company, First and Washington streets, Jersey City, N. J. The concern is the manufacturer under Sagendorph's patents of metal sectional ceilings and side wall decorations suitable for churches, amusement halls, hospitals, asylums, school buildings, theaters, stores and dwellings of all classes. The designs vary from the plainest to the most elaborate, and in the opening pages directions are given for putting up the work, together with directions for decorating in order to give the most satisfactory effects. A trifle more than one-half of the catalogue is devoted to designs of sheet metal work of various kinds, in many instances the cuts being of a size to occupy an entire page. Some of the plates shown are in *bas relief* and are striking in the extreme. More than 50 pages are given up to elaborate half tone engravings of interiors, showing the appearance of ceilings and siding as executed in sheet metal of rich and effective designs in leading styles of architecture. An interesting feature of the closing pages are illustrations suggestive of sheet metal treatment for church interiors, dwellings, &c.

### Colored Ruberoid Roofing.

Some new styles of fire resisting Ruberoid roofing, the composition and methods of production being the same as its standard ruberoid roofing except as to color, have just been put on the market by the Standard Paint Company, 100 William street, New York. The roofing can now be supplied in either red or brown, and later can be had in green, yellow, &c. It is described by the company as a permanent roofing with a permanent color which requires neither painting nor coating. The color is deeply impregnated in the elastic coating of the material during the process of manufacture, and it is said the color will develop more fully with exposure to the weather, the red roofing assuming a deep terra-cotta or brick red, which will last indefinitely. This style of roofing is designed for roofs of residences and similar structures for decorative and ornamental purposes, and where the black Ruberoid roofings, long on the market, are not so pleasing to the eye. The new style of roofing is supplied in rolls 36 inches wide, containing 216 square feet, which are sold for 200 square feet, the extra 16 feet being allowed for 2-inch laps. It is sold ready for application, is a little thicker than 1-16 inch, and in each roll are included adequate fixtures, comprising 5 pounds of broad headed nails and ¼ gallon of Ruberine cement of the proper color, for the laps. The company also makes black Ruberoid roofing in three thicknesses, sheathing thin enough to be used under tiling and weather boarding, and other articles of kindred character for building purposes.

### Aluminum Plasterers' Hocks.

Herbert Story, 23 Duane street, New York City, handling complete lines of masons', plasterers', sidewalk and plumbers' tools, is manufacturing an aluminum plasterer's hock with both adjustable and rigid handles, the former of which is shown in Figs. 3 and 4 of the engravings. The principal

*Aluminum Plasterers' Hock with Adjustable Handle.—Fig. 3.—General View.*

advantage of this construction is the absolutely even top surface and light weight, weighing complete but 27 ounces. The mortar carrying surface is 13 inches square and is made of 5-64-inch aluminum sheet, having a white wood or birch handle 1¾ x 5 inches. The adjustable handle hock, which is a great convenience when stowing in tool kit to carry, is reinforced on under side of aluminum plate with iron 1 inch square by ¼ inch thick and held securely by means of three brass rivets. Through the handle passes a 3-16-inch threaded rod which screws into the iron plate, there being an iron pin on the inner end of handle which keeps handle from turning when in use. Between handle and aluminum plate is a circular rubber hand protector 4 x ¼ inch. The rigid handle hock is made on much the same principle, except

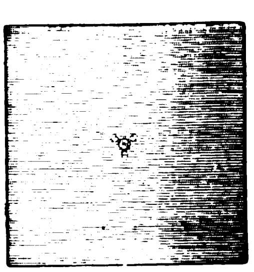


*Fig. 4.—Flush Top Surface.*

that the handle is held in place by an iron rod riveted at end of handle over a stout iron washer.

### Catalogue of Brick Mantels.

Under the title "Sketch Book," the Philadelphia & Boston Face Brick Company, 165 Milk street, Boston, Mass., issue a collection of most interesting designs of fire place mantels, indicating by means of half tone engravings the effects produced by the use of ornamental unglazed brick. In the preface to the eighteenth edition of the work in question the statement is made that the bricks used in the company's mantels are patterned after the most artistic Greek and

Renaissance designs and the appearance of them when set in mantels is that of carved work. The joints betwen the courses of brick serve to break up any tendency to a heavy or monumental effect, so that the general appearance of the mantels is soft, rich and harmonious. The designs which are presented in the "Sketch Book" under review were prepared by a well known Boston architect whose extended European travel renders him peculiarly fitted for the work, and the designs embody many ideas of the best brick work of England and the Continent. The brick is made in six colors, thus giving the customer a choice which will harmonize with or contrast properly with any scheme of surrounding decoration. The mantels shown are suitable for any kind of a room, the selection depending upon the size, the color, the amount of ornamentation, &c. In connection with the engravings are to be found brief descriptive particulars together with dimensions and prices, as well as a drawing of each ornamental brick used in the design. The entire make-up is exceedingly attractive, and the "Sketch Book" will be found a desirable addition to the architect's and builder's library of trade literature.

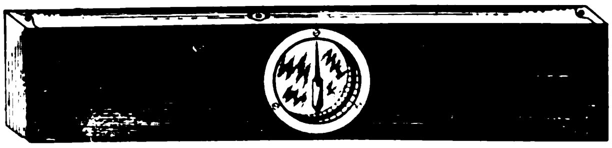
*Novelties.—Fig. 5.—American Door Catch No. 1.*

### American Door Catch No. 1.

The American Hardware Mfg. Company, Ottawa, Ill., manufacturer of the American door catch for screen doors, has added to its line the catch shown in Fig. 5 of the cuts, which is a larger size and slightly different in construction, for use on storm and panel doors, gates, sheds and light barn doors. The staple on the door enters the slot in the disk, and is fastened as shown, holding the door firmly against the jamb. The keeping of the door tight against the jamb is referred to as quite a feature in storm doors, preventing cold air entering and warm air getting out, also preventing the door being blown open by drafts. The point is made that no lock, knob or latch is necessary when the catch is used, and that a slight pull or gentle shove causes the catch to work automatically, whether operated from the inside or outside of the door. It is stated that the catch will work on any door on hinges, right or left hand, up or down, in or out, flush or lapping, and that it will do the work in an effective and noiseless manner. The catch is furnished complete with staples, screws and templet, all packed in a strong envelope.

### The Bradford Combined Level, Plumb and Inclinometer.

In the accompanying illustration we show an instrument offered by the Bradford Union Mfg. Company, Bradford, Pa., which was organized to put it on the market. It is made of aluminum, iron with nickel trim. or mahogany, cherry or white pine. Instead of the larger bulb common to other levels this instrument has a needle point indicator which registers on a graduated band of 360 degrees, and will give any degree or angle with absolute accuracy. The plumb bob works in bevel shaped polished glass bearings. It is adjusted and reversible, and readable either from top or bottom. Being operated directly from the center of bearing it is free from expansion or contraction and can be used either as level, plumb or inclinometer without any adjustment whatever. Fig. 6 shows the wooden construction.



*The Bradford Combined Level, Plumb and Inclinometer.—Fig. 6.—The Wooden Instrument.*

### The Roberts Combination Saw Jointer, Filing Guide and Clamp.

The filer of the device shown in Fig. 7 is made of nickel plated malleable iron, the carrier of gun metaled steel and the clamp of seasoned ash. The tool can be set in a moment to file any angle up or down, right or left. It is so graduated that the operator cannot fail to file the teeth any desired hook or bevel, thus making every tooth alike. By taking out the guide rod and reversing the guide bar it enables a left handed man to file as well as a right handed one. To joint a saw a file or a piece of one is inserted in the lugs prepared for this purpose and slid from end to end. Among other points of excellence the following are mentioned: The tool can be fastened to any bench or piece of timber in a moment without the use of screws or nails; the whole length of a cross cut or rip saw can be filed without changing or altering the adjustment of the tool, as the vise is long enough to take in the entire length, and the tool closes up, occupying little space. The weight complete is 3¼ pounds. The device is offered by the Roberts Company, 3935 Lancaster avenue, Philadelphia, Pa.

*Fig. 7.—The Roberts Combination Saw Jointer, Filing Guide and Clamp.*

### Modern Glue Room Appliances.

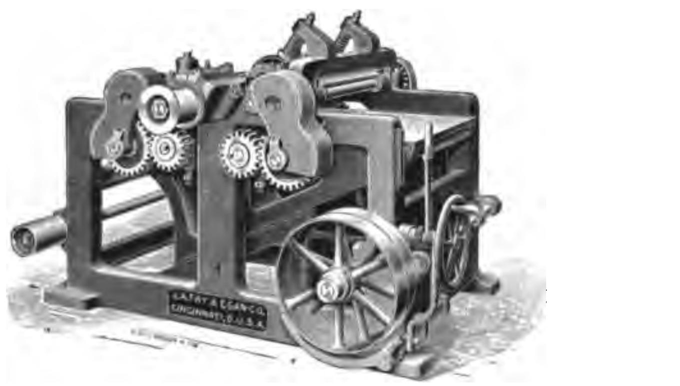
A little work which will be welcomed by every manufacturer, cabinet maker, carpenter or builder using glue in any quantity is the catalogue known as No. 160, issued under the above title, bound in stiff red covers by Hammacher, Schlemmer & Co., Fourth avenue and Thirteenth street, New York City. It consists of 163 pages of letter press illustrating the latest improved appliances for the proper and rapid handling of glued-up stock. The catalogue is unique in that it shows goods from the 1-pint glue pot to the 85-gallon steam glue boiler; from the simple hand glue spreading machine to the 60-inch combination single and double machine, and from the common iron clamp to the 6000-pound veneer press with 8 foot 6 inch base. In the endeavor to make the catalogue comprehensive there is to be found detailed information in the way of descriptions, sizes and experiences, all of which cannot fail to be appreciated by those who would profit by the experience of others. The company states that for the last fifteen years it has been making glueroom appliances a specialty and that there is carried in stock the leading sizes of the regular goods, so that the establishment is particularly well equipped to handle large orders in the best possible manner. Among the early pages is a table of contents, some important information relative to the ordering and delivery of goods, terms, claims, &c., an extended telegraphic code with directions for using, together with suggestions of interest and value in this connection. In Section I of the catalogue are considered glue pots, heaters, boilers or cookers; in Section II. attention is given to hand feed gluing machines and power feed glue spreading machines, while Section III gives an interesting account of the progress in clamping stock with tools and appliances therefor, the last section being devoted to trucks, truck irons, wood work, &c. A number of pages at the close of the catalogue are ruled so as to serve for purposes of memoranda. The matter has been prepared and arranged with a great deal of care, and those having any amount of glue work to do will be surprised to learn that for almost any emergency in the glue-room there is a special device which will "reduce old time obstacles to simple operations."

### School House Heating and Ventilation.

A new publication devoted to school house heating, ventilation and sanitation has been received from the Fuller & Warren Company, Troy, N. Y., through Wm. W. Underhill, manager of the company's warming and ventilating department at Boston, Mass. It may not be generally known that the Fuller & Warren Company, which was established in 1831, was among the first in the field as a heating and ventilating engineer and contractor, and it is natural to expect that what it has to say in any catalogue of the title of the present one is likely to contain much of direct value. Besides a reprint of the regulations of the inspection department of the Massachusetts Police Department affecting ventilation in school buildings the book discusses the subject of air supply with respect to its distribution and circulation, including methods of indirect heating, and gives opinions concerning mixing valves, air rotation, auxiliary heating and fan furnace heating. The catalogue is one of large size pages, 48 in number, and is profusely illustrated, mostly with half-tone engravings of schools and public buildings which the company has heated. These views include some instructive interiors which indicate the measures taken to secure satisfactory circulation. The description of a gravity system in a public school at Lexington, Mass., where there is a combination of furnace and steam heating, is given at length, with plans and some cross section details.

**New Cabinet Smoothing Planer.**

A machine which is designed more especially for use in cabinet, furniture and piano factories or wherever a fine, smooth surface is required is illustrated herewith. The heavy table provided is supported by two long inclines extending almost the entire length of the frame. The table has vertical adjustment, which is accomplished by two parallel screws mounted on ball bearings and operated at the feeding-in end of the machine by hand wheel and bevel gears. The claim is made that by this arrangement of the table the result is a firm, rigid support for the stock without any yielding or trembling under the pressure of the upper feed rolls. The feed mechanism consists of four rolls 5 inches in diameter, powerfully driven by a system of gearing. A valuable addition to the strength of the feed in this planer is found in the fact that all gears are keyed to shafts which run in babbitted bearings, thus entirely avoiding the use of studs with their consequent evils. The infeeding roll is controlled by spring pressure, but when desired the machine is furnished with the makers' new patent sectional feed roll, a feature which will be found very valuable when it is desired to plane at the same time a number of narrow strips of varying thicknesses. The cylinder is made from tool steel, from which a head of smaller cross section may be used without danger of springing out of true. This gives the advantage of a small cutting circle, which is essential to fine planing. Another feature to which attention is invited is the new patent sectional clamp bearings for the cylinder journals. The pressure bars set close to the cylinder on either side and the general arrangement of parts is such that pieces less than 3 inches long can be planed without clipping the ends. In Fig. 8 of the illustrations is a general view of the cabinet smoothing planer showing the operator's side. It is made by the J. A. Fay & Egan Company, 221 to 241 West Front street, Cincinnati, Ohio, who state that the weight of the 30-inch machine is 5600 pounds and that all sizes dress from 1/8 to 7 inches thick.



*Novelties.—Fig. 8.—General View of the Cabinet Smoothing Planer.*

**Atkins Perfect Saw Set and Vise.**

E. C. Atkins & Co., Incorporated, Indianapolis, Ind., are offering a new saw set for hand saws, as shown herewith. The device is so constructed that a uniform blow can be given to each tooth, thus insuring a perfectly even set throughout the blade. It is explained that there is no danger of breaking the points of the most highly tempered saw even when operated by a novice. It is adjustable to any amount of set desired and will, it is claimed, set the finest as well as the coarsest tooth perfectly. In Fig. 9 is illustrated the combined perfect saw set and vise. This is a combination which can be instantly adjusted to the different operations. The filing clamp ready for use is shown in the engraving. The jaws are rubber cushioned and practically noiseless. The clamp can be tilted to any desired angle and works on the lock lever principle. It can be fastened to a bench with a malleable iron screw clamp. The same tool can also be adjusted for use as a saw set.


*Fig. 9.—Atkins Combined Saw Set and Vise.*

**Improved Shingling Gauge.**

James Dinwiddie, Fayetteville, Ark., is bringing to the attention of carpenters and builders an improved shingling gauge, by means of which it is claimed shingling may be done much faster and more accurately than by the methods as commonly employed. The main labor saving feature of the device is the elimination of chalk lines, which in a long stretch of roof, where one man has to carry the line or chalk from end to end of the roof during which the men in the middle are idle, consumes, it is estimated, from one-quarter to one-fifth of the total time in roofing with shingles. Another advantage claimed for the gauge is the perfect uniformity of the various courses, the butts of the shingles being straight and parallel throughout the entire roof and at the same time finishing off parallel with the ridge. If the course at the eaves is straight every other course, it is pointed out, must be exactly the same. When one course is completed all that is necessary is to push the bar or gauge up one notch, which is done in a few seconds, and the workman is ready for the next course. The vertical bars or arms are of such a length that 10 or 12 courses of shingles may be laid without moving the device except to push the bars upward. An illustrated circular sent out by the maker of the gauge gives a detailed description of its merits.

**Erie King Barn Door Hanger and Track.**

A barn door hanger and track which has been recently brought out by the Griffin Mfg. Company, Erie, Pa., is shown in Figs. 10 and 11 of the cuts. In designing the hanger special care has been taken to make all the parts very heavy and to distribute the metal where most needed. The wheels have an improved form of groove, are carefully bored and are full roller bearing to make them anti-friction on any length of track. The frame or wheel case is made of heavy flange steel, of such shape as to protect the wheel from ice and snow and to form a very rigid support for the door. All parts except the wheel are made of

*Novelties.—Erie King Barn Door Hanger. Fig. 10.—Side View of Hanger.*

wrought metal. The hangers are packed one pair in a wooden box, complete with bolts for putting them on the door. The track is provided with heavy double braced brackets which have a broad bearing on the building to prevent sagging and getting out of line.

**Combination Oil Stone Boxes.**

The Pike Mfg. Company, Pike, N. H., is at present offering to the trade combination oil stone boxes which are likely to interest our readers. Skilled workmen agree that at least two oil stones of different grits are a necessity, and it is likewise recognized that the efficiency of a stone is greatly increased if it is kept clean and moistened with oil. In these boxes the stones rest on felt strips forming an oil reservoir in the bottom of each box, while the covers are lined with felt to absorb any surplus oil and keep the stone surfaces fresh and clean. The boxes are constructed of full weight prime tin plate, enameled. and fitted with brass springs to hold the oil stones firmly in place when the boxes are closed and carried about in a tool chest. The Mechanics' Delight box is 13 inches long by 2½ inches wide, having room for one 7-inch and one 5-inch stone, set end to end. The Pride o' the Shop is 8¾ inches by 4½ inches, having room for two 7-inch stones side by side, with a compartment at one end for a pocket oiler filled with Pike's Stonoil, which is referred to as a very efficient oil for oil stones, razor hones, and all kinds of tools, &c. Boxes may be ordered with any combination of bench stones desired.

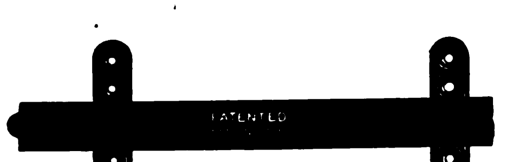



*Fig. 11.—Erie King Hanger Track.*

**Challenge Internal Gear Wind Mill.**

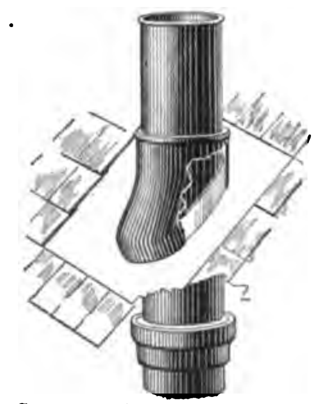
The Challenge Company, successors to Challenge Wind Mill & Feed Mill Company, Batavia, Ill., is offering a wind mill embodying new points of construction. An especial feature is the combination of working parts which compose the internal gear, rocking arms and split boxes. The internal gear has two cogs in mesh as against one of the externals. The rocking arm is referred to as the best means of guiding the piston, there being no slides to create friction or to require oiling. A one piece solid steel crank, which is driven without a key by the gear itself, is referred to as overcoming all possibility of gears and shafts working loose. The crank has a substantial bearing at each side and the load of the pump comes between to prevent all overhanging with its consequent torsion and wear. The boxes are easily replaced, of interchangeable babbitt with graphite and are of the highest grade. The shafts lie parallel, this arrangement being adopted to distribute the wear and strain uniformly from wheel to pump, so that the load and wear throughout may be perfectly equalized. Three lengths of stroke are arranged in each size of mill, and the changes can be easily made. The manufacturer states that only the best material is used for all parts, and that they are put together to produce a strong and simple mill.

**Orient Steel Radiator Company.**

The Orient Steel Radiator Company, capitalized at $2,000,000, has been incorporated to erect a plant in the Pittsburgh district for the manufacture of a new design of sheet steel radiator. The company controls patents issued to Clarence E. Safford on a sheet steel radiator which is made entirely of sheet steel stampings, though the radiators can, it is stated, be constructed of brass or copper. One of its features is that no solder is needed in its manufacture. To join the halves of each section a process known as freezing is employed. When the two halves meet each has a sheet steel flange. These flanges are turned under and coiled up together in five plys and stamped together under pressure of 2000 pounds to the square inch. To secure this joint it was necessary to devise special dies and special machinery, and these also have been patented. It is claimed for the sheet steel radiator that it can be heated instantly owing to the small amount of the metal, that great tonnage will be saved in shipping and in handling, that the expense of molding every section of every radiator will be saved and that the cost of production will be minimized as well as the selling price. The radiators will be made to hang upon the walls as well as stand upon floors and will be removable when not needed. The incorporators of the company are Julian Kennedy, C. E. Safford, Reid Kennedy, J. W. Lee and Eugene Mackey. Julian Kennedy, who holds the bulk of the $1,000,000 preferred stock, will be president of the company. Among those associated with Mr. Kennedy is E. C. Converse.

**The Granton Adjustable Roof Flange.**

The Granton adjustable roof flange, shown in Fig. 12, and patented and manufactured by C. A. Granton, Haverhill, Mass., is so constructed that one flange can be made to fit roofs pitching from 6 to 12 inches to the foot.



*The Granton Adjustable Roof Flange.—Fig. 12.—Method of Chipping Off for Adjustment.*

The upwardly extending sleeve is of cast iron, and inside of the sleeve are two deep grooves. The flange is made to fit roofs with a pitch of 45 degrees, but by clipping off to the first groove, as shown in Fig. 12, it can be made to fit roofs with a pitch of 37½ degrees, while by clipping off to the second groove it will fit a 30-degree pitched roof. The bulging portion looks neat

*Fig. 13.—Flange in Position on Roof.*

on the roof, as seen in Fig. 13, and allows the sleeve to slip the copper rain guard after clipping for adjustment. The sleeve is also made large enough to slip the bead end of the soil pipe. The method of connecting the soil pipe with the sleeve is by a molten lead joint. It is made with copper flashing, and the cast iron sleeve is not fastened to the copper flange, thus allowing for expansion and contraction. The flange is made in 2, 3, 4 and 5 inch sizes, with light and extra heavy copper flashings. An advantage in using this device, the maker points out, is that the roofer will always have the right angle in stock ready for use on any job.

## TRADE NOTES.

WE HAVE RECEIVED from A. W. Woods, architect, Lincoln, Neb., a sample of the "Key to the Steel Square," which he has brought out as something new in the way of a framing device and which is meeting with popular favor among carpenters and builders where introduced. It consists of a piece of celluloid, on either side of which is a pivoted disk, one giving the lengths and cuts for common rafters having a rise of from 1 to 24 inches to the foot, also the corresponding lengths, cuts and bevels for the octagon hip or valley and for the common hip or valley for roofs of equal pitch while on the other side is given all the cuts for rafters and braces having a rise of from 1 degree to

90 degrees. Accompanying the "Key" is a little book of 40 pages fully illustrating its use, together with other valuable information in this general connection. The "Key" and the book of explanation are contained in a neat morocco case suitable for carrying in the pocket. The price is $1.50, postpaid.

F. D. Kees, Beatrice, Neb., is directing the attention of the trade to Gossett's detachable suspension hinges, which are intended more particularly for window screens and are of a nature to be easily put up or removed. Full length window screens keep out all the flies and protect the windows, and when hinges of the kind mentioned are used there is no trouble in connection with the work, as no tools or ladder are necessary. The manufacturer suggests to those who are interested that they write for a free sample pair.

"The Advantage of Fall Painting" is the title of a dainty little folder sent out by the Joseph Dixon Crucible Company, Jersey City, N. J., and which calls attention to the merits of Dixon's silica-graphite paint for protecting steel work and metal surfaces from corrosion. The company states that to all interested in good paint and good painting it will send free upon application a copy of "Colors and Specifications," showing the four Dixon standard colors, with practical specifications for construction and maintenance painting.

Believing it to be for the best interests of its patrons as well as for the management of its business, the Mount Union Silica Brick Company has just transferred its main offices from Johnstown to Mount Union, Huntingdon County, Pa., where the works are located.

The two most important buildings being erected in the retail districts of New York and Chicago are to be ventilated throughout by American Blower Company apparatus. Eighteen large fans and heaters and tempering coils, containing an aggregate of about 60,000 feet of 1-inch pipe, will be used in equipping the Altman Building in New York and the Marshall Field Building in Chicago.

The merits of the "Kno-Burn" steel lath are set forth in a daintily printed pamphlet which reaches us from the Northwestern Expanded Metal Company, 790 Old Colony Building, Chicago, Ill. The claim is made that the use of this form of lath prevents cracking and falling of plastered walls and ceilings and that when embedded in a good coat of mortar it provides a good form of fire retardent. Directions for applying the lath are given, also for its use in connection with cement exteriors of dwellings. It is made in two styles, one called the Standard Mesh and the other the Diamond Mesh.

The Memphis Fibre Plaster Company, Memphis, Tenn., has been organized with a capital of $30,000. The following are the officers and directors: D. S. Weaver, president; W. R. Johnson, vice-president; C. W. Stover, treasurer, and F. D. Graham, secretary and general manager. The directors are C. W. Stover, H. C. Partee, C. D. Coddington, W. R. Johnson, E. M. Forbes, W. P. Biggs, D. S. Weaver, J. W. Howard and R. C. Galley. A site has been selected on the Belt Line, near Cooper and Central avenues, and the building will be erected at once. The plant, it is expected, will be in operation by January.

R. E. Kidder, 17 Hermon street, Worcester, Mass., calls attention in another part of this issue to an all iron saw bench with countershaft complete at a figure which cannot fail to strongly appeal to any wood worker desiring such an addition to his equipment. Circulars giving full particulars will be sent to any one who desires to investigate the matter further. Mr. Kidder also states in his advertisement that he makes a drawing table which will be found among the best on the market.

"The Champion Lock Joint Metal Shingle" is the subject of an illustrated folder which has just been issued by J. H. Eller & Co., Canton, Ohio. This shingle is made of galvanized steel and tin and is offered in two sizes—5½ x 8¾ inches and 8½ x 12 inches. It is referred to as ornamental and durable, simple in construction, easily applied and absolutely water tight. The shingle is of a character to render it suitable for all styles of roofs, gables and dormers. In connection with Champion shingles the company recommends that its special ridge and hip roll and capping, as well as its special valley, be used. Illustrations are presented showing the appearance of this form of construction.

The G. Drouvé Company, Bridgeport, Conn., has booked a number of contracts for the Anti-Pluvius skylight, including about 15,000 square feet for the new public library building on Forty-second street, New York; 30,000 square feet for the Edison power house, New York, and 3000 square feet for the West Virginia Pulp & Paper Company, Mechanicsville, N. Y. Orders for the Lovell sash operating device have been received for the equipment of the mill of J. L. Stifel & Sons, Wheeling, W. Va.; erecting shops of the Pennsylvania Railroad, Altoona, Pa.; new building for the Alden-Sampson Mfg. Company, Pittsfield, Mass.; shops of the Southern Pacific Railroad, Ogden, Utah, and the Dupont Powder Company's works, Wilmington, Del.

Sheet metal furniture will be used almost exclusively in the new Hall of Records, New York City. The first shipment of this furniture, which was manufactured by the Berger Mfg. Company, Canton, Ohio, was recently made to J. R. Sheehan & Co., general contractors of the building. A distinctive feature of this furniture is that the finish will be white so as to harmonize with the interior decorations of the building. While many special forms have been made particularly for this work a large number of standard designs are used.

A hasp and hook made in one piece is the "Simplex," which is being offered in 6 and 8 inch sizes by the Woodhouse Hardware Mfg. Company, St. Louis, Mo. The device is of a nature to interest many of our readers, and those who are desirous of securing a sample and prices can do so on application to the company.

An exceedingly neat and attractive pamphlet recently sent out by the Truss Metal Lath Company, Incorporated, 15 to 25 Whitehall street, New York City, and 1112 Frick Building, Pittsburgh, Pa., sets forth in convincing style the merits of truss metal lath as a reinforcement in connection with concrete construction. The lath is manufactured under the Kuhne patents in various gauges of soft steel and is referred to as admirably adapted for partitions and outside walls, for floors, roofs, tanks, segmental floor arches, &c. Among the illustrations is one showing a test structure of truss metal lath partition, the test being made at the Columbia University testing station on August 24, 1904. Other views show systems of floor construction, while among the text are specifications for the erection of solid plaster partitions reinforced with truss metal lath, &c. Not the least interesting feature of the pamphlet are numerous testimonials from some of those who have practically demonstrated the merits of the lath in question.

C. B. Tuttle, architect, contractor and builder, has opened an office at 1907 Buchanan street, Topeka, Kan., and is desirous of receiving catalogues and circulars of manufacturers of goods of interest to architects.

Some attractive illustrations of Berger's metal tiles, which are offered in a variety of styles, such as Spanish, African Horn, Pan-American and Twentieth Century, are contained in a pamphlet sent out by the Berger Mfg. Company, Canton, Ohio. The tiles are made of copper, zinc, galvanized steel and terne tin plates. The effects produced by the use of the tiles are shown by illustrations of several buildings which are roofed with them.

A package of leaflets and cards sent out by the Leavitt Machine Company, Orange, Mass., call attention to the Perfection barrel swing, an invention for swinging a barrel in a pantry or cupboard in the house or under the counter or broad shelf in a store, the arrangement being such as to save the annoyance of removing the molding board and other things from the shelf in order to reach the flour barrel. The claim is made that it will easily swing the largest barrel, containing 400 pounds; that it costs less to fit up the pantry with the Perfection barrel swing than in the old way; that the contents of the barrel are more accessible, and there is a saving of room. Barritt's improved roller gauge is one of the company's specialties and is of a nature to be quickly adjusted.

An exceedingly neat and attractive booklet of a size convenient to carry in the pocket and containing some interesting facts about blank estimating forms reaches us from the Gem Publishing Company, P. O. Box 14, Brooklyn, N. Y. The text consists of two articles by Arthur W. Massey, architect, one telling the builder why unsystematic estimating does not pay and the other why systematic estimating will pay. The subject is one which appeals so strongly to every practical carpenter, builder, mason, plumber and painter in the country that they cannot fail to be interested in what the author has to say.

The Columbia Mantel Company, Louisville, Ky., has filed articles of incorporation to manufacture wood mantels. The capital stock is placed at $25,000 and the incorporators are Chas. P. Brecher, president; G. Leonhardt and H. C. Kramer. The company has purchased a wood working plant, fully equipped.

"The Eleventh Arrow of Ye Third Quiver," as reads the inscription on the cover of the little pamphlet issued periodically by N. & G. Taylor Company, Philadelphia, Pa., contains the usual amount of interesting matter concerning the "Taylor Old-style" tin, and humorous comments by "Rufus the Roofer."

In another part of this issue B. C. Karol, 235 West Harrison street, Chicago, Ill., calls attention to the fact that he is offering plumbers' supplies at wholesale. He has issued an illustrated catalogue showing the various lines on which builders can effect an appreciable saving and he states that shipments can be promptly made "from a very complete stock of guaranteed goods." He also points out that small orders are handled with as much care as large ones.

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